WASTE MANAGEMENT
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March 24, 2017

Mr. David Denk
New York State Department of
Environmental Conservation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2915

Re: Air State Facility Permit Modification Application – RMU-2
Response to December 7, 2016 NYSDEC NOIA

Dear Mr. Denk:

On October 24, 2014, the New York State Department of Environmental Conservation (NYSDEC) issued an Air State Facility Permit (DEC ID 9-2934-00022/00233) for the CWM Chemical Services, LLC., Model City, New York Facility. Subsequently, an Air State Facility Permit Modification Application for the addition of Residuals Management Unit No. 2 (RMU-2), prepared by Conestoga-Rovers & Associates, Inc. (CRA, now known as GHD) was submitted to the NYSDEC on February 5, 2015.

By letter dated March 20, 2015, NYSDEC staff deemed the permit modification application complete and circulated, among other documents, a modified draft Air State Facility permit which incorporated conditions for the proposed RMU-2 landfill.

In a letter dated December 1, 2015 to Administrative Law Judge Honorable Daniel P. O'Connell, the NYSDEC indicated that based on the documents provided by petitioners in the RMU-2 proceedings following the issues conference, the NYSDEC reversed its decision on the completeness of CWM's permit modification application for the Air State Facility permit for RMU-2 proposal. The NYSDEC further indicated in the December 1, 2015 letter that a supplemental emissions inventory and clarification of certain calculations contained in the February 2015 permit modification application is required from CWM to render the modification application complete and for staff to determine if the draft Air State Facility permit for the proposed RMU-2 project needs to be modified.

On February 12, 2016, a letter and attachments was submitted by CWM providing CWM's response to the December 1, 2015 NYSDEC letter. Subsequent to the February 12, 2016 submittal, revisions and clarifications were found to be necessary and a revised application was submitted on March 21, 2016.

The NYSDEC issued a Notice of Complete Application and revised Draft Air State Facility Permit, dated July 7, 2016, and a public comment period through August 12, 2016. Subsequently, the NYSDEC issued a Notice of Incomplete Application (NOIA) on December 7, 2016. The NOIA letter indicated that the Application must be revised to include appropriate waste processing

quantities to calculate the potential emissions from the facility with adequate justification to support the emission calculations.

This letter and attachments contain an update to the March 21, 2016 submittal including the following:

- Revisions to the Current Operations Emissions Inventory (Enclosure No. 1); and
- Revisions to the Emissions Inventory for RMU-2 (Enclosure No. 2).

Enclosures 3, 4, and 5 of the March 21, 2016 applications have not been revised and include the following.

- Proposed revisions to CWM's Fugitive Dust Control Plan (Enclosure No. 3);
- Proposed revisions to CWM's Air & Meteorological Monitoring Plan (Enclosure No. 4); and
- Proposed Air Monitoring Program for the addition of RMU-2 (Enclosure No. 5).

Enclosures 3, 4, and 5 have been included in this revised application for completeness. This revised application replaces the March 21, 2016 submittal in its entirety. As indicated in Section 5.0 of Enclosure No. 2, an Air Quality Modeling Report will be prepared and will be provided under separate cover.

Please call Mr. Jonathan Rizzo at (716) 286-0354 or myself at (716) 286-0246 if you have any questions or comments.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Sincerely,
CWM CHEMICAL SERVICES, LLC

Jill A. Banaszak
Technical Manager
Model City Facility

JPR/JAB/jpr
Attachment

cc:

| | |
|---|---|
| T. Mucha | - NYSDEC/Region 9 (electronic copy) |
| M. Passuite | - NYSDEC/Region 9 (electronic copy) |
| P. Grasso | - NYSDEC/Region 9 (electronic copy) |
| B. Rostami | - NYSDEC/Region 9 (electronic copy) |
| A. Carlacci | - NYSDEC/Region 9 (electronic copy) |
| M. Cruden | - NYSDEC/Albany, NY (electronic copy) |
| M. Mortefolio | - NYSDEC/Albany, NY (electronic copy) |
| On-site Monitors | - NYSDEC/ Model City, NY (electronic copy) |
| A. Park | - USEPA/Region II (electronic copy) |
| N. Azzam | - USEPA/Region II (electronic copy) |
| P. Dicky | - NCHD/Lockport, NY (electronic copy) |
| M. Mahar | - CWM/Model City, NY (electronic copy) |
| J. Rizzo | - CWM/Model City, NY (electronic copy) |
| D. Darragh | - Cohen & Grigsby/Pittsburgh, PA (electronic copy) |
| EMD Subject File | |
| Q & A | |

**ENCLOSURE NO. 1**
**AIR STATE FACILITY PERMIT**

Revised Emissions Inventory – Current Site Conditions
Revised March 24, 2017

# Emissions Inventory - Existing Facility

## CWM Chemical Services Model City Site
## Model City, New York

CWM Chemical Services, LLC

1550 Balmer Road

Model City, NY 14107

2055 Niagara Falls Boulevard Niagara Falls New York 14304 USA

080335 | Report No 7 | Revised March 17, 2016 and March 24, 2017

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# 1. Introduction

GHD has been retained by CWM Chemical Services, LLC (CWM) to update the emissions inventory of their existing Model City Facility (Facility or Site).

The CWM facility is an existing commercial hazardous waste treatment, storage, and disposal facility (TSDF) in Model City, Niagara County, New York. This TSDF began operation in 1972 as ChemTrol Pollution Services, Inc. Due to corporate acquisitions and name changes, CWM, a subsidiary of Waste Management, Inc., is the present owner and operator of the facility.

Based on the previous quantification of air emissions from the facility, in accordance with the guidance and regulations presented in 6 NYCRR Part 201, of the New York Code of Rules and Regulations (NYCRR), the facility had not historically qualified as a potential Title V or Air State Facility source. Therefore, prior to 2013, emissions from sources not identified as Exempt or Trivial under 6 NYCRR Part 201-3, had been previously permitted with the New York State Department of Environmental Conservation (NYSDEC) Division of Air Resources in accordance with 6 NYCRR Part 201-4 (Minor Facility Registrations).

The recent promulgation of 6 NYCRR Part 201-9 presented the new 'Significant Mass Emission Rates for Persistent, Bioaccumulative and Toxic Compounds' that took effect on February 22, 2013. Any facility that has total emissions greater than the thresholds listed in the table for any compound must apply for an Air State Facility Permit or a Title V Permit within six months of receipt of the department's determination to submit a complete permit application. As a result, GHD representatives conducted a thorough review of CWM facility operations and existing permit documentation in order to ascertain the level of air permitting required for the CWM Facility going forward. Based on this review, GHD determined that an Air State Facility Permit Application was required for the Facility. The Air State Facility Permit Application for the existing facility was submitted to NYSDEC in January 2014. The Air State Facility Permit for the facility was issued on October 24, 2014.

Updates to the emissions inventory were submitted on February 12, 2016 and March 21, 2016 and included additional information requested in a December 1, 2015 letter from NYSDEC to the Honorable Daniel P. O'Connell regarding the proposed expansion at the CWM Facility. The NYSDEC issued a Notice of Complete Application and revised Draft Air State Facility Permit for RMU-2 for public comment on July 8, 2016. On December 7, 2016, the NYSDEC issued a letter to CWM indicating the application was incomplete and must be revised to include appropriate waste processing quantities to calculate the potential emissions from the facility with adequate justification to support the emissions calculations. This emissions inventory update includes additional information requested in the Notice of Incomplete Application from NYSDEC dated December 7, 2016.

# 2. Facility Description

The CWM Chemical Services, LLC (CWM), Model City Facility is located within the Erie-Niagara Region in the western section of New York State. The facility is situated on the boundary between the Towns of Lewiston and Porter in Niagara County. All hazardous waste management units are located within the Town of Porter. The facility's operations are authorized by a RCRA hazardous

waste permit issued by NYSDEC and a TSCA (PCB) Approval issued by USEPA. The facility uses a number of processes for the proper storage, treatment and disposal of a variety of liquid and solid organic and inorganic hazardous waste and industrial non-hazardous waste. Storage, treatment and disposal capabilities include an aqueous waste treatment system, which includes phase separation, oxidation/reduction, neutralization, solids precipitation and filtration, biological treatment and carbon filtration. The treated effluent is stored in a facultative (fac) pond, qualified and discharged pursuant to the facility's State Pollutant Discharge Elimination System (SPDES) Permit. Other operations include waste stabilization; secure landfilling of approved solid waste, including PCBs; solvent and fuel blending processes; RCRA and TSCA container storage and transfer; landfill leachate collection, storage and treatment. As a RCRA permitted TSDF, CWM is subject to the hazardous waste regulations in 6 NYCRR Parts 370-376. This includes several regulations focused on minimizing the release of hazardous waste contaminants to the air: 373-2.28, Air Emission Standards for Equipment Leaks, and 373-2.29, Air Emission Standards for Tanks, Containers and Surface Impoundments.

The Model City Facility began operations in 1971 as ChemTrol Pollution Services, Inc. Activities included fuels blending of waste oils, distillation of spent solvents, aqueous waste treatment, and land disposal. In 1973, the stock of ChemTrol was purchased by SCA Services, Inc. The ChemTrol name was retained until late 1978 at which time the corporate name changed to SCA Chemical Waste Services, Inc., and in 1981, was renamed SCA Chemical Services, Inc.

In October 1984, WM Acquiring Corp., owned jointly by Waste Management, Inc. (WMI), and Genstar, Inc., acquired SCA Services, Inc., of which SCA Chemical Services, Inc. was a subsidiary. Through a corporate reorganization in October 1986, SCA Chemical Services, Inc. became a wholly owned subsidiary of Chemical Waste Management, Inc. (CWM), itself majority-owned by Waste Management, Inc. In July 1988, the corporate name SCA Chemical Services, Inc. was changed to CWM Chemical Services, Inc. CWM Chemical Services, Inc., became a limited liability company in January 1998 and became CWM Chemical Services, LLC. CWM Chemical Services, LLC, is the owner and operator of the Model City Facility.

The fuels blending tanks and solvent distillation operation were eliminated in the 1980s. The Aqueous Treatment facility continues to operate. The following summarizes the closed and active landfill units at the Facility:

| Landfill Area | Status |
|---|---|
| SLF 1-6 | Closed |
| SLF 7 | Closed |
| SLF 10 | Closed |
| SLF 11 | Closed |
| SLF 12 | Closed |
| RMU-1 | Closed |

It should be noted that the Facility's most recent active landfill (RMU-1) reached its capacity and received its final volume of hazardous wastes on November 12, 2015. From 1997 through 2013, final cover was constructed over the remaining waste area of RMU-1 (approximately 31.8 acres) in accordance with the Part 373 Permit. A minimum of 12-inches of intermediate soil cover had been installed over the remaining active area (approximately 7.7 acres). In accordance with the Part 373 Permit, RMU-1 was completely closed by November 6, 2016 through the installation of final cover over the remaining 7.7 acres.

# 3. Facility Emission Unit Descriptions

The following sections present discussions of the emissions estimated for the sources identified at the Facility. Supporting calculations are provided as referenced.

## 3.1 Fugitive Dust Emissions

Off-road particulate matter (PM) emissions are primarily caused by the moving and handling of soil by heavy equipment such as loaders and bulldozers. The emissions were calculated based on the equipment and hours of operation for both operational and construction vehicles, and include such activities as soil handling and waste placement.

Operational vehicles and waste hauling vehicles also generate particulate emissions from traveling on both the paved and unpaved roads at the Facility. These emissions differ from those discussed above since they consider PM that is stirred up by vehicle tires on the road surface as opposed to the actual movement of soil. PM emissions to determine road dust were calculated based on information provided by the Facility, which include vehicle traffic, such as types of equipment and roads/paths traveled, as well as distances traveled and hours of operation. Figures 1 through 9 provide a description of the road segments and vehicle traffic routes for the different truck types that operate at the Facility.

GHD utilized a series of United States Environmental Protection Agency (USEPA) published emission factors and emission factor equations in the performance of this work. Baseline emissions for the existing facility were based on actual operations for the 24-month period of January 2011 through December 2012.[1] Attachment 1 presents the calculation of fugitive PM-10 dust baseline emissions for the Facility. Attachment 2 presents the calculation of fugitive PM-2.5 dust baseline emissions for the Facility. As indicated in Section 2.0, the RMU-1 Landfill has reached its capacity and received its final volume of hazardous wastes and was closed in 2016. The PM-10 and PM-2.5 calculations provided in Attachments 1 and 2 were prepared based on actual operating data (truck counts, waste totals, etc.) for the period of January 2011 through December 2012.

## 3.2 Landfill Emissions

This Section provides a summary of emissions from each of the landfill units, in addition to the emissions from the standpipes presented in section 3.3.1.

### 3.2.1 Cover Diffusion

Emissions from diffusion of pollutants through the cover of each closed and partially closed landfill unit were calculated using the methodology presented in Chapter 8.2 (Closed Landfills) of the USEPA document *Air Emissions Models for Waste and Wastewater*, dated November 1994. Aqueous pollutant concentrations of the leachate for each landfill area are described in Section 3.3.1. Diffusion coefficients for the cover system were referenced from the papers *Transport of Volatile Organic Compounds through PVC and LLDPE Geomembranes from Both Aqueous and Vapour Phases*, dated September 29, 2009 and *Migration of Dilute Aqueous Organic Pollutants*

[1] Baseline emissions for the existing facility (prior to RMU-2 Expansion) were estimated in order to obtain the Project Increase for the RMU-2 Expansion. The project increase is obtained by subtracting baseline emissions for the current facility from the Potential-to-Emit (PTE) for the facility with RMU-2 included.

*through HDPE Membranes*, dated May 10, 2001. The table below summarizes the calculation methodology for landfill cover diffusion for each area:

| Landfill | Synthetic Liner | Cover Description | See Table |
|---|---|---|---|
| SLF 1-6 | 20-mil PVC | 3-ft of clay below liner &<br>2-ft of clay & 0.5-ft of topsoil above liner | 21 |
| SLF-7 | 20-mil PVC | 3-ft of clay below liner &<br>min. 1.5-ft of uncompacted clay & 0.5-ft of topsoil above liner | 22 |
| SLF-10 | 20-mil PVC | 3-ft of clay below liner &<br>min. 1.5-ft of uncompacted clay & 0.5-ft of topsoil above liner | 23 |
| SLF-11 | 40-mil HDPE | 3-ft of clay below liner &<br>min. 1.5-ft of general fill & 0.5-ft of topsoil above liner | 24 |
| SLF-12 | 40-mil HDPE | 2-ft clay below liner &<br>2.5 ft general fill & 0.5 ft topsoil above liner | 25 |
| RMU-1 | 40-mil HDPE | 17.8 Acres: 2-ft clay below liner &<br>2.5 ft general fill & 0.5 ft topsoil above liner | 26 |
| RMU-1 | 40-mil HDPE | 21.7 acres: 0.5 ft general fill below liner<br>Geosynthetic Clay Liner (below liner)<br>1.5 ft general fill & 0.5 ft topsoil above liner | 26 |

Please note that diffusion coefficients were based on the geomembrane liner material only and did not take into account the clay cover or general fill soil cover above and below the liner material. Therefore, the effective diffusion coefficient is expected to be lower than what was presented in the calculations.

### 3.2.2 Barometric Pumping

According to RJ Pirkle, DE Wyatt, V Price, BB Looney (Barometric Pumping: The Connection Between the Vadose Zone and the Atmosphere, 1992) "the principal of barometric pumping is simple. During periods of falling barometric pressure, the pressure on the soil/atmosphere boundary is rapidly reduced. Soil gas from the sedimentary pore space flows vertically into the atmosphere in order to restore pressure equilibrium." This concept is well understood and documented in landfills with a vent system. This condition is common at municipal solid waste landfills (with gas collection or venting systems) and in some cases solid waste landfill personnel will increase the vacuum on a gas collection system during periods of a rapid barometric pressure loss.

One of the base assumptions in the EPA document entitled Air Emissions for Waste and Wastewater (EPA-453/R-94-080A, November 1994) is that "the landfill is assumed to be vented to the atmosphere. The volume of gas available for barometric pumping is assumed to consist of the total void volume of the waste bed." In a landfill with a vent system this makes complete sense. As barometric pressure drops, vapors would rise vertically through vents and/or a gas venting layer and be emitted. As pressure increases, the void spaces would be refilled with air from the atmosphere where it would mix with vapors from the waste – and then rise again to be vented when the barometric pressure drops (thus "barometric pumping").

However, the landfills at CWM have no venting system (refer to Attachment 16 for drawings). Therefore as barometric pressure drops, any vapors within the unsaturated zone of the landfill may rise, but they will be contained by the clay and synthetic cap (other than potentially by diffusion as

described in Section 3.2.1). They will not be emitted through a venting system, since one does not exist. Further, since the vapors will not be emitted, they will not be replenished during a high pressure event and the “barometric pumping” effect will not occur as described in the referenced document.

The only possible pathway for vapors to be emitted to the atmosphere from barometric pumping is through the standpipes. However, this is an incomplete pathway for the following reasons:

1. As described above, a reduction in barometric pressure will cause gases to rise vertically in an attempt to reach pressure equilibrium. The stand pipe risers are only perforated at the very bottom in order to allow leachate to flow from the landfill and into the bottom of the standpipes where it is then pumped from the landfill. During a reduction in barometric pressure gasses would be moving away from these perforations as they rise vertically.
2. The material at the bottom of the landfills is saturated with leachate, meaning that there is near zero pore space for gases to migrate through in the event that a preferential pressure gradient did exist.
3. The standpipes are covered, inhibiting gases present inside them from escaping.

The emissions inventory currently includes emissions from the leachate within the standpipes. This analysis is entirely consistent with NYSDEC’s September 12, 1990 letter to CWM allowing the removal/capping of gas vents from SLF-11. While we believe that the above information provides evidence that barometric pumping does not occur, or occurs only to a very limited extent. In an effort to be conservative, the many background documents that the above EPA study was based on relative to barometric pumping were reviewed. Again, all of these documents were associated with landfills with a vent system. No references to barometric pumping without a gas venting system were found. One reference (Evaluation and Selection of Models for Estimating Air Emissions from Hazardous Waste Treatment, Storage and Disposal Facilities, EPA-450/3-84-020, December 1984) states that "for a landfill handling strictly hazardous waste, with no expected internal gas generation…an increase of 10-15 percent to emission release could be expected." Therefore, in order to be conservative, 15 percent was added to the diffusion emission estimate to account for any limited effect barometric pumping may have.

### 3.2.3 Active Placement of Waste

The facility is no longer receiving waste at the RMU-1 Landfill and this area was closed on November 6, 2016. Therefore, there are currently no emissions from the active placement of waste.

## 3.3 Leachate Collection, Transfer and Storage

This Section provides a summary of emissions from the collection, transfer and storage of leachate at the Facility.

### 3.3.1 Standpipes and Sideslope Risers

Emissions occur within the landfill standpipes and sideslope risers due to the evaporation of leachate to the atmosphere. The calculation methodology for leachate emissions from the landfill standpipes and sideslope risers was taken from the USEPA paper, "*Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools under Simulated Indoor Environmental Conditions* (Guo, Z. and Roache, N.F., December 20, 2002)" [See Attachment 3 for paper]. The

exposed surface area for each landfill area was calculated by summing the individual standpipe areas using the diameters presented in Table 2.

Table 3 presents a summary of volatile organic compounds (VOCs) and hazardous air pollutant (HAPs) emissions from the SLF 1-6 standpipes. Individual VOC and HAP concentrations within the leachate are based on a sample taken from Tank 103 on March 21, 2013 (refer to Attachment 4 for laboratory analytical report). It should be noted that the emissions presented in Table 3 represent volatilization from the aqueous phase of leachate only.

The leachate collected from SLF 1-6 also contains non-aqueous phase liquids (NAPL). Attachment 5 presents a phase breakdown of leachate from SLF 1-6 based on a study conducted in 1994. This information was used to calculate emissions of light non-aqueous phase liquids (LNAPL) from SLF 1-6, presented in Table 4. Emissions were calculated based on the assumption that 2.5 percent of the total leachate collected from SLF 1-6 is LNAPL and approximately 1 percent of the LNAPL volatilizes from the leachate. The 1 percent volatilization rate was estimated based on site-specific testing that was conducted on the standpipes on August 23, 2013.

It is assumed that dense non-aqueous phase liquids (DNAPL) settle within the leachate and do not volatilize. DNAPL is ultimately removed from the standpipe and transferred to the oil/water separator (T-158) and sent off-site to a third party for incineration.

Table 5 presents a summary of VOC and HAP emissions from the SLF 7 standpipes. Individual VOC and HAP concentrations within the leachate in SLF 7 were based on the maximum detected value from historical sampling results for Tank T-107 (see Attachment 6).

Table 6 presents a summary of VOC and HAP emissions from the SLF 10 standpipes. Individual VOC and HAP concentrations within the leachate in SLF 10 were based on the maximum detected value from historical sampling results for Tank T-109 and Tank T-110 (see Attachment 6).

Table 7 presents a summary of VOC and HAP emissions from the SLF 11 standpipes. Individual VOC and HAP concentrations within the leachate in SLF 11 were based on the maximum detected value from historical sampling results for Tank T-108 (see Attachment 6).

Table 8 presents a summary of VOC and HAP emissions from the SLF 12 standpipes. Individual VOC and HAP concentrations within the leachate in SLF 12 were based on the maximum detected value from historical sampling results for Tank T-150 (see Attachment 6).

Table 9 presents a summary of VOC and HAP emissions from the RMU-1 standpipes. Individual VOC and HAP concentrations within the leachate in RMU-1 were based on the maximum detected value from the following historical sampling results (see Attachment 7):

- Periodic sampling results for individual standpipes between May 2006 and February 2013
- Periodic sampling results for Tank T-102 between April 2012 and April 2013
- Periodic sampling results for Tank T-160 (lift station for RMU-1 Landfill) between January 31, 2012 and February 15, 2012

### 3.3.2 Leachate Storage Tanks and Lift Stations

Emissions are generated from the volatilization of leachate and from the working and breathing losses from the filling and unloading of the lift stations and storage tanks at the Facility. Emissions

calculations for the storage tanks and lift stations that transfer and store leachate at the Facility were estimated utilizing TANKS 4.0.9d software (calculations have also been replicated by GHD in Microsoft Excel as requested by the NYSDEC using the methodology from AP-42, Section 7.1 (11/06), with the exception of meteorological data which was taken from the sources described in Section 6.2 of the *User's Guide to TANKS*, prepared by USEPA). Tank compositions were referenced based on periodic sampling results provided by CWM. Attachment 8 presents the TANKS model output for each of the following tanks:

| Tank ID | Description | Composition |
|---|---|---|
| T-102[2] | SLF-12 and RMU-1 Leachate | Maximum Detected value in Attachment 7 |
| T-103[2] | SLF 1-6 Leachate | Sample of T-103 (Attachment 4) |
| T-105 | Lift Station for T-130 | Overall Average in Table 20 |
| T-107 | SLF 7 Leachate | Maximum Detected value in Attachment 6 |
| T-108 | SLF 11 Leachate | Maximum Detected value in Attachment 6 |
| T-109 | SLF 10 Leachate | Maximum Detected value in Attachment 6 |
| T-110 | SLF 10 Leachate | Maximum Detected value in Attachment 6 |
| T-111 | SLF 11 Leachate | Maximum Detected value in Attachment 6 |
| T-130 | SLF 1-6 Leachate | Overall Average in Table 20 |
| T-150 | SLF-12 Leachate | Maximum Detected value in Attachment 6 |
| T-158 | SLF 1-6 Leachate | Overall Average in Table 20 |
| T-160 | RMU-1 Lift Station | Maximum Detected value in Attachment 6 |

Dimensions, capacities and throughputs for all tanks at the Facility are presented in Table 10. A summary of emissions from each tank is presented in Table 11.

It should be noted that the leachate tanks are vented to carbon canisters. To be conservative, the maximum constituent concentrations were used and no reduction was applied for the air emissions control provided by the carbon canisters.

### 3.3.3 Leachate Transfer via Tanker Trucks

Emissions due to the transfer of leachate collected from each landfill area via tanker trucks were calculated using the methodology presented in Chapter 9.9 (Vacuum Truck Loading) of the USEPA document *Air Emissions Models for Waste and Wastewater*, dated November 1994. Emissions from truck loading are estimated by calculating an equilibrium concentration of organic vapors in the vacuum truck at its operating conditions and assuming that a total volume of gas equal to the vacuum truck volume is emitted to the atmosphere for each loading episode. It is assumed that the truck has a capacity of 5,500 gallons and an operating pressure of 303 mmHg. It is assumed that

[2] Three tanks in the Leachate Tank Farm (T-101, T-102, T-103); one is used for SLF 1-6 aqueous leachate, one is used for SLF 12 and RMU-1 leachate and one is generally on stand-by. [tank service is changed from time to time]

leachate is transferred from each landfill area once per week. Aqueous pollutant concentrations of the leachate for each landfill area are the same as previously described in Section 3.3.1. The table below summarizes the calculation methodology from leachate transfer operations via transfer trucks:

| Landfill | Origin | Destination | See Table |
|---|---|---|---|
| SLF 1-6 | T-130 | T-158 | 21 |
| SLF-7 | T-107 | T-1010 / T-1020 | 22 |
| SLF-10 | T-109/T-110 | AWTF | 23 |
| SLF-11 | T-108/T-111 | AWTF | 24 |
| SLF-12 | Standpipes | T-150 | 25 |
| *** RMU-1 leachate is transferred by piping to the AWTF. | | | |

## 3.4 Stormwater Event Tanks

One of the three tanks in the Leachate Tank Farm (e.g. T-101) is on stand-by.[3] The Facility is currently required to maintain Tank T-101 on a stand-by basis for major storm events. As a conservative measure, emissions are assumed to be equal to those of Tank T-102 (which currently stores collected leachate from SLF-12 and RMU-1).

Tank T-165 was previously used to store collected contact stormwater from collection/storage basins located in the active area of RMU-1 and allowed for sufficient excess capacity to contain precipitation from a 25-year, 24-hour design storm event As RMU-1 is no longer active, Tank T-165 is currently inactive (only precipitation is collected in this open top tank).

## 3.5 Groundwater Extraction System

### 3.5.1 Storage Tanks

The 8000 series of tanks at the Facility represent the groundwater extraction system. Emissions are generated from the volatilization of collected groundwater and from the working and breathing losses from the filling and unloading of the lift stations and storage tanks at the Facility. Emission calculations for the storage tanks and lift stations that transfer and store groundwater at the Facility were estimated utilizing TANKS 4.0.9d software (calculations have also been replicated by GHD in Microsoft Excel as requested by the NYSDEC using the methodology from AP-42, Section 7.1 (11/06), with the exception of meteorological data which was taken from the sources described in Section 6.2 of the *User's Guide to TANKS*, prepared by USEPA).Tank compositions were referenced based on periodic sampling results provided by CWM. Attachment 9 presents the TANKS model output for each of the following tanks:

[3] Three tanks in the Leachate Tank Farm (T-101, T-102, T-103); one is used for SLF 1-6 aqueous leachate, one is used for SLF 12 and RMU-1 leachate and one is generally on stand-by. [tank service is changed from time to time]

| Tank ID | Description | Composition |
|---|---|---|
| T-8001[a] | Collected Groundwater | Maximum Detected value in Attachment 6 |
| T-8002[a] | Lift Station for T-8001 | Same as Tank T-8001 |
| T-8004[a] | Collected Groundwater | T-8004 samples (see Attachment 10) |
| T-8005 | Collected Groundwater | T-8005 samples (see Attachment 10) |
| T-8006 | Collected Groundwater | T-8006 samples (see Attachment 10) |
| T-8007 | Collected Groundwater | T-8007 samples (see Attachment 10) |
| T-8008[a] | Collected Groundwater | Nearby Extraction Well (see Attachment 10) |
| T-8009[a] | Collected Groundwater | T-8009 samples (see Attachment 10) |
| T-8010 | Collected Groundwater | T-8010 samples (see Attachment 10) |

Due to the level of VOCs in the groundwater stored in these tanks, they are vented to carbon canisters. Conservatively, no reduction by carbon was included in the calculations.

Dimensions, capacities and throughputs for all tanks at the Facility are presented in Table 10. A summary of emissions from each tank is presented in Table 13.

### 3.5.2 Groundwater Transfer via Tanker Trucks

Emissions due to the transfer of groundwater collected from the groundwater extraction system via tanker trucks were calculated using the methodology presented in Chapter 9.9 (Vacuum Truck Loading) of the USEPA document *Air Emissions Models for Waste and Wastewater*, dated November 1994. Emissions from truck loading are estimated by calculating an equilibrium concentration of organic vapors in the vacuum truck at its operating conditions and assuming that a total volume of gas equal to the vacuum truck volume is emitted to the atmosphere for each loading episode. It is assumed that the truck has a capacity of 5,500 gallons and an operating pressure of 303 mmHg. It is assumed that leachate is transferred from each landfill area once per week. Aqueous pollutant concentrations of the extracted groundwater for each tank are the same as previously described in Section 3.5.1. The table below summarizes the calculation methodology from groundwater transfer operations via transfer trucks:

| Origin | Destination | See Table |
|---|---|---|
| T-8004 | T-200 series | 27 |
| T-8005 | T-200 series | 28 |
| T-8006 | T-200 series | 29 |
| T-8007 | T-200 series | 30 |
| T-8008 | T-200 series | 31 |
| T-8009 | T-200 series | 32 |
| T-8010 | T-200 series | 33 |
| *** T-8001/T-8002 – transferred to AWTS by piping | | |

## 3.6 Aqueous Water Treatment Facility

This section provides the estimated emissions from the Aqueous Water Treatment Facility. Emissions are generated from the volatilization of collected influent water and from the working and breathing losses from the filling and unloading of the storage tanks at the Facility. Emissions calculations for the storage tanks at the Aqueous Water Treatment Facility were estimated utilizing TANKS 4.0.9d software (calculations have also been replicated by GHD in Microsoft Excel as requested by the NYSDEC using the methodology from AP-42, Section 7.1 (11/06), with the exception of meteorological data which was taken from the sources described in Section 6.2 of the *User's Guide to TANKS*, prepared by USEPA). Tank compositions were referenced based on periodic sampling results provided by CWM. Attachment 11 presents the TANKS model output for each of the following tanks:

| Tank ID | Description | Composition |
|---|---|---|
| T-100 | Filtrate Tank | Maximum Detected value in Attachment 12 |
| T-210 | Processing of Tank T-103 | Same as Tank T-103 |
| T-220 | Processing of Tank T-103 | Same as Tank T-103 |
| T-230 | Processing of Tank T-103 | Same as Tank T-103 |
| T-710 | Processing of Tank T-103 | Same as Tank T-103 |
| T-810 | Processing of Tank T-103 | Same as Tank T-103 |
| T-820 | Processing of Tank T-103 | Same as Tank T-103 |
| T-1010 | Processing of Tank T-103 | Same as Tank T-103 |
| T-1020 | Processing of Tank T-103 | Same as Tank T-103 |
| T-310 | Biotowers | Maximum Detected value in Attachment 12 |
| T-320 | Biotowers | Maximum Detected value in Attachment 12 |
| T-3002 | Feed to Biotowers | Same as Tank T-100 |
| T-3003 | Feed to Carbon | Same as Tank T-100 |
| T-3009 | Carbon Backwash | Same as Tank T-100 |
| T-3011 | Effluent From Biotowers | Same as Tank T-310 / Tank T-320 |
| T-3012 | Lift Station Between Biotowers | Same as Tank T-310 / Tank T-320 |
| Frac Tank #3 | SLF-7 Leachate Processing | Same as Tank T-107 |

Dimensions, capacities and throughputs for all tanks at the Facility are presented in Table 10. A summary of emissions from each tank is presented in Table 14. Tanks are vented to carbon canisters. Conservatively, no reduction by carbon was included in the calculations.

Emissions from the exhaust of the biotowers were estimated using SUMMA canister results from March 16, 2013 (refer to Attachment 13 for analytical report). Table 15 presents a summary of emissions from the biotower exhaust.

Emissions from the filter press are presented in Table 16.

## 3.7 Stabilization Facility

For the amount of material processed in the stabilization facility, CWM currently has a limit in their Part 373 permit limit of 150 tons per hour which equates to 1,314,000 tons per year. However, since the facility has a cap on the amount of waste landfilled (500,000 tons per year); the limit of 150 tons per hour is not suitable for air permitting purposes. In addition, based on a review of the amount of material stabilized at the facility over the last 20 years, the highest amount of material stabilized in a given year was approximately 137,000 tons. Therefore, CWM is proposing a State Facility Permit cap of 150,000 tons per year for the amount of material processed in the stabilization facility.

Emissions from the stabilization facility were estimated based on information compiled for the Toxic Release Inventory (TRI) Report for the facility. The calendar year of 2008 was selected since this year represents the worst-case organic waste profile for the 5-year period of 2008 through 2012.

Emissions of PM and metals from entrainment within the stabilization facility are presented in Table 1. A factor was applied to the actual totals in order to reflect the cap limit of 150,000 tons per year. It should be noted that the stabilization facility exhausts to two baghouses with a capture efficiency of greater than 99.998 percent according to manufacturer specifications.

Emissions of VOCs from volatilization within the stabilization facility are presented in Table 34. The following calculations methodology was utilized in the analysis:

- Each of the materials processed in the stabilization facility were classified as a VOC, HAP, or both.
- Actual totals for the worst-case organic profile year (2008) were adjusted with a factor to represent a cap limit of 150,000 tons per year in the stabilization facility.
- Each material was classified as either a “Subpart CC compound” or a “non-Subpart CC compound” according to Appendix VI of Part 265. The definition of a non-Subpart CC compound (is not volatile and does not need to be included in the total quantity of volatile compounds, which must be <500 ppm to process without air controls) is less than 0.1 [mole fraction in gas phase] / [mole fraction in liquid phase] or the compound has a Henry’s Law constant of less than $1.8 \times 10^{-6}$ atm/gram-mole/$m^3$ at 25 degrees C.
- Subpart CC compounds are assumed to emit 100 percent of its total weight during the stabilization process (extremely conservative assumption)
- Non-Subpart CC compounds are assumed to emit 50 percent of its total weight during the stabilization process (extremely conservative assumption)
- PCBs are estimated to emit 0.044 percent of its total weight during the stabilization process based on CWM’s data (based on actual laboratory studies)
- Mercury compounds are estimated to emit 0.3% of its total weight during the stabilization process. This is based on the addition of calcium polysulfide during the stabilization process that converts mercury compounds into an insoluble mercury sulfide form.

It should be noted that GHD elected to use the above approach since the USEPA methodology given in the document *Air Emissions Models for Waste and Wastewater*, dated November 1994, does not provide a calculation methodology for fixation pits in Section 8.3 (which states “This Section is currently under review”).

## 3.8 Fugitive Emissions from Pipe Valves/Connectors

Equipment leaks and testing are addressed under 6 NYCRR Part 373-2.28 (RCRA Subpart BB). CWM performs routine monitoring with a flame ionization detector (FID) for hazardous waste systems with >10 percent organics and performs daily visual inspections of all hazardous waste tanks and ancillary equipment. The BB valve leak threshold of 10,000 ppm is high and rarely if ever exceeded. The majority of the valve monitoring results are ND/<10 ppm. When a leak is identified by monitoring or observation, the equipment is repaired immediately. The potential for emissions from equipment leaks is much less than for other industries since the volatile fraction of the material being handled is typically less than 10 percent (except for oily organic phase leachate from SLF 1-6). Using emission factors from the USEPA's Protocol for Equipment Leak Emission Estimates (EPA-453/R-95-017), which is intended for the chemical and petroleum industries, and using the conservative values of 10 ppm emissions and 10 percent volatile compound concentration, the VOC emission rate is calculated at 13 pounds per year (see Table 35). Since monitoring records have documented that monitored actual concentrations are less than 10 ppm, the actual emissions would be significantly less than 13 pounds per year and are deminimis.

## 3.9 Facultative Ponds

Treated wastewater is stored in the batch qualification tanks (T-58 and T-125) prior to discharge to Facultative Pond 1 /2 and Facultative Pond 3. Samples are collected from the batch qualification tanks and analyzed for VOCs, metals. In addition, one batch per month is analyzed for PCBs, SVOCs, pH, and sulfide. Results of the analyses of the monthly batch qualification samples are submitted to the NYSDEC. The laboratory analytical results for the treated wastewater discharged to the facultative ponds shows non-detects (NDs) for all Volatile Organic Compounds (VOCs) with the exception of acetone (which is not considered a VOC according to 6 NYCRR 200.1(cg)). In order to obtain an estimate of emissions from the facultative ponds, one-half of the detection limit was assumed for each compound for a sample collected on December 2, 2015. Emissions of PCBs from the facultative ponds were estimated based on the SPDES permit limit of 200 nanograms per liter. Emissions from the facultative ponds were calculated using the mass balance approach presented as Equation 5-30 in the USEPA document *Air Emissions Models for Waste and Wastewater*, dated November 1994. Tables 36A and 36B present emissions from Facultative Ponds 1 & 2 and Facultative Pond 3, respectively.

## 3.10 Heating Equipment

Heating at the Facility is provided by the following boilers/heaters:

- Two (2) 1.633 MMBTU/hr Steam Boilers (Propane-fired, AWTF)
- One (1) 1.0 MMBTU/hr Hot Water Boiler (Propane-fired)
- A number of small propane heaters located throughout the facility (cumulative rating of 2.709 MMBTU/hr)
- Fulton Model 50063 (Propane-fired, Locker Room)
- Copper Hydronic Boiler (Propane-fired, Firewater Pump Bld.)
- Davo Hastings Heaters (Two (2) Propane-fired, Drum Bld. Roof)
- Stabilization Main Heaters (One (1) Propane-fired, Stab. Bld. Roof)
- Pug Mill Heaters (One (1) Propane-fired, Stab. Pug Mill Area)

Emission factors for the propane-fired boilers/heaters were referenced from USEPA AP-42, Section 1.5 (07/08). Table 17 presents the estimated emissions from the heating equipment at the Facility.

## 3.11 Diesel Generator

The Site operates a Cummins Diesel Fire-Water Pump rated at 187 horsepower for 1 day each month for a maximum of 2 hours per occurrence. Emission factors for the diesel generator were referenced from USEPA AP-42, Section 3.3 (10/96). Table 18 presents a summary of emissions for the diesel generator.

## 3.12 Laboratory Emissions

An estimate of emissions laboratory activities was compiled based on an analysis of 2012 purchase records and actual evaporation rates derived for each compound. Table 19 presents a summary of emissions from the laboratory at the CWM Facility.

## 3.13 Storage of Petroleum Products

Unleaded gasoline, diesel fuel, engine oil and propane are stored in above-ground storage tanks at the facility. Emissions are generated from the volatilization of these liquids and from the working and breathing losses from the filling and unloading of the tanks. Emissions calculations for the storage tanks at the Facility were estimated utilizing TANKS 4.0.9d software and estimated throughputs at the Facility. Attachment 14 contains the model output of the TANKS program for the storage of petroleum products for each tank.

## 3.14 Container Storage/Movement

Bulk solid shipments for direct landfills are disposed of in the landfill on the day of receipt. They are covered with daily cover in the landfill as discussed in section 3.2. Dump trucks and roll-off boxes have disposable plastic bed liners. The units are RCRA empty after the shipment has been deposited in the landfill. No washing of the inside of the container is performed. Bulk solid shipments for stabilization treatment are processed on the day of receipt. Emissions during stabilization process are discussed in Section 3.7. The total expected release is included in the stabilization emissions estimate. The majority of the treated batches go the landfill after treatment; daily cover is applied. A small portion of the treated batches are held in roll-off boxes, securely tarped, placed in a containment area, pending test results in accordance with the facility's Waste Analysis Plan. When the test results are issued, and the batch passes, it will be transferred to the landfill for disposal.

Sampling and waste fuel transfer occurs at the Drum Warehouse building. Emissions from these activities are quantified in Attachment 15. No drum washing is performed.

Emissions due to spills as a result of container storage were calculated based on the methodology presented in Chapter 9.7 (Spills) of the USEPA document *Air Emissions Models for Waste and Wastewater*, dated November 1994. Table 37 presents VOC and HAP emissions from spills due to container storage at the CWM facility. Emissions were also estimated based on the site container inventory and spill reports for the 2015 calendar year. The more conservative estimate using the EPA model was employed for the inventory.

# 4. Emission Discussion

Table 1 presents a summary of total emissions for the CWM Facility. A summary of select compounds is presented below:

| ***Emission Source*** | ***Emissions (TPY)*** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ***VOCs*** | ***HAPs*** | ***CO*** | ***NOx*** | ***$SO_2$*** | ***$PM_{10}$*** | ***$PM_{2.5}$*** | ***Total GHG*** |
| **Totals (TPY)** | **4.11** | **2.29** | **2.64** | **4.62** | **0.01** | **2.96** | **2.32** | **4,472** |
| **Title V Threshold (TPY)** | **50** | **25** | **100** | **100** | **100** | **100** | **100** | **100,000** |

Emissions have been prepared using site-specific test data, where available. VOC and metals emissions from stabilization have been based on 2008 data. The 2008 data is considered conservative since it represents the worst-case organic waste profile. Potential emissions were derived by applying a factor to the 2008 waste totals to represent a capped limit of 150,000 tons per year of material stabilized.

As shown in the table above, the facility is well below the thresholds for Title V applicability. The CWM Facility has applied for and obtained an Air State Facility Permit as described under 6 NYCRR 201-4.1.

# 5. Emission Caps

As shown in Table 1, potential emissions for all compounds are at least an order of magnitude (less than 10 percent) less than the facility emission thresholds for Title V Permit applicability. Even though CWM is not required to, they have voluntarily agreed to accept the following emission caps to demonstrate that the facility is non major for VOCs and HAPs:

| Compound | Proposed Emission Cap |
|---|---|
| | |
| Total VOC | 50 tons per year |
| Total HAP | 25 tons per year |
| All Individual HAP | 10 tons per year (each) |

In addition, potential emissions for high toxicity air contaminants (HTAC) compounds are lower than the thresholds provided under 6 NYCRR Part 212 2.2, with the exception of PCBs and polycyclic organic matter (POM). Therefore, CWM will accept emission caps for the volatile organic HTAC compounds listed in 6 NYCRR Part 212-2.2 that are commonly found in hazardous waste (see Appendix 1 of SDP 5000 provided as Attachment 17), with the exception of PCBs and POM. Tracking of emissions compared to the emissions caps will be performed:

1. Utilizing the emissions data presented in the Emissions Inventory that were calculated based on historical site-specific data for the landfills and other sources.

2. Utilizing the monitoring, recordkeeping and reporting requirements that the facility will implement to estimate the emissions from the stabilization facility (the major source of VOC and HAP that may be controlled by processing rate) are provided in the Standard Division Practice (SDP) document titled “Estimated Air Emissions from Stabilization” (provided as Attachment 17). The estimated emissions will be compared to the limits in the Appendix 1 of the SDP to demonstrate compliance with Part 212.

Stabilization is the largest source of VOCs and HAPs, has the greatest potential for variability, and can be monitored and controlled. Emissions from the remaining process sources are less likely to fluctuate and any fluctuation that does occur is expected to be addressed by the conservative nature of the methods and assumptions used in the Emissions Inventory.

The proposed permit condition outlining the monitoring requirements for the stabilization facility is provided as Attachment 18.

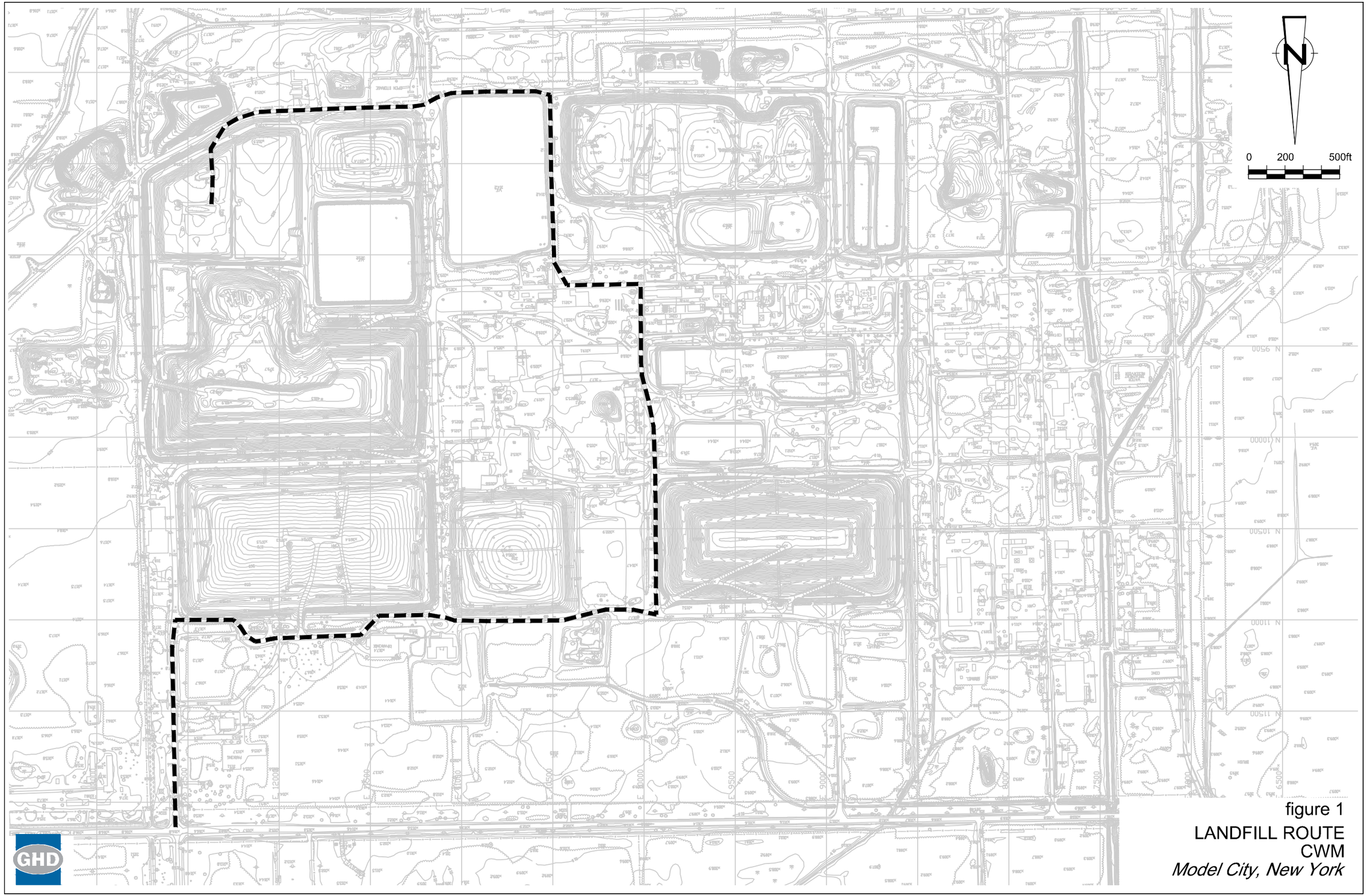



figure 1
LANDFILL ROUTE
CWM
*Model City, New York*

80335-00(007)GN-NI001 MAR 17/2017

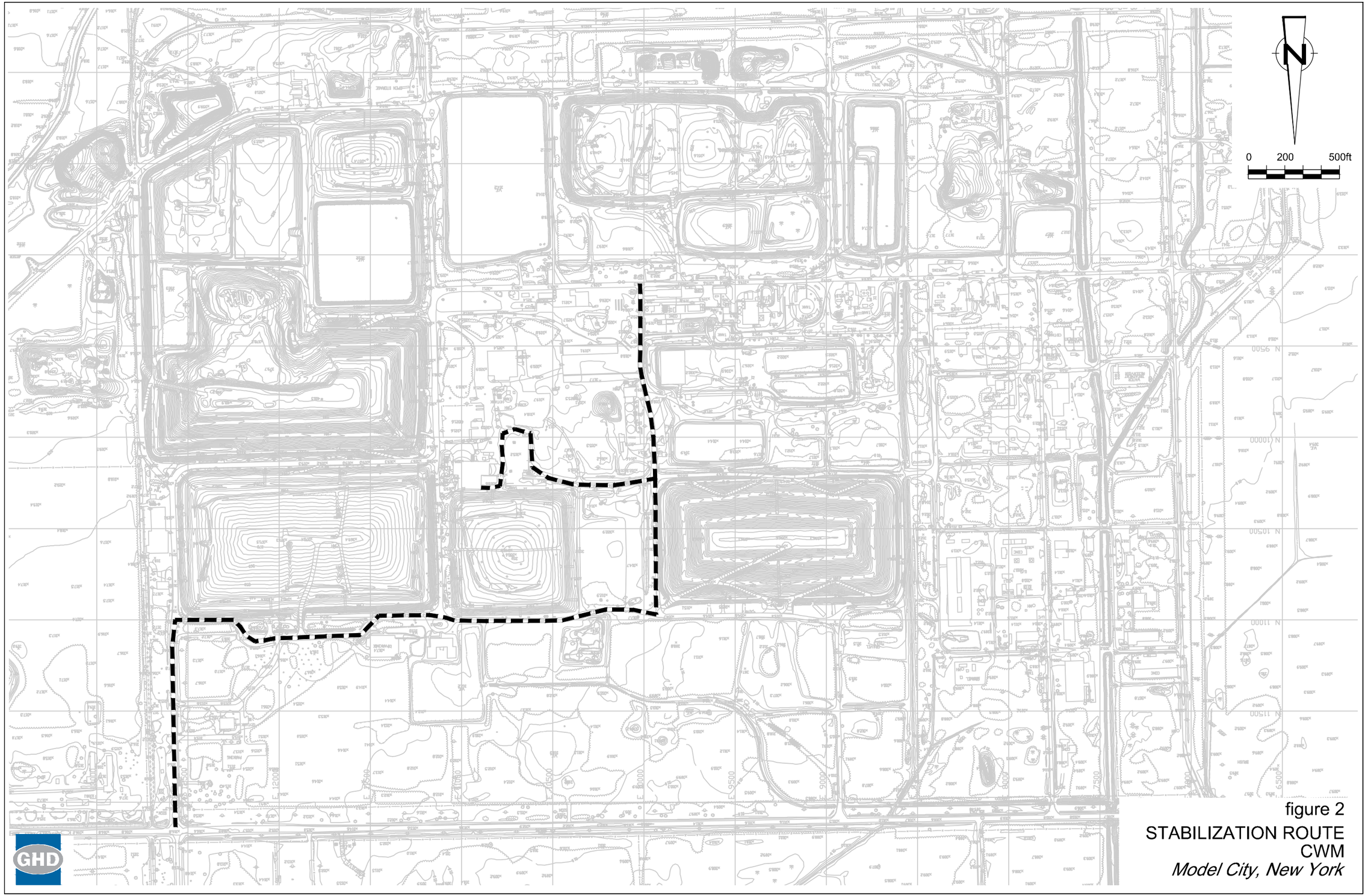



figure 2
STABILIZATION ROUTE
CWM
*Model City, New York*

80335-00(007)GN-NI002 MAR 17/2017

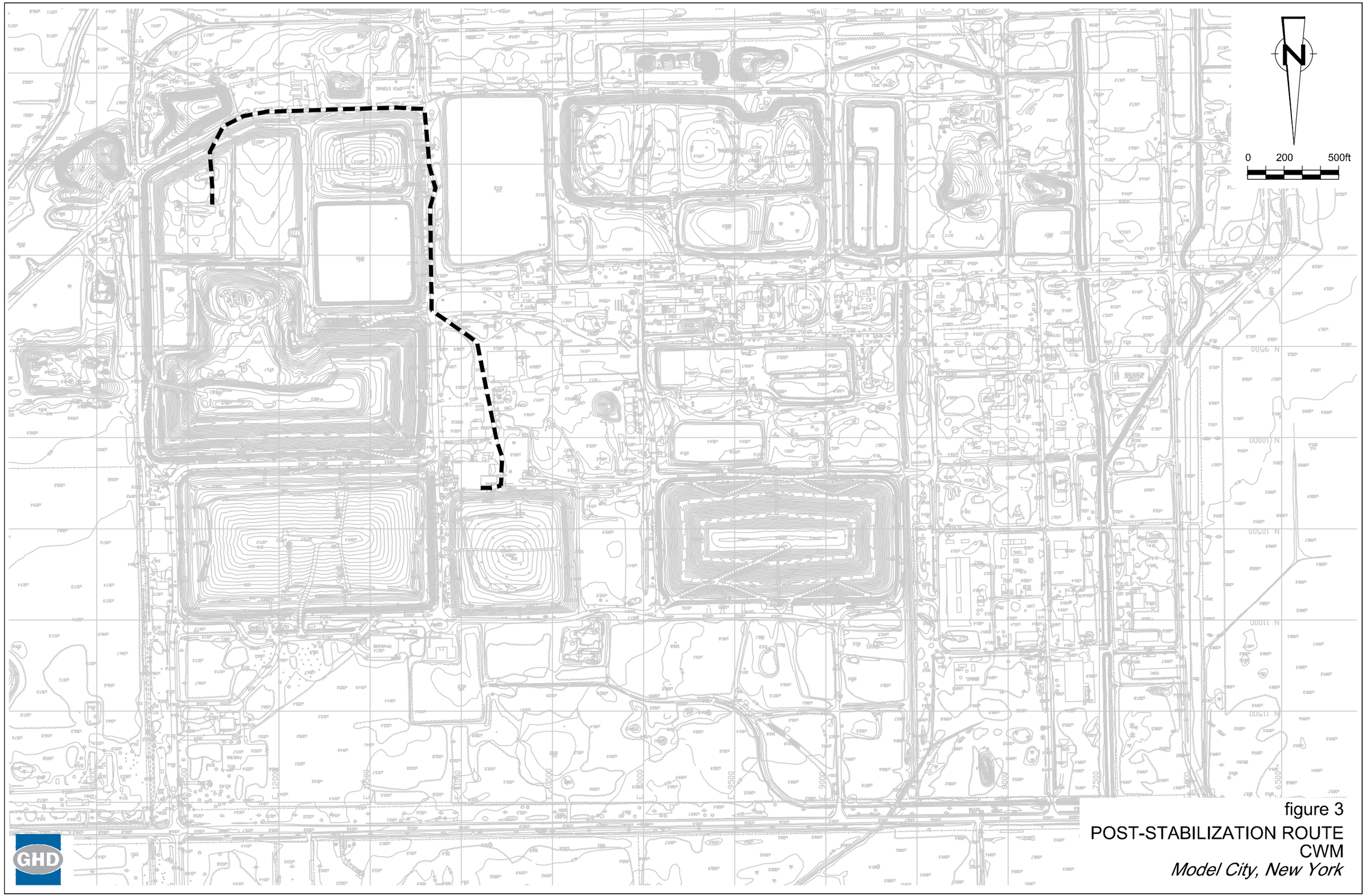



figure 3

POST-STABILIZATION ROUTE

CWM

*Model City, New York*

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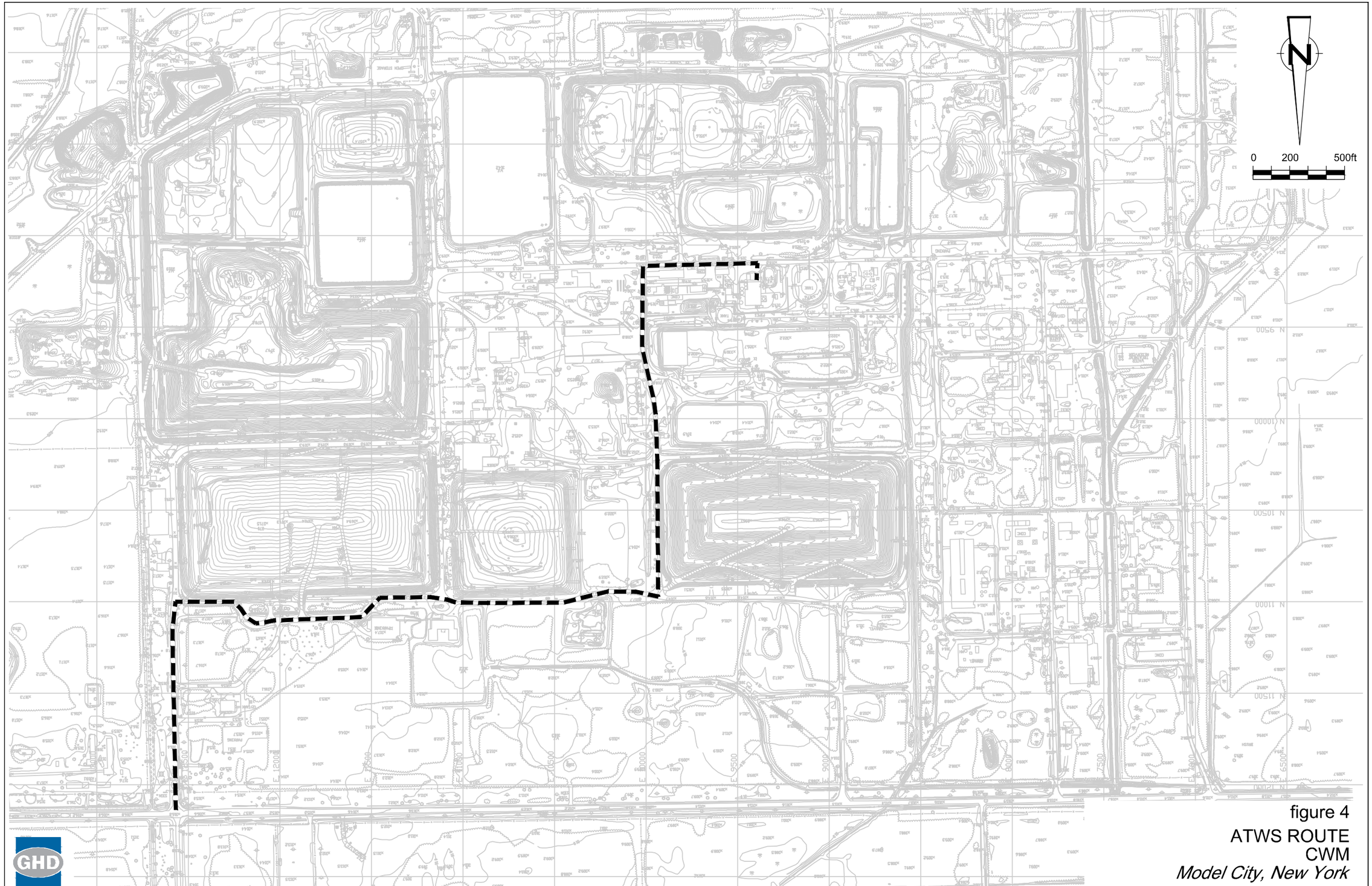



figure 4

ATWS ROUTE

CWM

*Model City, New York*

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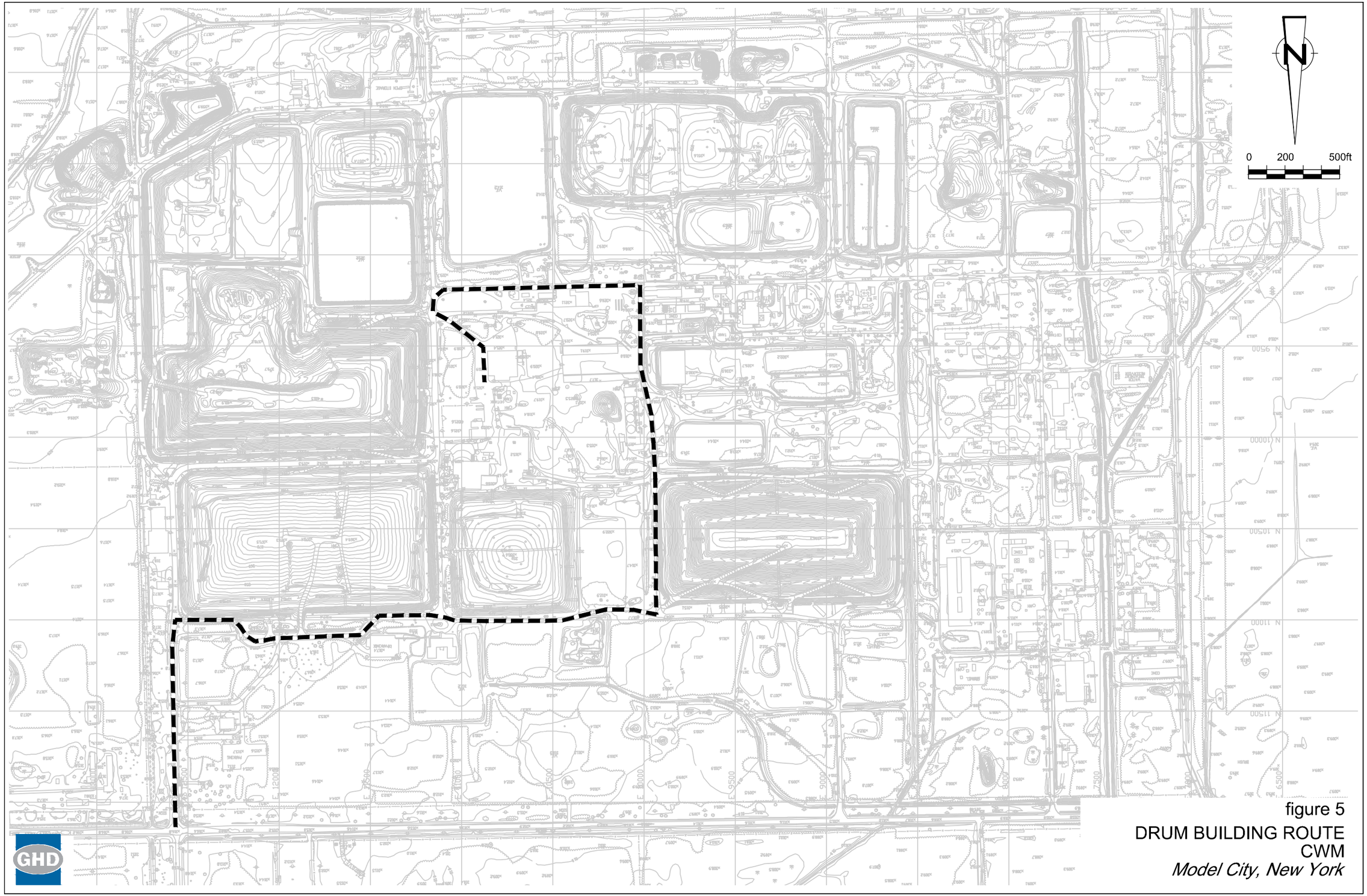



figure 5

DRUM BUILDING ROUTE

CWM

*Model City, New York*

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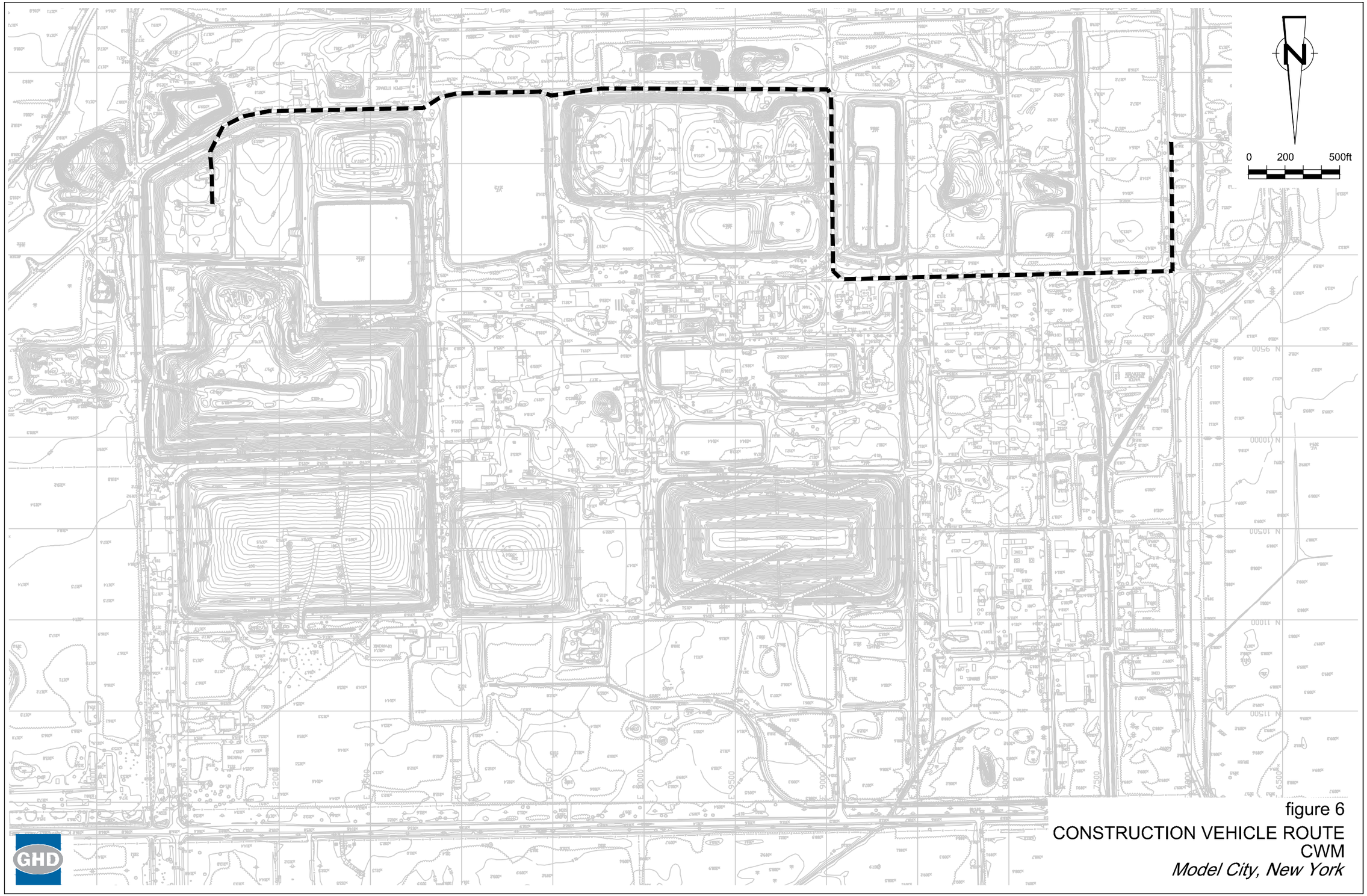



figure 6

CONSTRUCTION VEHICLE ROUTE

CWM

*Model City, New York*

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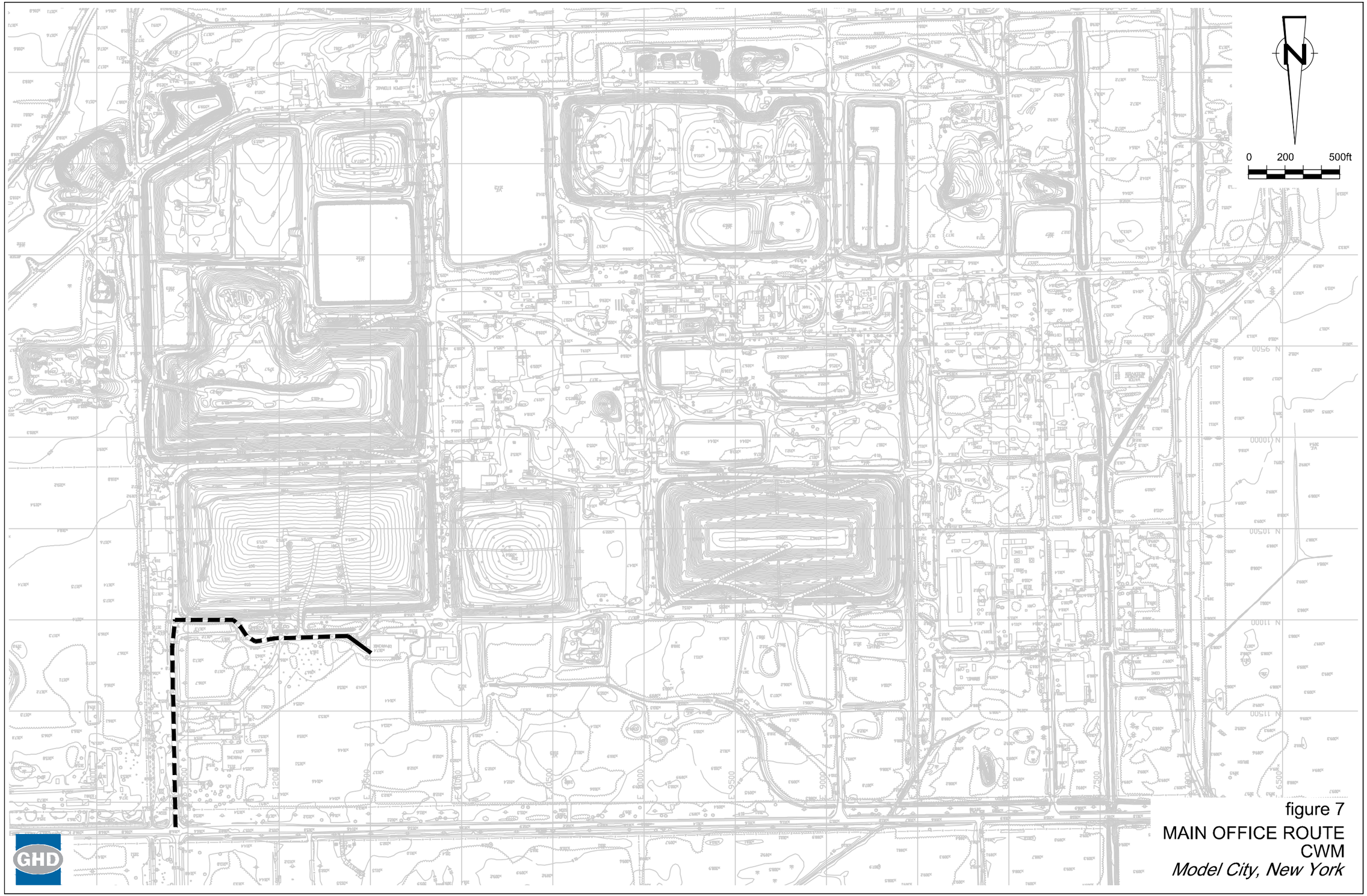



figure 7

MAIN OFFICE ROUTE

CWM

*Model City, New York*

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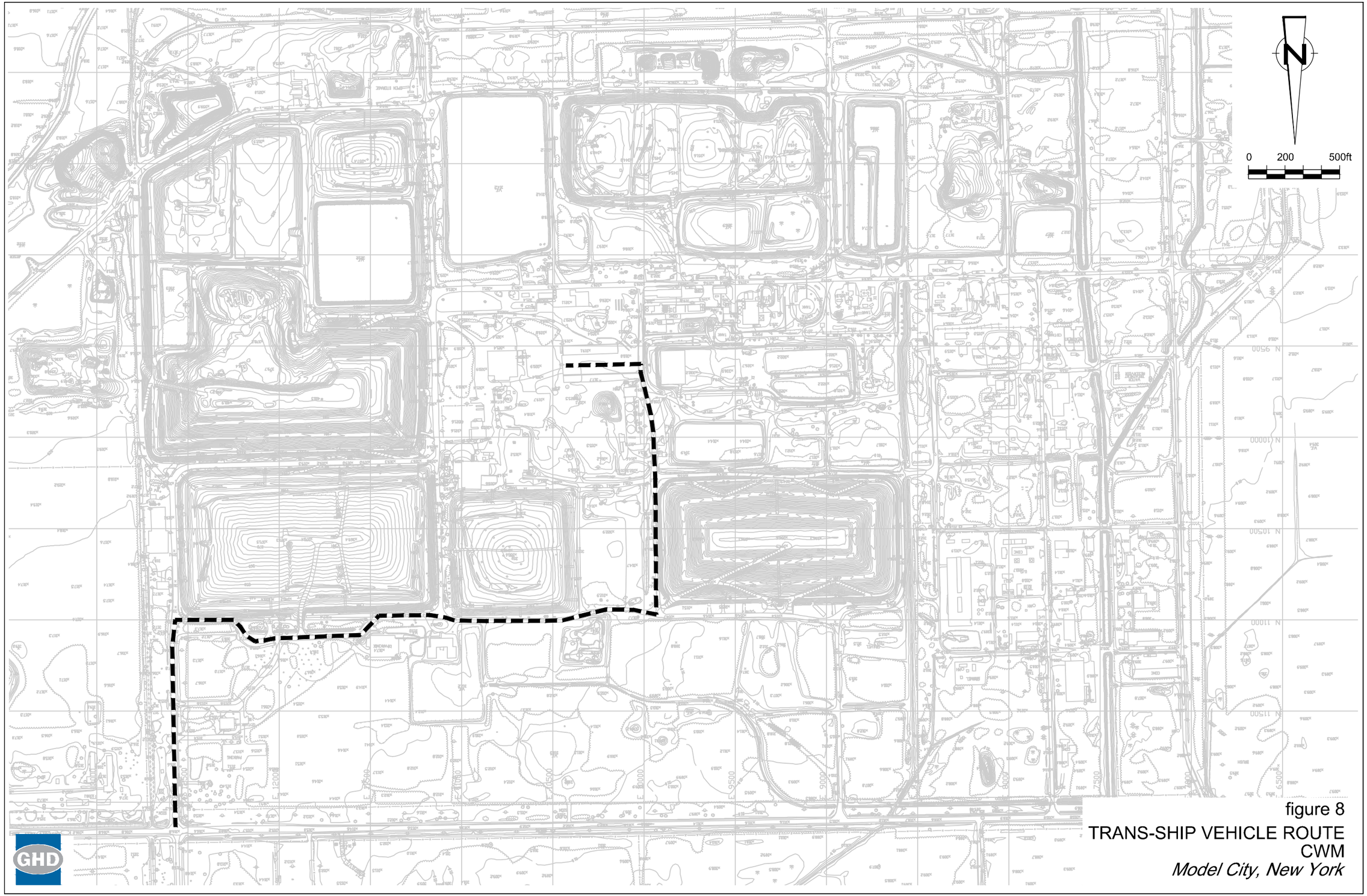


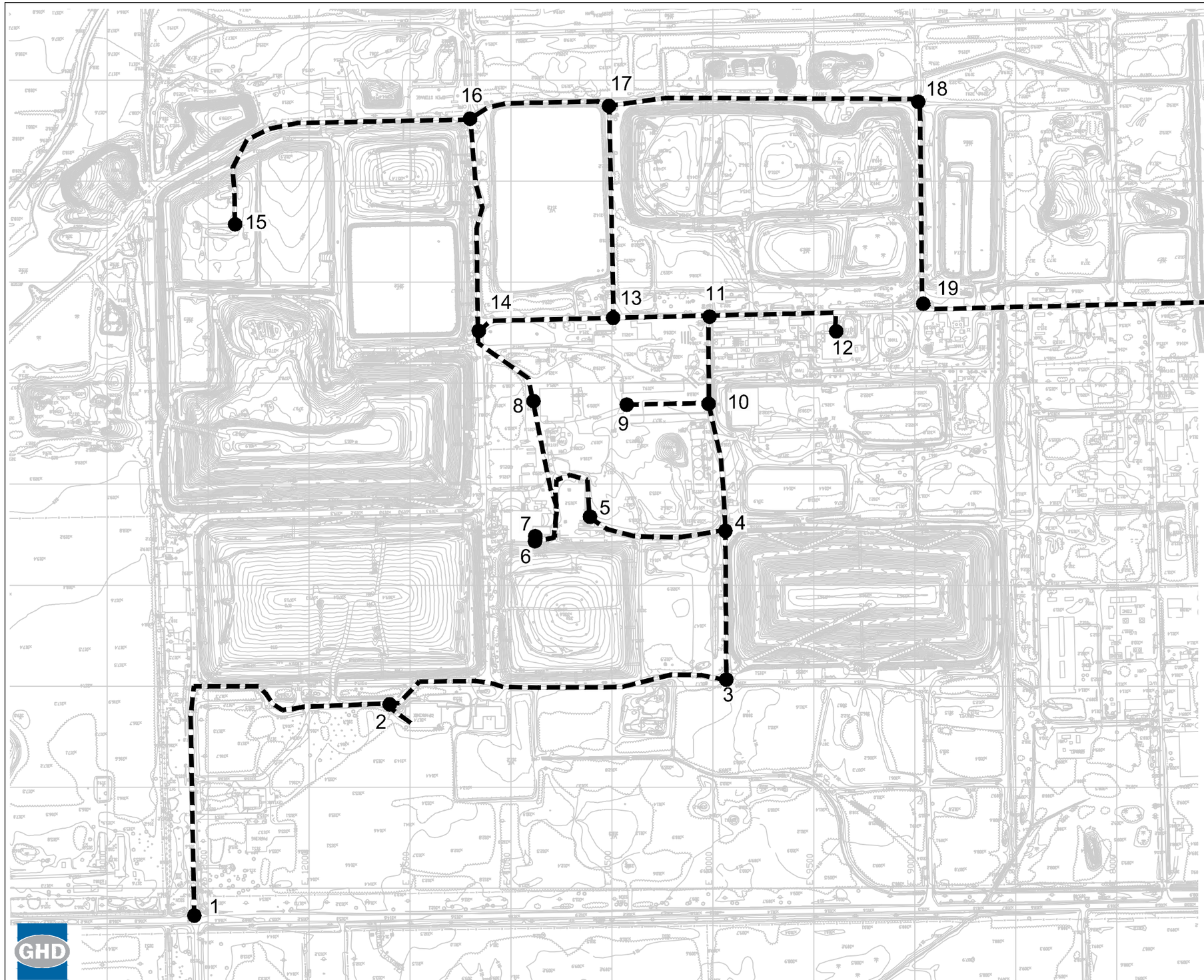

figure 8

TRANS-SHIP VEHICLE ROUTE

CWM

*Model City, New York*

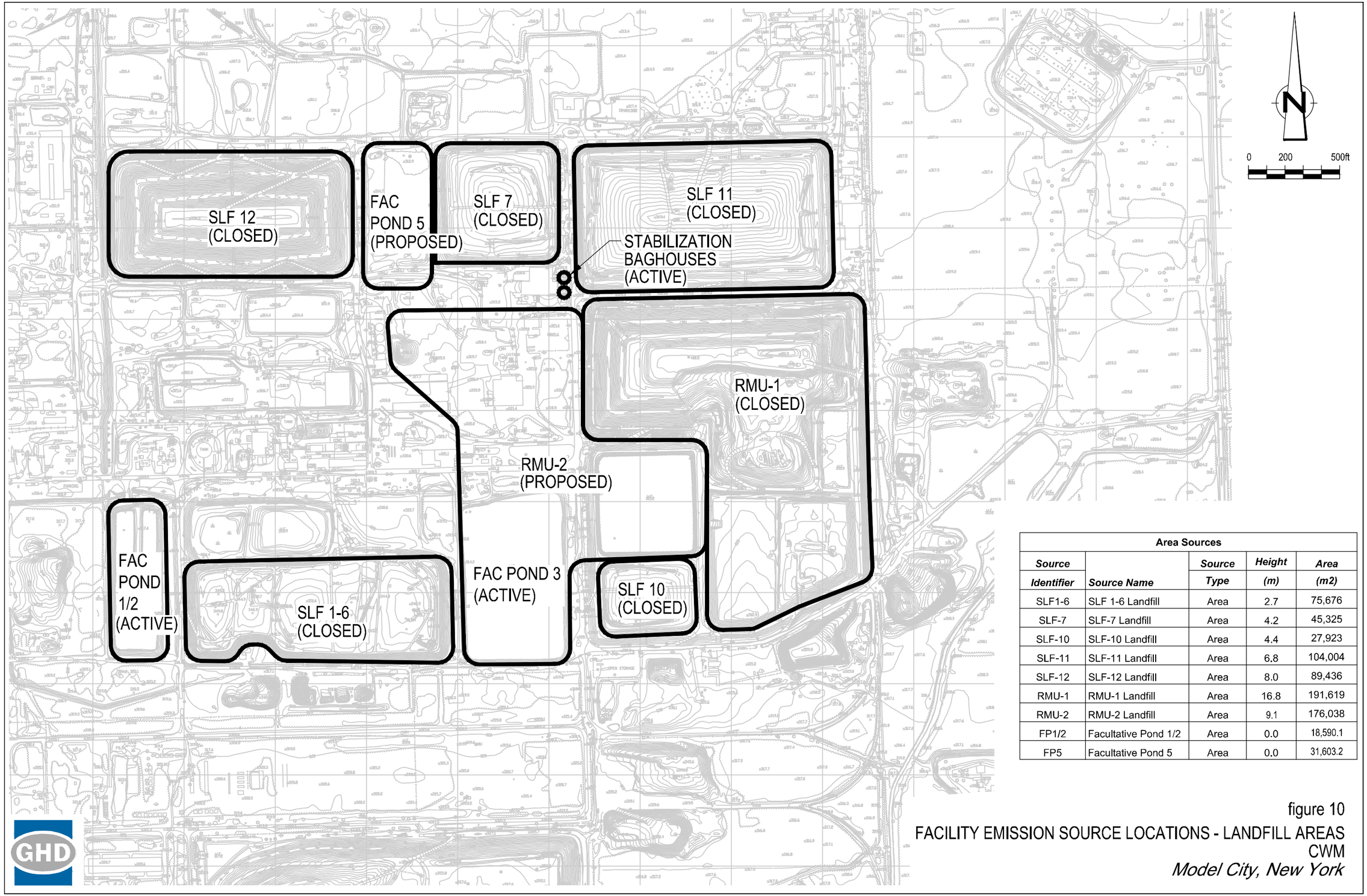
80335-00(007)GN-NI008 MAR 17/2017




| LINE SEGMENT | DISTANCE (FEET) |
|---|---|
| 1-2 | 2,148 |
| 2-3 | 1,726 |
| 3-4 | 736 |
| 4-5 | 696 |
| 4-10 | 637 |
| 5-6 | 719 |
| 7-8 | 783 |
| 8-14 | 476 |
| 10-9 | 405 |
| 10-11 | 434 |
| 11-12 | 712 |
| 11-13 | 478 |
| 13-17 | 1,049 |
| 13-14 | 684 |
| 14-16 | 1,062 |
| 16-15 | 1,557 |
| 16-17 | 712 |
| 17-18 | 1,534 |
| 18-19 | 1,008 |
| 19-20 | 2,562 |

figure 9
ROUTE DISTANCES
CWM
*Model City, New York*

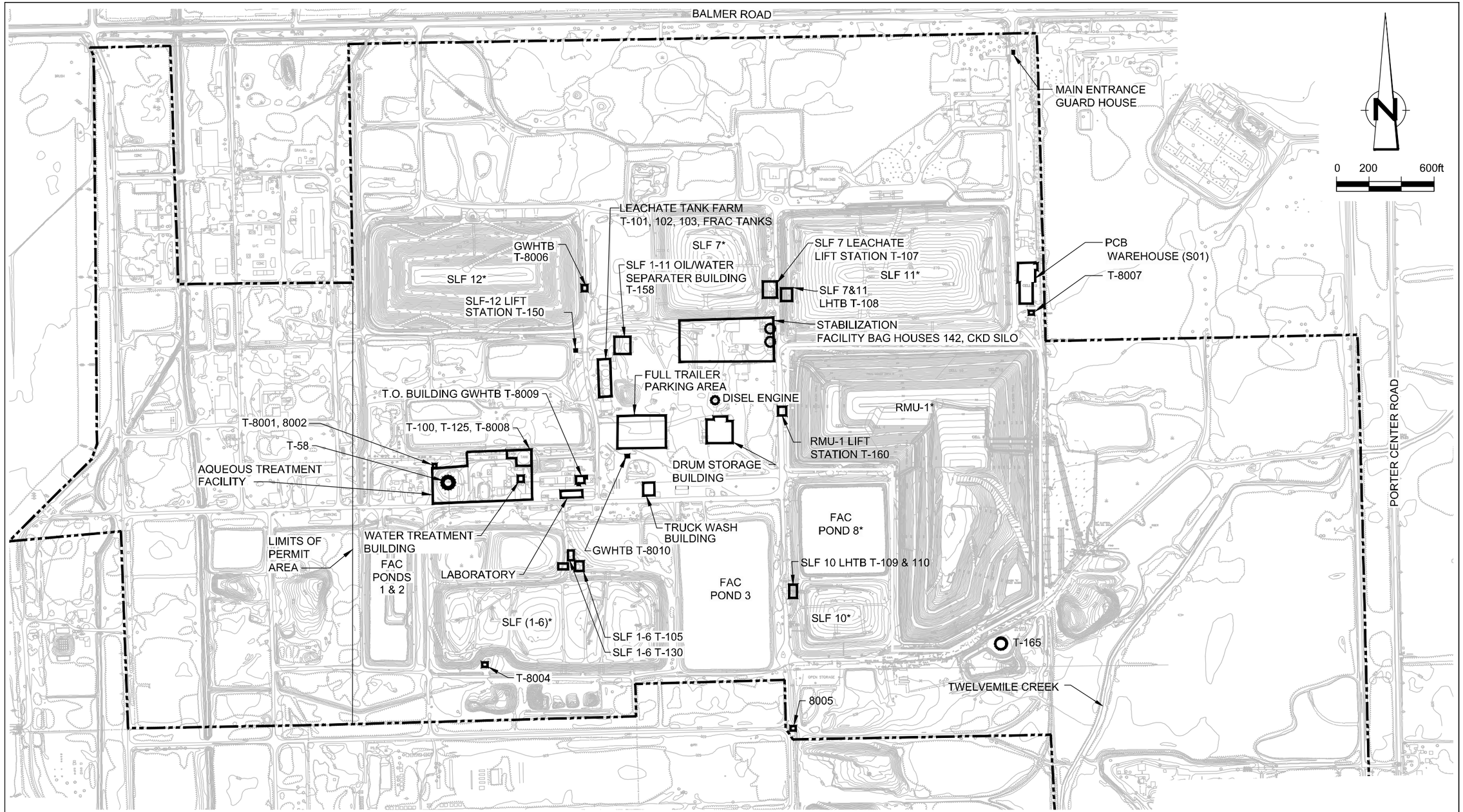
80335-00(007)GN-NI009 MAR 17/2017




| Area Sources | | | | |
|---|---|---|---|---|
| *Source Identifier* | *Source Name* | *Source Type* | *Height (m)* | *Area (m2)* |
| SLF1-6 | SLF 1-6 Landfill | Area | 2.7 | 75,676 |
| SLF-7 | SLF-7 Landfill | Area | 4.2 | 45,325 |
| SLF-10 | SLF-10 Landfill | Area | 4.4 | 27,923 |
| SLF-11 | SLF-11 Landfill | Area | 6.8 | 104,004 |
| SLF-12 | SLF-12 Landfill | Area | 8.0 | 89,436 |
| RMU-1 | RMU-1 Landfill | Area | 16.8 | 191,619 |
| RMU-2 | RMU-2 Landfill | Area | 9.1 | 176,038 |
| FP1/2 | Facultative Pond 1/2 | Area | 0.0 | 18,590.1 |
| FP5 | Facultative Pond 5 | Area | 0.0 | 31,603.2 |

figure 10

FACILITY EMISSION SOURCE LOCATIONS - LANDFILL AREAS
CWM
*Model City, New York*




LEGEND

SLF = SECURE LANDFILL
FAC = FACULTATIVE
PROPERTY LINE
LIMITS OF ACTIVE LANDFILL
* = INACTIVE
LHTB = LEACHATE HOLDING TANK BUILDING
GWHTB = GROUNDWATER COLLECTION HOLDING TANK BUILDING

NOTES:

1. THIS MAP COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 5-31-01. (AIR SURVEY CORP. PROJECT NO.71010503)
2. VERTICAL DATUM BASED ON NGS MEAN SEA LEVEL.
3. GRID BASED ON LOCAL COORDINATE SYSTEM.
4. CONTOUR INTERVAL 2 FT.
5. DASHED CONTOURS INDICATE THAT GROUND IS PARTIALLY OBSCURED BY VEGETATION OR SHADOWS. THESE AREAS MAY NOT MEET STANDARD ACCURACY AND REQUIRE FIELD TESTING COMPLETION.
6. PROPERTY LINES ARE APPROXIMATE.
7. 630 PERMITTED ACRES.
8. 710 TOTAL ACRES.

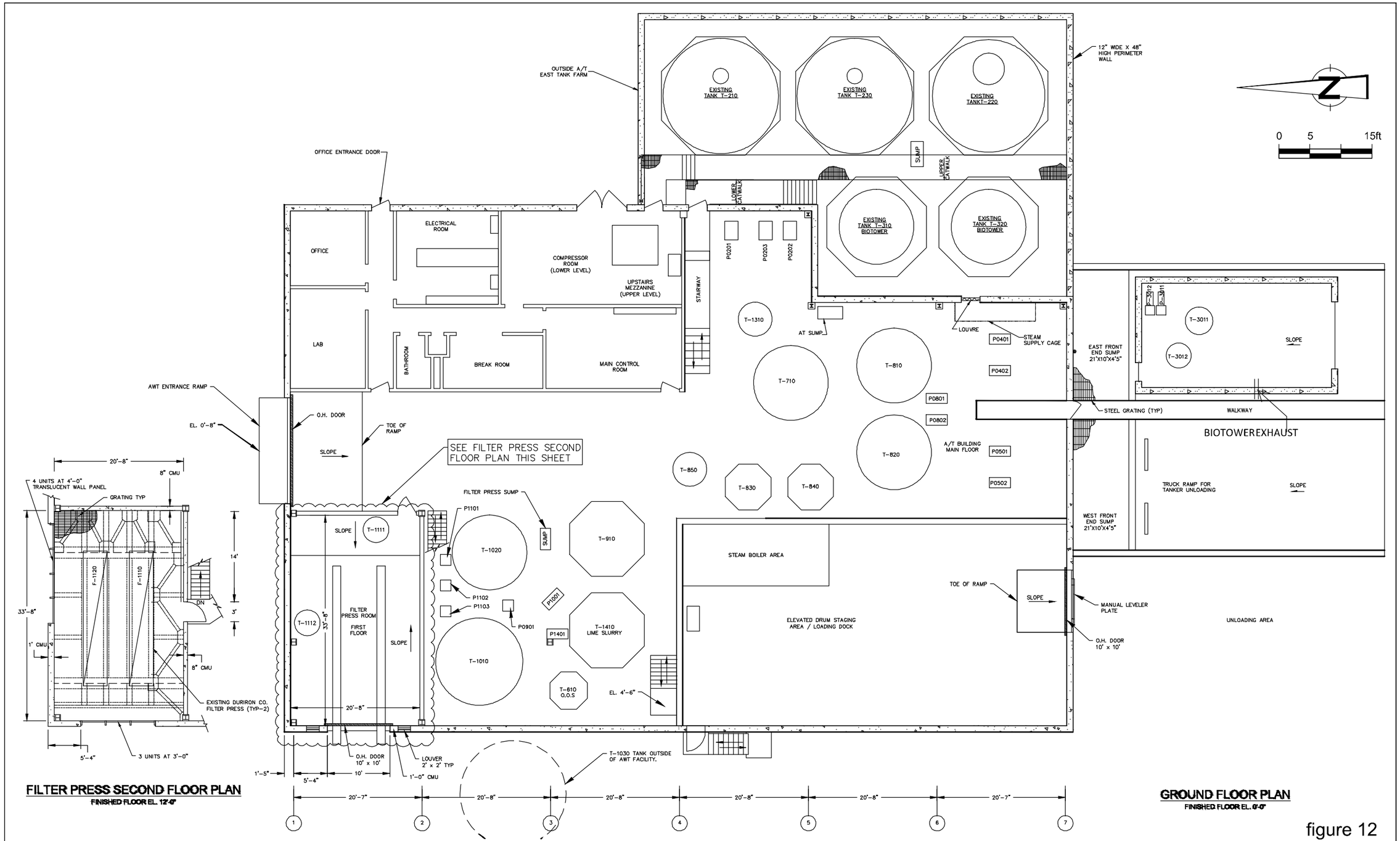
GHD

figure 11

# FACILITY EMISSION SOURCE LOCATIONS - BUILDINGS AND TANKS

CWM

*Model City, New York*

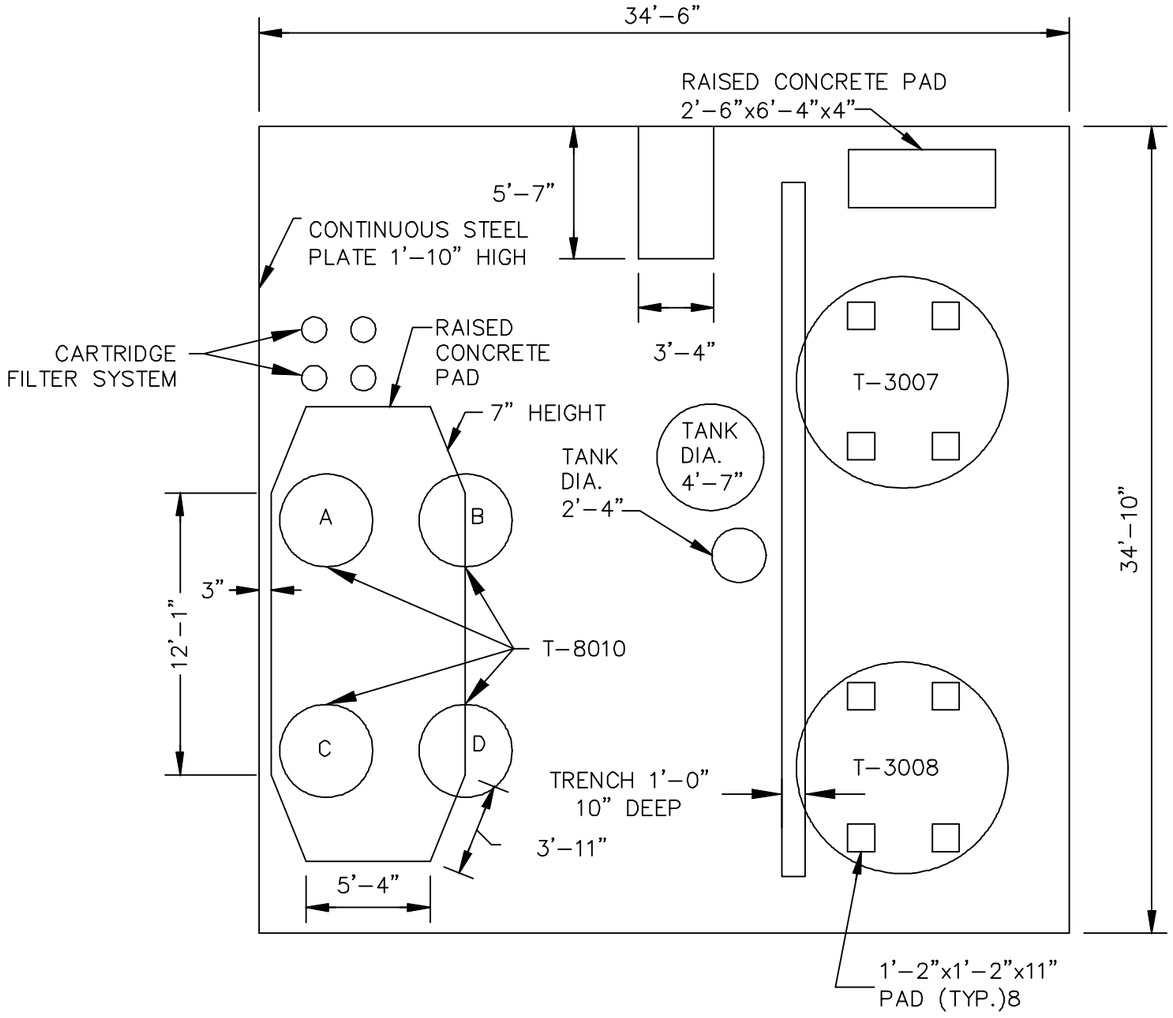



**FILTER PRESS SECOND FLOOR PLAN**
FINISHED FLOOR EL. 12'-0"

**GROUND FLOOR PLAN**
FINISHED FLOOR EL. 0'-0"

figure 12

FACILITY SOURCE LOCATIONS (AWT BUILDING)
CWM
*Model City, New York*




PLAN

N.T.S.

Modified: Nov. 2013

SOURCE REFERENCE:

| WATER TREATMENT BUILDING<br>6NYCRR PART 373 PERMIT | | |
|---|---|---|
| CWM CHEMICAL SERVICES LLC<br>TOWN OF PORTER, STATE OF NEW YORK | | |
| **EnSol, Inc.**<br>Environmental Solutions | 661 MAIN STREET<br>NIAGARA FALLS, NY 14301<br>PHONE (716) 285-3920<br>FAX (716) 285-3928 | FIGURE<br>D-20 |
| 8/13/13 | PN: 13-7028 | |

figure 13

FACILITY SOURCE LOCATIONS (WATER TREATMENT BUILDING)

CWM

*Model City, New York*

# TABLE 1

## FACILITY EMISSION SUMMARY
## EMISSIONS INVENTORY
## CWM CHEMICAL SERVICES, LLC

| Emission Source | Exempt/ Trivial | Exempt / Trivial Basis | VOC | HAP | CO | NOx | $SO_2$ | PM-10 | PM-2.5 | Carbon Tetrachloride | Chloroform | Benzene | Methylene Chloride | TCE | Acrylonitrile | Pesticides, Herbicides, Insecticides | PCBs | POM | $CO_2$ | $CH_4$ | $N_2O$ | Arsenic | Cadmium | Chromium | Manganese | Nickel | Lead |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Emissions (lb/year)* | | | | | | | | | | | | | | | | | | | | | | | | |
| SLF 1-6 Standpipes | N | --- | 343.33 | 339.85 | - | - | - | - | - | 0.10 | 6.20 | 0.72 | 180.03 | 14.64 | 0.07 | 0.16 | 4.37 | 0.82 | - | - | - | - | - | - | - | - | - |
| SLF 1-6 Cover Diffusion | N | --- | 147.38 | 312.08 | - | - | - | - | - | - | 9.10 | 1.62 | 153.12 | 42.55 | 0.01 | 0.07 | 1.98 | - | - | - | - | - | - | - | - | - | - |
| SLF 1-6 Barometric Pumping | N | --- | 22.11 | 46.81 | - | - | - | - | - | - | 1.36 | 0.24 | 22.97 | 6.38 | 0.00 | 0.01 | 0.30 | - | - | - | - | - | - | - | - | - | - |
| SLF 7 Standpipes | N | --- | 20.75 | 39.94 | - | - | - | - | - | - | - | - | 35.38 | - | - | - | 0.06 | - | - | - | - | - | - | - | - | - | - |
| SLF 7 Cover Diffusion | N | --- | 42.34 | 134.69 | - | - | - | - | - | - | - | - | 92.83 | - | - | - | 0.06 | - | - | - | - | - | - | - | - | - | - |
| SLF 7 Barometric Pumping | N | --- | 6.35 | 20.20 | - | - | - | - | - | - | - | - | 13.92 | - | - | - | 0.01 | - | - | - | - | - | - | - | - | - | - |
| SLF 10 Standpipes | N | --- | 34.73 | 21.69 | - | - | - | - | - | - | - | - | 17.41 | - | - | - | 0.01 | - | - | - | - | - | - | - | - | - | - |
| SLF 10 Cover Diffusion | N | --- | 0.93 | 9.26 | - | - | - | - | - | - | - | - | 8.53 | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| SLF 10 Barometric Pumping | N | --- | 0.14 | 1.39 | - | - | - | - | - | - | - | - | 1.28 | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| SLF 11 Standpipes | N | --- | 11.30 | 5.27 | - | - | - | - | - | - | - | - | 0.74 | - | - | - | 2.73 | - | - | - | - | - | - | - | - | - | - |
| SLF 11 Cover Diffusion | N | --- | 3.31 | 3.49 | - | - | - | - | - | - | - | - | 0.21 | - | - | - | 1.45 | - | - | - | - | - | - | - | - | - | - |
| SLF 11 Barometric Pumping | N | --- | 0.50 | 0.52 | - | - | - | - | - | - | - | - | 0.03 | - | - | - | 0.22 | - | - | - | - | - | - | - | - | - | - |
| SLF 12 Standpipes | N | --- | 0.09 | 0.51 | - | - | - | - | - | - | - | - | 0.4 | - | - | - | 0.09 | - | - | - | - | - | - | - | - | - | - |
| SLF 12 Cover Diffusion | N | --- | 0.29 | 1.11 | - | - | - | - | - | - | - | - | 0.83 | - | - | - | 0.29 | - | - | - | - | - | - | - | - | - | - |
| SLF 12 Barometric Pumping | N | --- | 0.04 | 0.17 | - | - | - | - | - | - | - | - | 0.12 | - | - | - | 0.04 | - | - | - | - | - | - | - | - | - | - |
| RMU-1 Standpipes | N | --- | 3.96 | 3.57 | - | - | - | - | - | - | - | - | 1.23 | - | - | - | 0.06 | - | - | - | - | - | - | - | - | - | - |
| RMU-1 Cover Diffusion | N | --- | 0.11 | 0.14 | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.03 | 0.01 | 0.00 | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| RMU-1 Barometric Pumping | N | --- | 0.02 | 0.02 | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| RMU-1 Capping | N | --- | - | - | - | - | - | 1,289.29 | 445.58 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| RMU-1 Landfill Operations | N | --- | - | - | - | - | - | 3,436.62 | 2,992.61 | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.10 | 0.02 | 0.23 | 0.34 |
| Vacuum Trucks (Leachate Transfer) | N | --- | 1.95 | 1.39 | - | - | - | - | - | - | 0.01 | 0.00 | 0.29 | 0.01 | 0.00 | - | 0.01 | - | - | - | - | - | - | - | - | - | - |
| Vacuum Trucks (Groundwater Transfer) | N | --- | 0.20 | 0.27 | - | - | - | - | - | 0.09 | 0.01 | 0.00 | 0.04 | 0.04 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Stabilization Baghouse #1 | N | --- | 1,156.28 | 1,189.18 | - | - | - | 344.42 | 344.42 | 0.66 | 0.44 | 2.35 | 3.72 | 130.56 | - | - | 4.96 | 76.63 | - | - | - | 0.00 | 0.00 | 1.00 | 0.05 | 4.91 | 2.49 |
| Stabilization Baghouse #2 | N | --- | 1,156.28 | 1,189.18 | - | - | - | 191.34 | 191.34 | 0.66 | 0.44 | 2.35 | 3.72 | 130.56 | - | - | 4.96 | 76.63 | - | - | - | 0.00 | 0.00 | 1.00 | 0.05 | 4.91 | 2.49 |
| Cement Kiln Silo | Y | 6 NYCRR 201-3.2(c)(27) | - | - | - | - | - | 22.28 | 22.28 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Lime Silo | Y | 6 NYCRR 201-3.2(c)(27) | - | - | - | - | - | 67.10 | 67.10 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-101 [C] | N | --- | 0.06 | 0.08 | - | - | - | - | - | - | - | - | 0.05 | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-102 | N | --- | 0.06 | 0.08 | - | - | - | - | - | - | - | - | 0.05 | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-103 | N | --- | 1.47 | 1.91 | - | - | - | - | - | - | 0.01 | 0.00 | 0.90 | 0.01 | 0.00 | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-105 | Y | 6 NYCRR 201-3.2(c)(25) | 0.40 | 1.33 | - | - | - | - | - | 0.01 | 0.03 | 0.00 | 0.70 | 0.22 | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-107 | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.01 | - | - | - | - | - | - | - | - | 0.01 | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-108 | N | --- | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-109 | Y | 6 NYCRR 201-3.2(c)(25) | 0.00 | 0.01 | - | - | - | - | - | - | - | - | 0.01 | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-110 | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | 0.00 | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-111 | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-130 | Y | 6 NYCRR 201-3.2(c)(25) | 0.43 | 1.43 | - | - | - | - | - | 0.01 | 0.04 | 0.00 | 0.75 | 0.24 | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-150 | Y | 6 NYCRR 201-3.2(c)(25) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | 0.00 | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-158 | N | --- | 1.22 | 4.04 | - | - | - | - | - | 0.02 | 0.10 | 0.01 | 2.13 | 0.67 | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-160 | Y | 6 NYCRR 201-3.2(c)(25) | 0.01 | 1.07 | - | - | - | - | - | - | - | - | 1.07 | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - |
| Tank T-165 | N | --- | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-8001 | Y | 6 NYCRR 201-3.2(c)(25) | 0.01 | 0.01 | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-8002 | Y | 6 NYCRR 201-3.3(c)(44) | 0.01 | 0.01 | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-8004 | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-8005 | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-8006 | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.00 | - | - | - | - | - | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-8007 | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.00 | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-8008 | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.00 | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-8009 | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.00 | - | - | - | - | - | - | 0.00 | 0.00 | - | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-8010 | Y | 6 NYCRR 201-3.2(c)(25) | 0.00 | 0.00 | - | - | - | - | - | 0.00 | 0.00 | - | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-100 | N | --- | 0.11 | 0.23 | - | - | - | - | - | - | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-210 | N | --- | 0.44 | 0.57 | - | - | - | - | - | - | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-220 | N | --- | 0.44 | 0.57 | - | - | - | - | - | - | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-230 | N | --- | 0.44 | 0.57 | - | - | - | - | - | - | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-1010 | N | --- | 0.31 | 0.40 | - | - | - | - | - | - | 0.00 | 0.00 | 0.19 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-1020 | Y | 6 NYCRR 201-3.2(c)(25) | 0.26 | 0.34 | - | - | - | - | - | - | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-310 | N | --- | 0.02 | 0.01 | - | - | - | - | - | - | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-320 | N | --- | 0.02 | 0.01 | - | - | - | - | - | - | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-3002 | Y | 6 NYCRR 201-3.2(c)(25) | 0.02 | 0.03 | - | - | - | - | - | - | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-3003 | Y | 6 NYCRR 201-3.2(c)(25) | 0.02 | 0.03 | - | - | - | - | - | - | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| T-3007/3008 Carbon Adsorbers [A] | Y | 6 NYCRR 201-3.2(c)(22) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-3009 | Y | 6 NYCRR 201-3.2(c)(25) | 0.01 | 0.02 | - | - | - | - | - | - | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tanks T-3010 A/B/C/D [A] | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-3011 | Y | 6 NYCRR 201-3.3(c)(44) | 0.01 | 0.00 | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-3012 | Y | 6 NYCRR 201-3.3(c)(44) | 0.01 | 0.03 | - | - | - | - | - | - | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Frac Tank #3 | N | --- | 0.01 | 0.05 | - | - | - | - | - | - | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |

# TABLE 1

## FACILITY EMISSION SUMMARY
## EMISSIONS INVENTORY
## CWM CHEMICAL SERVICES, LLC

| Emission Source | Exempt/ Trivial | Exempt / Trivial Basis | VOC | HAP | CO | NOx | $SO_2$ | PM-10 | PM-2.5 | Carbon Tetrachloride | Chloroform | Benzene | Methylene Chloride | TCE | Acrylonitrile | Pesticides, Herbicides, Insecticides | PCBs | POM | $CO_2$ | $CH_4$ | $N_2O$ | Arsenic | Cadmium | Chromium | Manganese | Nickel | Lead |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Emissions (lb/year)* | | | | | | | | | | | | | | | | | | | | | | | | |
| Biotower Exhaust | N | --- | 0.00 | 0.01 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tanks T-1111 / T-1112 [B] | Y | 6 NYCRR 201-3.3(c)(44) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Filter Press | N | --- | 179.6 | 198.40 | - | - | - | - | - | - | - | - | 129.00 | 43.7 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-710 | Y | 6 NYCRR 201-3.2(c)(25) | 0.07 | 0.09 | - | - | - | - | - | - | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-810 | Y | 6 NYCRR 201-3.2(c)(25) | 0.07 | 0.09 | - | - | - | - | - | - | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-820 | Y | 6 NYCRR 201-3.2(c)(25) | 0.07 | 0.09 | - | - | - | - | - | - | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| T-830/T-840 Ferrous Sulfate Tanks [B] | Y | 6 NYCRR 201-3.2(c)(25) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-850 [D] | Y | 6 NYCRR 201-3.2(c)(25) | 0.00 | 0.00 | - | - | - | 4.37 | 4.37 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-58 | N | --- | 0.00 | 0.00 | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-125 | N | --- | 0.00 | 0.00 | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-910 [B] | Y | 6 NYCRR 201-3.2(c)(25) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-1310 [B] | Y | 6 NYCRR 201-3.3(c)(44) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Tank T-1410 [B] | Y | 6 NYCRR 201-3.2(c)(25) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Drum Storage Building Ventilation [E] | Y | 6 NYCRR 201-3.3(c)(5)(ii) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PCB Drum Building [E] | Y | 6 NYCRR 201-3.3(c)(5)(ii) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Two Propane Steam Boilers | Y | 6 NYCRR 201-3.2(c)(1)(i) | 157.20 | - | 1,178.99 | 2,043.58 | 3.14 | 110.04 | 110.04 | - | - | - | - | - | - | - | - | - | 1,964,983.52 | 31.44 | 141.48 | - | - | - | - | - | - |
| One Hot Water Propane Boiler | Y | 5 NYCRR 201-3.2(c)(1)(i) | 96.26 | - | 721.98 | 1,251.43 | 1.93 | 67.38 | 67.38 | - | - | - | - | - | - | - | - | - | 1,203,296.70 | 19.25 | 86.64 | - | - | - | - | - | - |
| Propane Heaters | Y | 6 NYCRR 201-3.2(c)(1)(i) | 130.39 | - | 977.92 | 1,695.06 | 2.61 | 91.27 | 91.27 | - | - | - | - | - | - | - | - | - | 1,629,865.38 | 26.08 | 117.35 | - | - | - | - | - | - |
| 0.506 MMBtu/hr Propane Boiler | Y | 6 NYCRR 201-3.2(c)(1)(i) | 24.35 | - | 182.66 | 316.61 | 0.49 | 17.05 | 17.05 | - | - | - | - | - | - | - | - | - | 304,434.07 | 4.87 | 21.92 | - | - | - | - | - | - |
| 1.34 MMBtu/hr Propane Boiler | Y | 6 NYCRR 201-3.2(c)(1)(i) | 64.50 | - | 483.73 | 838.46 | 1.29 | 45.15 | 45.15 | - | - | - | - | - | - | - | - | - | 806,208.79 | 12.90 | 58.05 | - | - | - | - | - | - |
| 2 - 0.16 MMBtu/hr Propane Heaters | Y | 6 NYCRR 201-3.2(c)(1)(i) | 15.40 | - | 115.52 | 200.23 | 0.31 | 10.78 | 10.78 | - | - | - | - | - | - | - | - | - | 192,527.47 | 3.08 | 13.86 | - | - | - | - | - | - |
| 4 MMBtu/hr Propane Heater | Y | 6 NYCRR 201-3.2(c)(1)(i) | 192.53 | - | 1,443.96 | 2,502.86 | 3.85 | 134.77 | 134.77 | - | - | - | - | - | - | - | - | - | 2,406,593.41 | 38.51 | 173.27 | - | - | - | - | - | - |
| 2 - 0.4 MMBtu/hr Propane Heaters | Y | 6 NYCRR 201-3.2(c)(1)(i) | 19.25 | - | 144.40 | 250.29 | 0.39 | 13.48 | 13.48 | - | - | - | - | - | - | - | - | - | 240,659.34 | 3.85 | 17.33 | - | - | - | - | - | - |
| Diesel Engine | Y | 6 NYCRR 201-3.2(c)(3)(ii) | 11.22 | - | 29.98 | 139.13 | 9.20 | 9.87 | 9.87 | - | - | - | - | - | - | - | - | - | 5,161.20 | - | - | - | - | - | - | - | - |
| Laboratory Emissions | Y | 6 NYCRR 201-3.2(c)(40) | 395.15 | 700.88 | - | - | - | 67.07 | 67.07 | - | - | - | 148.57 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Safety Kleen Parts Washer [B] | Y | 6 NYCRR 201-3.2(c)(39) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Septic Tanks [B] | Y | 6 NYCRR 201-3.3(c)(39) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| T-27 20,000 gal Fuel Oil Tank | Y | 6 NYCRR 201-3.2(c)(21) | 10.60 | 10.60 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Propane Storage Tanks [A] | Y | 6 NYCRR 201-3.3(c)(79) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 275-gal Kerosene Tank | Y | 6 NYCRR 201-3.3(c)(44) | 0.11 | 0.11 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Two 1,000-gal Gasoline Tanks | Y | 6 NYCRR 201-3.2(c)(25) | 313.68 | 313.68 | - | - | - | - | - | - | - | 15.68 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1,000-gal Diesel Fuel Tank | Y | 6 NYCRR 201-3.2(c)(25) | 0.55 | 0.55 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 117-gal Diesel Fuel Tank | Y | 6 NYCRR 201-3.2(c)(25) | 0.09 | 0.09 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 325-gal Engine Oil Tank | Y | 6 NYCRR 201-3.2(c)(25) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 325-gal Engine Oil Tank | Y | 6 NYCRR 201-3.2(c)(25) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 270-gal Engine Oil Tank | Y | 6 NYCRR 201-3.2(c)(25) | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1,500-gal Fuel Oil Tank | Y | 6 NYCRR 201-3.2(c)(25) | 0.69 | 0.69 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Fuel Transfer Operation | Y | 6 NYCRR 201-3.3(c)(67) | 3200.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Drum Sampling | Y | 6 NYCRR 201-3.3(c)(5)(i) | 420.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Leaks / Spills from Drums | N | --- | 11.52 | 11.52 | - | - | - | - | - | - | - | - | - | - | - | 4.26 | - | - | - | - | - | - | - | - | - | - | - |
| Leaks From Pipes/ valves/ flanges | N | --- | 12.84 | 12.84 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Facultative Pond 1/2 | N | --- | 0.64 | 0.52 | - | - | - | - | - | 0.02 | 0.02 | 0.02 | 0.04 | 0.02 | - | - | 0.03 | - | - | - | - | - | - | - | - | - | - |
| Facultative Pond 3 | N | --- | 0.64 | 0.52 | - | - | - | - | - | 0.02 | 0.02 | 0.02 | 0.04 | 0.02 | - | - | 0.03 | - | - | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **EXISTING TOTALS (lb/year)** | | | **8,215.62** | **4,584.26** | **5,279.12** | **9,237.64** | **23.20** | **5,922.28** | **4,634.56** | **1.60** | **17.80** | **23.03** | **821.87** | **369.64** | **0.08** | **0.24** | **25.90** | **154.08** | **8,753,729.88** | **139.98** | **629.90** | **0.01** | **0.00** | **2.11** | **0.11** | **10.05** | **5.31** |
| **EXISTING TOTALS (TPY)** | | | **4.11** | **2.29** | **2.64** | **4.62** | **0.01** | **2.96** | **2.32** | **0.00** | **0.01** | **0.01** | **0.41** | **0.18** | **0.00** | **0.00** | **0.01** | **0.08** | **4,376.86** | **0.07** | **0.31** | **0.00** | **0.00** | **0.00** | **0.00** | **0.01** | **0.00** |
| **Title V Thresholds (TPY)** | | | **50** | **25** | **100** | **100** | **100** | **100** | **100** | **10** | **10** | **10** | **10** | **10** | **10** | **-** | **-** | **-** | **100,000** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **% of Title V Threshold** | | | **8.22%** | **9.17%** | **2.64%** | **4.62%** | **0.01%** | **2.96%** | **2.32%** | **0.01%** | **0.09%** | **0.12%** | **4.11%** | **1.85%** | **0.00%** | | | | **4.38%** | | | | | | | | |

Notes:
A - There are no emissions from these tanks because they are sealed vessels with no vent to the atmosphere
B - These sources either do not have quantifiable emissions and/or do not emit regulated air pollutants
C - Tank T-101 is on standby for RMU-1 leachate; assume emissions are equal to Tank T-102
D - Referenced from April 2006 Emission Inventory
E - No emissions expected from storage of closed containers. Emissions from container sampling at Drum Warehouse listed separately. Emissions from container spills listed separately.

**General Note: The numbers presented on this table have been rounded to 2 decimal places. Therefore, a value of '0.00' means less than 0.005 pounds per year, not necessarily that zero emissions are present. Emissions were reported to two significant digits past the decimal fro consistency, and since this level is orders of magnitude below applicable thresholds.**

**TABLE 2**

**LANDFILL STANDPIPE AND SIDESLOPE RISER DIAMETERS**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Standpipe # | Internal Pipe Dimension (in.) | Internal Pipe Dimensions Sideslope Risers (in.) | Internal Pipe Dimensions Landfill Secondaries (in.) |
|---|---|---|---|
| **SLF 1-6** | | | |
| 1 | 24 | N/A | N/A |
| 2 | 8 | N/A | N/A |
| 3 | 8 | N/A | N/A |
| 4 | 24 | N/A | N/A |
| 5 | 8 | N/A | N/A |
| 6 | 24 | N/A | N/A |
| 7 | 8 | N/A | N/A |
| 8 | 24 | N/A | N/A |
| 9 | 24 | N/A | N/A |
| 10 | 8 | N/A | N/A |
| 12 | 24 | N/A | N/A |
| 13 | 30 | N/A | N/A |
| 14 | 24 | N/A | N/A |
| 15 | 30 | N/A | N/A |
| 16 | 24 | N/A | N/A |
| 17 | 8 | N/A | N/A |
| 18 | 30 | N/A | N/A |
| 19 | 30 | N/A | N/A |
| 20 | 30 | N/A | N/A |
| 21 | 30 | N/A | N/A |
| 22 | 24 | N/A | N/A |
| 23 | 24 | N/A | N/A |
| 24 | 30 | N/A | N/A |
| 25 | 30 | N/A | N/A |
| **SLF 7** | | | |
| 26 | 24 | N/A | N/A |
| 27 | 24 | N/A | N/A |
| 28 | 24 | N/A | N/A |
| 29 | 24 | N/A | N/A |
| 30 | 24 | N/A | N/A |
| 31 | 24 | N/A | N/A |
| **SLF 10** | | | |
| 32 | 48 | N/A | N/A |
| 33 | 48 | N/A | N/A |
| 34 | 48 | N/A | N/A |
| 35 | 48 | N/A | N/A |
| 36 | 48 | N/A | N/A |

**TABLE 2**

**LANDFILL STANDPIPE AND SIDESLOPE RISER DIAMETERS**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Standpipe # | Internal Pipe Dimension (in.) | Internal Pipe Dimensions Sideslope Risers (in.) | Internal Pipe Dimensions Landfill Secondaries (in.) |
|---|---|---|---|
| **SLF 11** | | | |
| 37 | 48 | N/A | N/A |
| 38 | 48 | N/A | N/A |
| 39 | 48 | N/A | N/A |
| 40 | 48 | N/A | N/A |
| 41 | 48 | N/A | 21 |
| 42 | 48 | N/A | 21 |
| 43 | 48 | N/A | 21 |
| 44 | 48 | N/A | 21 |
| 45 | 26 | N/A | N/A |
| 46 | 26 | N/A | 18 |
| 47 | 26 | N/A | N/A |
| 48 | 26 | N/A | N/A |
| 49 | 26 | N/A | N/A |
| 50 | 26 | N/A | N/A |
| **SLF 12** | | | |
| 51 | 19.5 | 19.5 | N/A |
| 52 | 19.5 | 19.5 | N/A |
| 53 | 19.5 | 19.5 | N/A |
| 54 | 19.5 | 19.5 | N/A |
| **RMU-1** | | | |
| 55 | 19.5 | 19.5 | 19.5 |
| 56 | 19.5 | 19.5 | 19.5 |
| 57 | 19.5 | 19.5 | 19.5 |
| 58 | 19.5 | 19.5 | 19.5 |
| 59 | 19.5 | 19.5 | 19.5 |
| 60 | 19.5 | 19.5 | 19.5 |
| 61 | 19.5 | 19.5 | 19.5 |
| 62 | 19.5 | 19.5 | 19.5 |
| 63 | 19.5 | 19.5 | 19.5 |
| 64 | 19.5 | 19.5 | 19.5 |

**TABLE 3**

**ESTIMATED VOC AND HAP EMISSIONS FROM SLF 1-6 STANDPIPES (FROM AQUEOUS PORTION ONLY)**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | Mol. Weight (g/mol) | Leachate Concentration [4] (µg/L) | Leachate Concentration (µg/m$^3$) | # Carbon Atoms | # Hydrogen Atoms | # Oxygen Atoms | # Chloride Atoms | # Fluorine Atoms | # Sulfur Atoms | # Bromine Atoms | # Nitrogen Atoms | Atomic Diffusion Volume for $D_a$ Calculation [5] | Gas Diffusion Coefficient $D_a$ [6] (m$^2$/h) | Atomic Volume for $D_l$ Calculation [7] (cm$^3$/mol) | Liquid Diffusion Coefficient $D_l$ [8] (m$^2$/h) | Schmidt Number $S_c$ [9] | Reynolds Number $R_e$ [9] | Sherwood Number $S_h$ [9] | Total Surface Area [10] (m$^2$) | Char. Length [11] (m) | $k_G$ [9] (m/h) | $k_L$ [9] (m/h) | $K_{OL}$ [9] (m/h) | Henry's Constant [12] | $K_{OG}$ [9] (m/h) | Emissions [9] (µg/hr) | Emissions (lb/hr) | Emissions (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Method 8260B VOCs* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | | X | 133.4 | 3900 | 3,900,000 | 2 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 97.44 | 2.86E-02 | 105.50 | 3.51E-06 | 2.0 | 24,813.8 | 131.4 | 6.77 | 2.60 | 1.44 | 5.60E-03 | 5.57E-03 | 7.05E-01 | 7.90E-03 | 1.47E+05 | 3.24E-04 | 2.84 | | 2.84 |
| 1,1,2-Trichloro-1,2,2-trichfluoroethane [1] | 76-13-1 | X | | 187.376 | 39 | 39,000 | 2 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 114.80 | 2.60E-02 | 120.50 | 3.24E-06 | 2.2 | 24,813.8 | 135.6 | 6.77 | 2.60 | 1.35 | 5.38E-03 | 5.38E-03 | 1.96E+01 | 2.75E-04 | 1.42E+03 | 3.13E-06 | 0.03 | 0.03 | | |
| 1,1,2-Trichloroethane | 79-00-5 | X | X | 133.4 | 4800 | 4,800,000 | 2 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 97.44 | 2.86E-02 | 105.50 | 3.51E-06 | 2.0 | 24,813.8 | 131.4 | 6.77 | 2.60 | 1.44 | 5.60E-03 | 5.07E-03 | 3.74E-02 | 1.36E-01 | 1.65E+05 | 3.63E-04 | 3.18 | 3.18 | 3.18 |
| 1,1-Dichloroethane | 75-34-3 | X | X | 98.96 | 2700 | 2,700,000 | 2 | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 79.92 | 3.20E-02 | 87.60 | 3.91E-06 | 1.8 | 24,813.8 | 126.5 | 6.77 | 2.60 | 1.56 | 5.91E-03 | 5.82E-03 | 2.30E-01 | 2.53E-02 | 1.06E+05 | 2.34E-04 | 2.05 | 2.05 | 2.05 |
| 1,1-Dichloroethene | 75-35-4 | X | X | 96.94 | 410 | 410,000 | 2 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 75.96 | 3.27E-02 | 80.20 | 4.12E-06 | 1.7 | 24,813.8 | 125.6 | 6.77 | 2.60 | 1.58 | 6.07E-03 | 6.05E-03 | 1.06E+00 | 5.71E-03 | 1.68E+04 | 3.70E-05 | 0.32 | 0.32 | 0.32 |
| 1,2-Dibromoethane [2] | 106-93-4 | X | X | 187.86 | 560 | 560,000 | 2 | 4 | 0 | 0 | 0 | 0 | 2 | 0 | 108.12 | 2.66E-02 | 98.40 | 3.65E-06 | 2.1 | 24,813.8 | 134.5 | 6.77 | 2.60 | 1.38 | 5.71E-03 | 5.03E-03 | 3.03E-02 | 1.66E-01 | 1.90E+04 | 4.20E-05 | 0.37 | 0.37 | 0.37 |
| 1,2-Dichloroethane | 107-06-2 | X | X | 98.96 | 6900 | 6,900,000 | 2 | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 79.92 | 3.20E-02 | 87.60 | 3.91E-06 | 1.8 | 24,813.8 | 126.5 | 6.77 | 2.60 | 1.56 | 5.91E-03 | 5.40E-03 | 4.01E-02 | 1.35E-01 | 2.52E+05 | 5.56E-04 | 4.87 | 4.87 | 4.87 |
| 1,4-Dioxane [3] | 123-91-1 | X | X | 88.11 | 95000 | 95,000,000 | 4 | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 72.80 | 3.37E-02 | 88.60 | 3.89E-06 | 1.7 | 24,813.8 | 124.4 | 6.77 | 2.60 | 1.61 | 5.89E-03 | 3.34E-04 | 2.20E-04 | 1.52E+00 | 2.15E+05 | 4.74E-04 | 4.15 | 4.15 | 4.15 |
| Acetonitrile | 75-05-8 | X | X | 41.05 | 6400 | 6,400,000 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 44.63 | 4.62E-02 | 56.30 | 5.08E-06 | 1.2 | 24,813.8 | 111.9 | 6.77 | 2.60 | 1.99 | 6.74E-03 | 1.65E-03 | 1.10E-03 | 1.50E+00 | 7.15E+04 | 1.58E-04 | 1.38 | 1.38 | 1.38 |
| Acrylonitrile | 107-13-1 | X | X | 53.06 | 160 | 160,000 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 61.13 | 3.89E-02 | 71.10 | 4.42E-06 | 1.5 | 24,813.8 | 118.5 | 6.77 | 2.60 | 1.77 | 6.29E-03 | 3.37E-03 | 4.10E-03 | 8.23E-01 | 3.65E+03 | 8.05E-06 | 0.07 | 0.07 | 0.07 |
| Benzene [3] | 71-43-2 | X | X | 78.11 | 920 | 920,000 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 90.88 | 3.12E-02 | 96 | 3.71E-06 | 1.8 | 24,813.8 | 127.5 | 6.77 | 2.60 | 1.53 | 5.76E-03 | 5.66E-03 | 2.28E-01 | 2.48E-02 | 3.53E+04 | 7.77E-05 | 0.68 | 0.68 | 0.68 |
| Carbon disulfide | 75-15-0 | X | X | 76.14 | 27 | 27,000 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 50.5 | 3.96E-02 | 66.00 | 4.62E-06 | 1.4 | 24,813.8 | 117.8 | 6.77 | 2.60 | 1.79 | 6.43E-03 | 6.41E-03 | 1.24E+00 | 5.17E-03 | 1.17E+03 | 2.58E-06 | 0.02 | 0.02 | 0.02 |
| Chlorobenzene [3] | 108-90-7 | X | X | 112.56 | 1000 | 1,000,000 | 6 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 108.4 | 2.78E-02 | 113.90 | 3.35E-06 | 2.0 | 24,813.8 | 132.6 | 6.77 | 2.60 | 1.42 | 5.47E-03 | 5.34E-03 | 1.52E-01 | 3.51E-02 | 3.61E+04 | 7.96E-05 | 0.70 | 0.70 | 0.70 |
| Chloroethane | 75-00-3 | X | X | 64.51 | 110 | 110,000 | 2 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 62.4 | 3.74E-02 | 69.70 | 4.48E-06 | 1.5 | 24,813.8 | 120.1 | 6.77 | 2.60 | 1.73 | 6.33E-03 | 6.26E-03 | 3.60E-01 | 1.74E-02 | 4.66E+03 | 1.03E-05 | 0.09 | 0.09 | 0.09 |
| Chloroform | 67-66-3 | X | X | 119.38 | 7800 | 7,800,000 | 1 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 76.98 | 3.18E-02 | 83.30 | 4.03E-06 | 1.8 | 24,813.8 | 126.7 | 6.77 | 2.60 | 1.55 | 6.00E-03 | 5.85E-03 | 1.50E-01 | 3.90E-02 | 3.09E+05 | 6.81E-04 | 5.96 | 5.96 | 5.96 |
| Chloromethane | 74-87-3 | X | X | 50.49 | 84 | 84,000 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 41.94 | 4.54E-02 | 47.50 | 5.61E-06 | 1.2 | 24,813.8 | 112.6 | 6.77 | 2.60 | 1.97 | 7.08E-03 | 7.01E-03 | 3.60E-01 | 1.95E-02 | 3.99E+03 | 8.79E-06 | 0.08 | 0.08 | 0.08 |
| Dibromomethane [2] | 74-95-3 | X | | 173.83 | 3500 | 3,500,000 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 87.66 | 2.92E-02 | 76.20 | 4.25E-06 | 1.9 | 24,813.8 | 130.4 | 6.77 | 2.60 | 1.47 | 6.16E-03 | 5.51E-03 | 3.53E-02 | 1.56E-01 | 1.30E+05 | 2.87E-04 | 2.52 | 2.52 | |
| Ethyl ether | 60-29-7 | X | | 74.12 | 9400 | 9,400,000 | 4 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 91.28 | 3.14E-02 | 103.6 | 3.54E-06 | 1.8 | 24,813.8 | 127.3 | 6.77 | 2.60 | 1.54 | 5.63E-03 | 5.25E-03 | 5.04E-02 | 1.04E-01 | 3.34E+05 | 7.36E-04 | 6.45 | 6.45 | |
| Ethylbenzene [3] | 100-41-4 | X | X | 106.17 | 170 | 170,000 | 8 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 131.8 | 2.57E-02 | 140.4 | 2.96E-06 | 2.2 | 24,813.8 | 136.1 | 6.77 | 2.60 | 1.34 | 5.15E-03 | 5.09E-03 | 3.21E-01 | 1.58E-02 | 5.85E+03 | 1.29E-05 | 0.11 | 0.11 | 0.11 |
| Isobutanol | 78-83-1 | X | | 74.12 | 37000 | 37,000,000 | 4 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 91.28 | 3.14E-02 | 103.6 | 3.54E-06 | 1.8 | 24,813.8 | 127.3 | 6.77 | 2.60 | 1.54 | 5.63E-03 | 6.57E-04 | 4.84E-04 | 1.36E+00 | 1.64E+05 | 3.62E-04 | 3.18 | 3.18 | |
| Tetrachloroethene | 127-18-4 | | X | 165.83 | 500 | 500,000 | 2 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 111 | 2.66E-02 | 116 | 3.32E-06 | 2.1 | 24,813.8 | 134.6 | 6.77 | 2.60 | 1.37 | 5.44E-03 | 5.42E-03 | 7.50E-01 | 7.22E-03 | 1.83E+04 | 4.04E-05 | 0.35 | | 0.35 |
| Toluene [3] | 108-88-3 | X | X | 92.14 | 4800 | 4,800,000 | 7 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 111.34 | 2.81E-02 | 118.2 | 3.28E-06 | 2.0 | 24,813.8 | 132.1 | 6.77 | 2.60 | 1.43 | 5.41E-03 | 5.34E-03 | 2.71E-01 | 1.97E-02 | 1.73E+05 | 3.82E-04 | 3.35 | 3.35 | 3.35 |
| trans-1,2-Dichloroethene | 156-60-5 | X | | 96.94 | 300 | 300,000 | 2 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 75.96 | 3.27E-02 | 80.2 | 4.12E-06 | 1.7 | 24,813.8 | 125.6 | 6.77 | 2.60 | 1.58 | 6.07E-03 | 6.01E-03 | 3.85E-01 | 1.56E-02 | 1.22E+04 | 2.69E-05 | 0.24 | 0.24 | |
| Xylenes [3] | 1330-20-7 | X | X | 106.16 | 820 | 820,000 | 8 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 131.8 | 2.57E-02 | 140.4 | 2.96E-06 | 2.2 | 24,813.8 | 136.1 | 6.77 | 2.60 | 1.34 | 5.15E-03 | 5.07E-03 | 2.56E-01 | 1.98E-02 | 2.81E+04 | 6.20E-05 | 0.54 | 0.54 | 0.54 |
| Cyclohexanone [3] | 108-94-1 | X | | 98.15 | 2100 | 2,100,000 | 6 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 104.28 | 2.87E-02 | 118.2 | 3.28E-06 | 2.0 | 24,813.8 | 131.2 | 6.77 | 2.60 | 1.45 | 5.41E-03 | 6.29E-04 | 4.92E-04 | 1.28E+00 | 8.93E+03 | 1.97E-05 | 0.17 | 0.17 | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | X | X | 167.85 | 12000 | 12,000,000 | 2 | 2 | 0 | 4 | 0 | 0 | 0 | 0 | 114.96 | 2.62E-02 | 123.4 | 3.20E-06 | 2.2 | 24,813.8 | 135.3 | 6.77 | 2.60 | 1.36 | 5.35E-03 | 4.18E-03 | 1.41E-02 | 2.97E-01 | 3.40E+05 | 7.48E-04 | 6.56 | 6.56 | 6.56 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 550000 | 550,000,000 | 4 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 87.32 | 3.21E-02 | 96.2 | 3.70E-06 | 1.8 | 24,813.8 | 126.4 | 6.77 | 2.60 | 1.56 | 5.75E-03 | 2.20E-03 | 2.28E-03 | 9.64E-01 | 8.18E+06 | 1.80E-02 | 157.96 | 157.96 | |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 79000 | 79,000,000 | 6 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 128.24 | 2.62E-02 | 140.6 | 2.96E-06 | 2.2 | 24,813.8 | 135.3 | 6.77 | 2.60 | 1.36 | 5.14E-03 | 3.08E-03 | 5.63E-03 | 5.47E-01 | 1.65E+06 | 3.63E-03 | 31.78 | 31.78 | 31.78 |
| Acetone | 67-64-1 | | | 58.08 | 740000 | 740,000,000 | 3 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 66.86 | 3.70E-02 | 74 | 4.32E-06 | 1.5 | 24,813.8 | 120.5 | 6.77 | 2.60 | 1.71 | 6.22E-03 | 1.89E-03 | 1.59E-03 | 1.19E+00 | 9.49E+06 | 2.09E-02 | 183.25 | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 220000 | 220,000,000 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 59.46 | 3.67E-02 | 65.4 | 4.65E-06 | 1.5 | 24,813.8 | 120.9 | 6.77 | 2.60 | 1.70 | 6.45E-03 | 6.18E-03 | 8.93E-02 | 6.92E-02 | 9.21E+06 | 2.03E-02 | 177.78 | | 177.78 |
| Trichloroethene | 79-01-6 | X | X | 131.39 | 13000 | 13,000,000 | 2 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 93.48 | 2.91E-02 | 98.1 | 3.66E-06 | 1.9 | 24,813.8 | 130.5 | 6.77 | 2.60 | 1.46 | 5.72E-03 | 5.67E-03 | 4.21E-01 | 1.35E-02 | 4.99E+05 | 1.10E-03 | 9.63 | 9.63 | 9.63 |
| *Method 8270C SVOCs* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4,5-Tetrachlorobenzene [3] | 95-94-3 | X | | 215.89 | 210 | 210,000 | 6 | 2 | 0 | 4 | 0 | 0 | 0 | 0 | 160.96 | 2.22E-02 | 167.6 | 2.67E-06 | 2.5 | 24,813.8 | 142.9 | 6.77 | 2.60 | 1.22 | 4.89E-03 | 4.71E-03 | 1.06E-01 | 4.45E-02 | 6.69E+03 | 1.47E-05 | 0.13 | 0.13 | |
| 2,4-Dichlorophenol [3] | 120-83-2 | X | | 163 | 1300 | 1,300,000 | 6 | 4 | 1 | 2 | 0 | 0 | 0 | 0 | 131.4 | 2.47E-02 | 139.2 | 2.98E-06 | 2.3 | 24,813.8 | 137.8 | 6.77 | 2.60 | 1.31 | 5.16E-03 | 1.64E-04 | 1.30E-04 | 1.27E+00 | 1.45E+03 | 3.19E-06 | 0.03 | 0.03 | |
| 2,4-Dimethylphenol [3] | 105-67-9 | X | | 122.16 | 2600 | 2,600,000 | 8 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 137.28 | 2.49E-02 | 147.8 | 2.87E-06 | 2.3 | 24,813.8 | 137.6 | 6.77 | 2.60 | 1.32 | 5.07E-03 | 1.06E-04 | 8.20E-05 | 1.29E+00 | 1.86E+03 | 4.10E-06 | 0.04 | 0.04 | |
| 2-Chlorophenol [3] | 95-57-8 | X | | 128.56 | 230 | 230,000 | 6 | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 113.88 | 2.68E-02 | 121.3 | 3.23E-06 | 2.1 | 24,813.8 | 134.1 | 6.77 | 2.60 | 1.38 | 5.37E-03 | 4.92E-04 | 3.91E-04 | 1.26E+00 | 7.65E+02 | 1.69E-06 | 0.01 | 0.01 | |
| 2-Methylphenol [3] | 95-48-7 | X | X | 108.14 | 2200 | 2,200,000 | 7 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 116.82 | 2.70E-02 | 125.6 | 3.16E-06 | 2.1 | 24,813.8 | 133.8 | 6.77 | 2.60 | 1.39 | 5.32E-03 | 6.75E-05 | 4.92E-05 | 1.37E+00 | 1.01E+03 | 2.22E-06 | 0.02 | 0.02 | 0.02 |
| 3-Methylphenol [3] | 108-39-4 | X | X | 108.14 | 17000 | 17,000,000 | 7 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 116.82 | 2.70E-02 | 125.6 | 3.16E-06 | 2.1 | 24,813.8 | 133.8 | 6.77 | 2.60 | 1.39 | 5.32E-03 | 4.88E-05 | 3.547E-05 | 1.38E+00 | 5.62E+03 | 1.24E-05 | 0.11 | 0.11 | 0.11 |
| 4-Chloroaniline [3] | 106-47-8 | X | | 127.57 | 3000 | 3,000,000 | 6 | 6 | 0 | 1 | 0 | 0 | 0 | 1 | 116.07 | 2.67E-02 | 133.2 | 3.06E-06 | 2.1 | 24,813.8 | 134.5 | 6.77 | 2.60 | 1.38 | 5.23E-03 | 1.87E-05 | 1.36E-05 | 1.37E+00 | 3.79E+02 | 8.35E-07 | 0.01 | 0.01 | | |
| 4-Methylphenol [3] | 106-44-5 | X | X | 108.13 | 17000 | 17,000,000 | 7 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 116.82 | 2.70E-02 | 125.6 | 3.16E-06 | 2.1 | 24,813.8 | 133.8 | 6.77 | 2.60 | 1.39 | 5.32E-03 | 4.48E-05 | 3.25E-05 | 1.38E+00 | 5.15E+03 | 1.14E-05 | 0.10 | 0.10 | 0.10 |
| Acetophenone [3] | 98-86-2 | X | X | 120.15 | 3400 | 3,400,000 | 8 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 133.32 | 2.52E-02 | 140.4 | 2.96E-06 | 2.2 | 24,813.8 | 136.9 | 6.77 | 2.60 | 1.33 | 5.15E-03 | 5.24E-04 | 4.39E-04 | 1.19E+00 | 1.20E+04 | 2.66E-05 | 0.23 | 0.23 | 0.23 |
| Aniline [3] | 62-53-3 | X | X | 93.13 | 2200 | 2,200,000 | 6 | 7 | 0 | 0 | 0 | 0 | 0 | 1 | 98.55 | 2.95E-02 | 115.3 | 3.33E-06 | 1.9 | 24,813.8 | 129.9 | 6.77 | 2.60 | 1.47 | 5.45E-03 | 1.13E-04 | 0.0000779 | 1.44E+00 | 1.68E+03 | 3.69E-06 | 0.03 | 0.03 | 0.03 |
| Diethyl phthalate [3] | 84-66-2 | X | | 222.24 | 270 | 270,000 | 12 | 14 | 4 | 0 | 0 | 0 | 0 | 0 | 227.64 | 1.90E-02 | 244 | 2.14E-06 | 3.0 | 24,813.8 | 150.6 | 6.77 | 2.60 | 1.10 | 4.37E-03 | 2.02E-05 | 1.845E-05 | 1.09E+00 | 3.68E+01 | 8.12E-08 | 0.00 | 0.00 | |
| Dimethyl phthalate [3] | 131-11-3 | X | X | 194.18 | 280 | 280,000 | 10 | 10 | 4 | 0 | 0 | 0 | 0 | 0 | 186.72 | 2.09E-02 | 199.6 | 2.41E-06 | 2.7 | 24,813.8 | 145.8 | 6.77 | 2.60 | 1.17 | 4.64E-03 | 5.04E-06 | 4.305E-06 | 1.17E+00 | 9.55E+00 | 2.11E-08 | 0.00 | 0.00 | 0.00 |
| Pentachlorobenzene [3] | 608-93-5 | X | | 250.34 | 300 | 300,000 | 6 | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 178.48 | 2.10E-02 | 185.5 | 2.51E-06 | 2.7 | 24,813.8 | 145.5 | 6.77 | 2.60 | 1.18 | 4.74E-03 | 4.16E-03 | 2.91E-02 | 1.43E-01 | 8.46E+03 | 1.86E-05 | 0.16 | 0.16 | |
| Pyridine [3] | 110-86-1 | X | | 79.1 | 4600 | 4,600,000 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 1 | 78.09 | 3.32E-02 | 93.1 | 3.77E-06 | 1.7 | 24,813.8 | 125.0 | 6.77 | 2.60 | 1.59 | 5.81E-03 | 5.28E-04 | 3.64E-04 | 1.45E+00 | 1.64E+04 | 3.62E-05 | 0.32 | 0.32 | |
| Phenol [3] | 108-95-2 | X | X | 94.11 | 140000 | 140,000,000 | 6 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 96.36 | 2.98E-02 | 103.4 | 3.55E-06 | 1.9 | 24,813.8 | 129.6 | 6.77 | 2.60 | 1.48 | 5.63E-03 | 2.41E-05 | 1.63E-05 | 1.48E+00 | 2.28E+04 | 5.03E-05 | 0.44 | 0.44 | 0.44 |
| *Method 8015B - Nonhalogenated Organic Compounds* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Methanol | 67-56-1 | X | X | 32.04 | 9.70E+05 | 970,000,000 | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 29.9 | 5.65E-02 | 37 | 6.50E-06 | 1.0 | 24,813.8 | 104.6 | 6.77 | 2.60 | 2.27 | 7.62E-03 | 4.02E-04 | 1.87E-04 | 2.15E+00 | 2.64E+06 | 5.81E-03 | 50.94 | 50.94 | 50.94 |
| Butyl alcohol, n- | 71-36-3 | X | | 74.12 | 290000 | 290,000,000 | 4 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 91.28 | 3.14E-02 | 103.6 | 3.54E-06 | 1.8 | 24,813.8 | 127.3 | 6.77 | 2.60 | 1.54 | 5.63E-03 | 5.05E-04 | 3.61E-04 | 1.40E+00 | 9.92E+05 | 2.19E-03 | 19.15 | 19.15 | | |
| *Method 608 - Organochloride Pesticides in Water* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD [3] | 72-54-8 | X | | 320.04 | 2.6 | 2,600 | 14 | 10 | 0 | 4 | 0 | 0 | 0 | 0 | 308.8 | 1.61E-02 | 315.6 | 1.84E-06 | 3.5 | 24,813.8 | 158.9 | 6.77 | 2.60 | 0.99 | 4.05E-03 | 1.56E-04 | 1.64E-04 | 9.48E-01 | 2.74E+00 | 6.03E-09 | 0.00005 | 0.00005 | | |
| 4,4-DDT [3] | 50-29-3 | X | | 354.49 | 2.5 | 2,500 | 14 | 9 | 0 | 5 | 0 | 0 | 0 | 0 | 326.32 | 1.57E-02 | 333.5 | 1.78E-06 | 3.6 | 24,813.8 | 160.5 | 6.77 | 2.60 | 0.97 | 3.99E-03 | 2.97E-04 | 3.32E-04 | 8.94E-01 | 5.02E+00 | 1.11E-08 | 0.00010 | 0.00010 | | |
| alpha-BHC [3] | 319-84-6 | X | | 290.83 | 6.2 | 6,200 | 6 | 6 | 0 | 6 | 0 | 0 | 0 | 0 | 207.88 | 1.95E-02 | 225.6 | 2.24E-06 | 2.9 | 24,813.8 | 149.2 | 6.77 | 2.60 | 1.12 | 4.48E-03 | 4.38E-04 | 4.35E-04 | 1.01E+00 | 1.84E+01 | 4.05E-08 | 0.00036 | 0.00036 | | |
| beta-BHC [3] | 319-85-7 | X | | 290.83 | 13 | 13,000 | 6 | 6 | 0 | 6 | 0 | 0 | 0 | 0 | 207.88 | 1.95E-02 | 225.6 | 2.24E-06 | 2.9 | 24,813.8 | 149.2 | 6.77 | 2.60 | 1.12 | 4.48E-03 | 3.38E-05 | 3.046E-05 | 1.11E+00 | 2.97E+00 | 6.56E-09 | 0.00006 | 0.00006 | | |
| delta-BHC [3] | 319-86-8 | X | | 290.83 | 14 | 14,000 | 6 | 6 | 0 | 6 | 0 | 0 | 0 | 0 | 207.88 | 1.95E-02 | 225.6 | 2.24E-06 | 2.9 | 24,813.8 | 149.2 | 6.77 | 2.60 | 1.12 | 4.48E-03 | 1.96E-05 | 1.759E-05 | 1.11E+00 | 1.86E+00 | 4.09E-09 | 0.00004 | 0.00004 | | |
| Endrin [3] | 72-20-8 | X | | 380.91 | 1.4 | 1,400 | 12 | 8 | 1 | 6 | 0 | 0 | 0 | 0 | 316.32 | 1.58E-02 | 329.2 | 1.79E-06 | 3.6 | 24,813.8 | 159.9 | 6.77 | 2.60 | 0.97 | 4.00E-03 | 2.79E-04 | 3.08E-04 | 9.06E-01 | 2.65E+00 | 5.84E-09 | 0.00005 | 0.00005 | | |
| Lindane [3] | 58-89-9 | X | X | 290.83 | 14 | 14,000 | 6 | 6 | 0 | 6 | 0 | 0 | 0 | 0 | 207.88 | 1.95E-02 | 225.6 | 2.24E-06 | 2.9 | 24,813.8 | 149.2 | 6.77 | 2.60 | 1.12 | 4.48E-03 | 5.61E-04 | 5.74E-04 | 9.78E-01 | 5.32E+01 | 1.17E-07 | 0.00103 | 0.00103 | 0.00103 |
| *Method 8151A - Herbicides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2,4-D [3] | 94-75-7 | X | | 221.04 | 1300 | 1,300,000 | 8 | 6 | 3 | 2 | 0 | 0 | 0 | 0 | 179.32 | 2.11E-02 | 191 | 2.47E-06 | 2.7 | 24,813.8 | 145.3 | 6.77 | 2.60 | 1.18 | 4.70E-03 | 4.94E-07 | 4.18E-07 | 1.18E+00 | 4.34E+00 | 9.57E-09 | 0.00008 | 0.00008 | | |
| *Method 8280A - Dioxins and Furans* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin [3] | 35822-46-9 | X | | 425.31 | 2.4 | 2,400 | 12 | 1 | 2 | 7 | 0 | 0 | 0 | 0 | 327.44 | 1.55E-02 | 332.3 | 1.78E-06 | 3.6 | 24,813.8 | 161.0 | 6.77 | 2.60 | 0.96 | 3.99E-03 | 7.07E-04 | 8.94E-04 | 7.91E-01 | 1.15E+01 | 2.53E-08 | 0.00022 | 0.00022 | | |
| OCDD [3] | 3268-87-9 | X | | 459.75 | 1.5 | 1,500 | 12 | 0 | 2 | 8 | 0 | 0 | 0 | 0 | 344.96 | 1.51E-02 | 350.2 | 1.73E-06 | 3.7 | 24,813.8 | 162.4 | 6.77 | 2.60 | 0.94 | 3.93E-03 | 2.43E-04 | 2.75E-04 | 8.85E-01 | 2.47E+00 | 5.44E-09 | 0.00005 | 0.00005 | | |
| OCDF [3, 13] | 39001-02-0 | X | | 443.75 | 1.3 | 1,300 | 12 | 0 | 1 | 8 | 0 | 0 | 0 | 0 | 339.48 | 1.52E-02 | 342.8 | 1.75E-06 | 3.7 | 24,813.8 | 162.0 | 6.77 | 2.60 | 0.95 | 3.96E-03 | 2.45E-04 | 2.75E-04 | 8.91E-01 | 2.15E+00 | 4.74E-09 | 0.00004 | 0.00004 | | |
| *PCBs (from Tank T-130 sample)* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aroclor 1242 [3] | 53469-21-9 | X | X | 291.99 | 2810 | 2,810,000 | 12 | 6 | 0 | 4 | 0 | 0 | 0 | 0 | 267.88 | 1.73E-02 | 271.2 | 2.01E-06 | 3.3 | 24,813.8 | 155.2 | 6.77 | 2.60 | 1.03 | 4.24E-03 | 3.56E-03 | 2.13E-02 | 1.67E-01 | 6.76E+04 | 1.49E-04 | 1.31 | 1.31 | 1.31 |
| Aroclor 1254 [3] | 11097-69-1 | X | X | 326.44 | 795 | 795,000 | 12 | 5 | 0 | 5 | 0 | 0 | 0 | 0 | 285.4 | 1.67E-02 | 289.1 | 1.94E-06 | 3.4 | 24,813.8 | 157.0 | 6.77 | 2.60 | 1.01 | 4.16E-03 | 3.96E-03 | 8.20E-02 | 4.83E-02 | 2.13E+04 | 4.70E-05 | 0.41 | 0.41 | 0.41 |
| Aroclor 1260 [3] | 11096-82-5 | X | X | 395.33 | 690 | 690,000 | 12 | 3 | 0 | 7 | 0 | 0 | 0 | 0 | 320.44 | 1.57E-02 | 324.9 | 1.81E-06 | 3.6 | 24,813.8 | 160.3 | 6.77 | 2.60 | 0.97 | 4.02E-03 | 3.93E-03 | 1.89E-01 | 2.09E-02 | 1.84E+04 | 4.05E-05 | 0.35 | 0.35 | 0.35 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **TOTALS** | **320.22** | **310.81** |

Notes:

1 No value of atomic diffusion volume provided for fluorine atom; assumed total value of 114.8 for $CCl_3F_2$ to calculate air diffusivity
2 No value of atomic diffusion volume provided for bromine atom; referenced value of 67.2 for bromine molecule (2 bonded bromine atoms) to calculate air diffusivity
3 Deduction of 20 and 15 applied for calculation of atomic diffusion volumes for air and liquid, respectively (deduction applied for a hexagonal ring)
4 Analytical results from sample taken at Tank 103 on March 21, 2013
5 Method for calculating total diffusion volume for air taken from Fuller et al., 1966
6 Calculation method for gas diffusion coefficient referenced from *Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design* , 2008
7 Method for calculating total diffusion volume for water was taken from the LeBas Method, 1915
8 Calculation method for liquid diffusion coefficient referenced from *Water Treatment Principles and Design, Third Edition* , 2012
9 Parameter was calculated using method presented in paper: "Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools Under Simulated Indoor Environmental Conditions," December 2002
10 Total surface area of all standpipes in SLF 1-6 calculated as follows: (Pi) x ( [ (6 standpipes) x (0.102 m radius)$^2$ ] + [ (10 standpipes) x (0.305 m radius)$^2$ ] + [ (8 standpipes) x (0.381 m radius)$^2$ ] ) = 6.77 m$^2$
11 Characteristic length calculated as the square root of the total surface area
12 Referenced materials provided on USEPA website and CHEMFATE provided by SRC
13 Henry's constant could not be located for OCDF; assumed value for OCDD

**TABLE 4**

**ESTIMATED LIGHT NON-AQUEOUS PHASE LIQUID EMISSIONS FROM SLF 1-6 STANDPIPES**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| | | |
|---|---|---|
| Annual Leachate Collected From SLF 1-6 = | 200,000 | gallons / year |
| LNAPL Portion = | 5,000 | gallons / year (2.5% of total leachate) |
| LNAPL Portion = | 18,927 | liters / year (2.5% of total leachate) |
| Amount Volatilized = | 1% | (for PCBs, pesticides or PAHs) |
| Amount Volatilized = | 1% | (for compounds that are not PCBs, pesticides or PAHs) |

| Detected Compounds | CAS Number | VOC | HAP | Composition [1] (µg/L) | Emissions [2] (lb/year) | Emissions (lb/yr) | Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | | | 340,000 | 0.1 | | |
| Anthracene | 120-12-7 | X | | 38,000 | 0.0 | 0.0 | |
| Benzene | 71-43-2 | X | X | 86,000 | 0.0 | 0.0 | 0.0 |
| Bis(2-ethylhexyl)phthalate | 117-81-7 | X | X | 730,000 | 0.3 | 0.3 | 0.3 |
| 2-Butanone | 78-93-3 | X | | 980,000 | 0.4 | 0.4 | |
| Butyl benzyl Phthalate | 85-68-7 | X | | 35,000 | 0.0 | 0.0 | |
| Carbon Tetrachloride | 56-23-5 | X | X | 250,000 | 0.1 | 0.1 | 0.1 |
| Chlorobenzene | 108-90-7 | X | X | 2,200,000 | 0.9 | 0.9 | 0.9 |
| Chloroform | 67-66-3 | X | X | 570,000 | 0.2 | 0.2 | 0.2 |
| 1,1-Dichloroethane | 75-34-3 | X | X | 88,000 | 0.0 | 0.0 | 0.0 |
| 1,2-Dichloroethane | 107-06-2 | X | X | 200,000 | 0.1 | 0.1 | 0.1 |
| Diethlyphthalate | 84-66-2 | X | | 90,000 | 0.0 | 0.0 | |
| Di-n-Butyl phthalate | 84-74-2 | X | | 340,000 | 0.1 | 0.1 | |
| Ethylbenzene | 100-41-4 | X | X | 1,600,000 | 0.7 | 0.7 | 0.7 |
| Methylene Chloride | 75-09-2 | | X | 5,400,000 | 2.3 | | 2.3 |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 1,700,000 | 0.7 | 0.7 | 0.7 |
| Naphthalene | 91-20-3 | X | X | 1,100,000 | 0.5 | 0.5 | 0.5 |
| PCB-1242 | 53469-21-9 | X | X | 4,100,000 | 1.7 | 1.7 | 1.7 |
| PCB-1254 | 11097-69-1 | X | X | 1,400,000 | 0.6 | 0.6 | 0.6 |
| Phenol | 108-95-2 | X | X | 490,000 | 0.2 | 0.2 | 0.2 |
| Phenanthrene | 85-01-8 | X | | 98,000 | 0.0 | 0.0 | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | X | X | 6,800,000 | 2.8 | 2.8 | 2.8 |
| Tetrachloroethene | 127-18-4 | | X | 4,100,000 | 1.7 | | 1.7 |
| Toluene | 108-88-3 | X | X | 6,500,000 | 2.7 | 2.7 | 2.7 |
| 1,2,4-Trichlorobenzene | 120-82-1 | X | X | 4,800,000 | 2.0 | 2.0 | 2.0 |
| 1,1,1-Trichloroethane | 71-55-6 | | X | 6,300,000 | 2.6 | | 2.6 |
| 1,1,2-Trichloroethane | 79-00-5 | X | X | 290,000 | 0.1 | 0.1 | 0.1 |
| Trichloroethene | 79-01-6 | X | X | 12,000,000 | 5.0 | 5.0 | 5.0 |
| Xylenes | 1330-20-7 | X | X | 8,900,000 | 3.7 | 3.7 | 3.7 |
| | | | | | **TOTALS** | **23.11** | **29.04** |

Notes:

1 Referenced from study of SLF 1-6 Leachate conducted in 1994 (represents profile of light oil phase only)

2 Assumes 1% volatilization

**TABLE 5**

**ESTIMATED VOC AND HAP EMISSIONS FROM SLF 7 STANDPIPES**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | Mol. Weight (g/mol) | Leachate Concentration [2] (µg/L) | Leachate Concentration ($\mu g/m^3$) | # Carbon Atoms | # Hydrogen Atoms | # Oxygen Atoms | # Chloride Atoms | # Fluorine Atoms | # Sulfur Atoms | # Bromine Atoms | # Nitrogen Atoms | Atomic Diffusion Volume for $D_a$ Calculation [3] | Gas Diffusion Coefficient $D_a$ [4] ($m^2/h$) | Atomic Volume for $D_l$ Calculation [5] ($cm^3/mol$) | Liquid Diffusion Coefficient $D_l$ [6] ($m^2/h$) | Schmidt Number $S_c$ [7] | Reynolds Number $R_e$ [7] | Sherwood Number $S_h$ [7] | Total Surface Area [8] ($m^2$) | Char. Length [9] (m) | $k_G$ [7] (m/h) | $k_L$ [7] (m/h) | $K_{OL}$ [7] (m/h) | Henry's Constant [10] | $K_{OG}$ [7] (m/h) | Emissions [7] (µg/hr) | Emissions (lb/hr) | Emissions (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Toluene [1] | 108-88-3 | X | X | 92.14 | 5990 | 5,990,000 | 7 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 111.34 | 2.81E-02 | 118.2 | 3.28E-06 | 2.0 | 12,631.3 | 94.3 | 1.75 | 1.32 | 2.00 | 5.41E-03 | 5.36E-03 | 2.71E-01 | 1.98E-02 | 5.63E+04 | 1.24E-04 | 1.09 | 1.09 | 1.09 |
| Xylenes [1] | 1330-20-7 | X | X | 106.16 | 17600 | 17,600,000 | 8 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 131.8 | 2.57E-02 | 140.4 | 2.96E-06 | 2.2 | 12,631.3 | 97.1 | 1.75 | 1.32 | 1.88 | 5.15E-03 | 5.09E-03 | 2.56E-01 | 1.99E-02 | 1.57E+05 | 3.46E-04 | 3.04 | 3.04 | 3.04 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 179000 | 179,000,000 | 4 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 87.32 | 3.21E-02 | 96.2 | 3.70E-06 | 1.8 | 12,631.3 | 90.2 | 1.75 | 1.32 | 2.19 | 5.75E-03 | 2.67E-03 | 2.28E-03 | 1.17E+00 | 8.38E+05 | 1.85E-03 | 16.19 | 16.19 | |
| Acetone | 67-64-1 | | | 58.08 | 180000 | 180,000,000 | 3 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 66.86 | 3.70E-02 | 74 | 4.32E-06 | 1.5 | 12,631.3 | 86.0 | 1.75 | 1.32 | 2.40 | 6.22E-03 | 2.37E-03 | 1.59E-03 | 1.49E+00 | 7.47E+05 | 1.65E-03 | 14.42 | | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 167000 | 167,000,000 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 59.46 | 3.67E-02 | 65.4 | 4.65E-06 | 1.5 | 12,631.3 | 86.2 | 1.75 | 1.32 | 2.39 | 6.45E-03 | 6.26E-03 | 8.93E-02 | 7.01E-02 | 1.83E+06 | 4.04E-03 | 35.38 | | 35.38 |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 2500 | 2,500,000 | 6 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 128.24 | 2.62E-02 | 140.6 | 2.96E-06 | 2.2 | 12,631.3 | 96.5 | 1.75 | 1.32 | 1.91 | 5.14E-03 | 3.48E-03 | 5.63E-03 | 6.18E-01 | 1.52E+04 | 3.36E-05 | 0.29 | 0.29 | 0.29 |
| Phenol [1] | 108-95-2 | X | X | 94.11 | 73000 | 73,000,000 | 6 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 96.36 | 2.98E-02 | 103.4 | 3.55E-06 | 1.9 | 12,631.3 | 92.5 | 1.75 | 1.32 | 2.08 | 5.63E-03 | 3.37E-05 | 1.63E-05 | 2.07E+00 | 4.31E+03 | 9.50E-06 | 0.08 | 0.08 | 0.08 |
| Aroclor 1242 [1] | 53469-21-9 | X | X | 291.99 | 480 | 480,000 | 12 | 6 | 0 | 4 | 0 | 0 | 0 | 0 | 267.88 | 1.73E-02 | 271.2 | 2.01E-06 | 3.3 | 12,631.3 | 110.7 | 1.75 | 1.32 | 1.45 | 4.24E-03 | 3.73E-03 | 2.13E-02 | 1.75E-01 | 3.14E+03 | 6.92E-06 | 0.06 | 0.06 | 0.06 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **TOTALS** | **20.75** | **39.94** |

Notes:

1 Deduction of 20 and 15 applied for calculation of atomic diffusion volumes for air and liquid, respectively (deduction applied for a hexagonal ring)
2 Sample results provided by CWM Chemical Services, LLC
3 Method for calculating total diffusion volume for air taken from Fuller et al., 1966
4 Calculation method for gas diffusion coefficient referenced from *Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design* , 2008
5 Method for calculating total diffusion volume for water was taken from the LeBas Method, 1915
6 Calculation method for liquid diffusion coefficient referenced from *Water Treatment Principles and Design, Third Edition* , 2012
7 Parameter was calculated using method presented in paper: "Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools under Simulated Indoor Environmental Conditions," December 2002
8 Total surface area of all standpipes in SLF 7 calculated as follows: (6 standpipes) x (Pi) x (0.305 m radius)$^2$ = 1.75 $m^2$
9 Characteristic length calculated as the square root of the total surface area
10 Referenced materials provided on USEPA website and CHEMFATE provided by SRC

**TABLE 6**

**ESTIMATED VOC AND HAP EMISSIONS FROM SLF 10 STANDPIPES**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | Mol. Weight (g/mol) | Leachate Concentration [1] (µg/L) | Leachate Concentration (µg/m$^3$) | # Carbon Atoms | # Hydrogen Atoms | # Oxygen Atoms | # Chloride Atoms | # Fluorine Atoms | # Sulfur Atoms | # Bromine Atoms | # Nitrogen Atoms | Atomic Diffusion Volume for $D_a$ Calculation [2] | Gas Diffusion Coefficient $D_a$ [3] (m$^2$/h) | Atomic Volume for $D_l$ Calculation [4] (cm$^3$/mol) | Liquid Diffusion Coefficient $D_l$ [5] (m$^2$/h) | Schmidt Number $S_c$ [6] | Reynolds Number $R_e$ [6] | Sherwood Number $S_h$ [6] | Total Surface Area [7] (m$^2$) | Char. Length [8] (m) | $k_G$ [6] (m/h) | $k_L$ [6] (m/h) | $K_{OL}$ [6] (m/h) | Henry's Constant [9] | $K_{OG}$ [6] (m/h) | Emissions [6] (µg/hr) | Emissions (lb/hr) | Emissions (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 11900 | 11,900,000 | 6 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 128.24 | 2.62E-02 | 140.6 | 2.96E-06 | 2.2 | 23,061.6 | 130.4 | 5.84 | 2.42 | 1.41 | 5.14E-03 | 3.12E-03 | 5.63E-03 | 5.55E-01 | 2.17E+05 | 4.79E-04 | 4.20 | 4.20 | 4.20 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 120000 | 120,000,000 | 4 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 87.32 | 3.21E-02 | 96.2 | 3.70E-06 | 1.8 | 23,061.6 | 121.8 | 5.84 | 2.42 | 1.62 | 5.75E-03 | 2.25E-03 | 2.28E-03 | 9.86E-01 | 1.58E+06 | 3.48E-03 | 30.45 | 30.45 | |
| Acetone | 67-64-1 | | | 58.08 | 236000 | 236,000,000 | 3 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 66.86 | 3.70E-02 | 74 | 4.32E-06 | 1.5 | 23,061.6 | 116.2 | 5.84 | 2.42 | 1.78 | 6.22E-03 | 1.94E-03 | 1.59E-03 | 1.22E+00 | 2.68E+06 | 5.91E-03 | 51.77 | | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 24900 | 24,900,000 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 59.46 | 3.67E-02 | 65.4 | 4.65E-06 | 1.5 | 23,061.6 | 116.5 | 5.84 | 2.42 | 1.77 | 6.45E-03 | 6.19E-03 | 8.93E-02 | 6.93E-02 | 9.01E+05 | 1.99E-03 | 17.41 | | 17.41 |
| Phenol [10] | 108-95-2 | X | X | 94.11 | 28000 | 28,000,000 | 6 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 96.36 | 2.98E-02 | 103.4 | 3.55E-06 | 1.9 | 23,061.6 | 124.9 | 5.84 | 2.42 | 1.54 | 5.63E-03 | 2.50E-05 | 1.63E-05 | 1.53E+00 | 4.09E+03 | 9.01E-06 | 0.08 | 0.08 | 0.08 |
| Aroclor 1242 [10] | 53469-21-9 | X | X | 291.99 | 15.3 | 15,300 | 12 | 6 | 0 | 4 | 0 | 0 | 0 | 0 | 267.88 | 1.73E-02 | 271.2 | 2.01E-06 | 3.3 | 23,061.6 | 149.6 | 5.84 | 2.42 | 1.07 | 4.24E-03 | 3.58E-03 | 2.13E-02 | 1.68E-01 | 3.20E+02 | 7.05E-07 | 0.01 | 0.01 | 0.01 |
| Aroclor 1254 [10] | 11097-69-1 | X | X | 326.44 | 5.25 | 5,250 | 12 | 5 | 0 | 5 | 0 | 0 | 0 | 0 | 285.4 | 1.67E-02 | 289.1 | 1.94E-06 | 3.4 | 23,061.6 | 151.4 | 5.84 | 2.42 | 1.05 | 4.16E-03 | 3.97E-03 | 8.20E-02 | 4.84E-02 | 1.22E+02 | 2.68E-07 | 0.00 | 0.00 | 0.00 |

**TOTALS** **34.73** **21.69**

Notes:

1 Sample results provided by CWM Chemical Services, LLC
2 Method for calculating total diffusion volume for air taken from Fuller et al., 1966
3 Calculation method for gas diffusion coefficient referenced from *Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design* , 2008
4 Method for calculating total diffusion volume for water was taken from the LeBas Method, 1915
5 Calculation method for liquid diffusion coefficient referenced from *Water Treatment Principles and Design, Third Edition* , 2012
6 Parameter was calculated using method presented in paper: "Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools Under Simulated Indoor Environmental Conditions," December 2002
7 Total surface area of all standpipes in SLF 10 calculated as follows: (5 standpipes) x (Pi) x (0.610 m radius)$^2$ = 5.84 m$^2$
8 Characteristic length calculated as the square root of the total surface area
9 Referenced materials provided on USEPA website and CHEMFATE provided by SRC
10 Deduction of 20 and 15 applied for calculation of atomic diffusion volumes for air and liquid, respectively (deduction applied for a hexagonal ring)

**TABLE 7**

**ESTIMATED VOC AND HAP EMISSIONS FROM SLF 11 STANDPIPES**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | Mol. Weight (g/mol) | Leachate Concentration [1] (µg/L) | Leachate Concentration (µg/m$^3$) | # Carbon Atoms | # Hydrogen Atoms | # Oxygen Atoms | # Chloride Atoms | # Fluorine Atoms | # Sulfur Atoms | # Bromine Atoms | # Nitrogen Atoms | Atomic Diffusion Volume for $D_a$ Calculation [2] | Gas Diffusion Coefficient $D_a$ [3] (m$^2$/h) | Atomic Volume for $D_l$ Calculation [4] (cm$^3$/mol) | Liquid Diffusion Coefficient $D_l$ [5] (m$^2$/h) | Schmidt Number $S_c$ [6] | Reynolds Number $R_e$ [6] | Sherwood Number $S_h$ [6] | Total Surface Area [7] (m$^2$) | Char. Length [8] (m) | $k_G$ [6] (m/h) | $k_L$ [6] (m/h) | $K_{OL}$ [6] (m/h) | Henry's Constant [9] | $K_{OG}$ [6] (m/h) | Emissions [6] (µg/hr) | Emissions (lb/hr) | Emissions (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 2580 | 2,580,000 | 6 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 128.24 | 2.62E-02 | 140.6 | 2.96E-06 | 2.2 | 33,678.2 | 157.6 | 12.47 | 3.53 | 1.17 | 5.14E-03 | 2.89E-03 | 5.63E-03 | 5.13E-01 | 9.28E+04 | 2.05E-04 | 1.79 | 1.79 | 1.79 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 14100 | 14,100,000 | 4 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 87.32 | 3.21E-02 | 96.2 | 3.70E-06 | 1.8 | 33,678.2 | 147.2 | 12.47 | 3.53 | 1.34 | 5.75E-03 | 1.99E-03 | 2.28E-03 | 8.75E-01 | 3.51E+05 | 7.73E-04 | 6.77 | 6.77 | |
| Acetone | 67-64-1 | | | 58.08 | 32000 | 32,000,000 | 3 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 66.86 | 3.70E-02 | 74 | 4.32E-06 | 1.5 | 33,678.2 | 140.4 | 12.47 | 3.53 | 1.47 | 6.22E-03 | 1.70E-03 | 1.59E-03 | 1.07E+00 | 6.78E+05 | 1.49E-03 | 13.10 | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 500 | 500,000 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 59.46 | 3.67E-02 | 65.4 | 4.65E-06 | 1.5 | 33,678.2 | 140.8 | 12.47 | 3.53 | 1.46 | 6.45E-03 | 6.14E-03 | 8.93E-02 | 6.88E-02 | 3.83E+04 | 8.44E-05 | 0.74 | | 0.74 |
| Phenol [10] | 108-95-2 | X | X | 94.11 | 1700 | 1,700,000 | 6 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 116.36 | 2.75E-02 | 118.4 | 3.28E-06 | 2.1 | 33,678.2 | 155.0 | 12.47 | 3.53 | 1.21 | 5.41E-03 | 1.96E-05 | 1.63E-05 | 1.20E+00 | 4.15E+02 | 9.16E-07 | 0.01 | 0.01 | 0.01 |
| Aroclor 1242 [10] | 53469-21-9 | X | X | 291.99 | 457 | 457,000 | 12 | 6 | 0 | 4 | 0 | 0 | 0 | 0 | 267.88 | 1.73E-02 | 271.2 | 2.01E-06 | 3.3 | 33,678.2 | 180.8 | 12.47 | 3.53 | 0.89 | 4.24E-03 | 3.46E-03 | 2.13E-02 | 1.62E-01 | 1.97E+04 | 4.35E-05 | 0.38 | 0.38 | 0.38 |
| Aroclor 1254 [10] | 11097-69-1 | X | X | 326.44 | 1590 | 1,590,000 | 12 | 5 | 0 | 5 | 0 | 0 | 0 | 0 | 285.4 | 1.67E-02 | 289.1 | 1.94E-06 | 3.4 | 33,678.2 | 182.9 | 12.47 | 3.53 | 0.87 | 4.16E-03 | 3.93E-03 | 8.20E-02 | 4.79E-02 | 7.79E+04 | 1.72E-04 | 1.50 | 1.50 | 1.50 |
| Aroclor 1260 [10] | 11096-82-5 | X | X | 395.33 | 892 | 892,000 | 12 | 3 | 0 | 7 | 0 | 0 | 0 | 0 | 320.44 | 1.57E-02 | 324.9 | 1.81E-06 | 3.6 | 33,678.2 | 186.7 | 12.47 | 3.53 | 0.83 | 4.02E-03 | 3.92E-03 | 1.89E-01 | 2.08E-02 | 4.36E+04 | 9.61E-05 | 0.84 | 0.84 | 0.84 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **TOTALS** | **11.30** | **5.27** |

Notes:

1 Sample results provided by CWM Chemical Services, LLC
2 Method for calculating total diffusion volume for air taken from Fuller et al., 1966
3 Calculation method for gas diffusion coefficient referenced from *Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design* , 2008
4 Method for calculating total diffusion volume for water was taken from the LeBas Method, 1915
5 Calculation method for liquid diffusion coefficient referenced from *Water Treatment Principles and Design, Third Edition* , 2012
6 Parameter was calculated using method presented in paper: "Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools Under Simulated Indoor Environmental Conditions," December 2002
7 Total surface area of all standpipes in SLF 11 calculated as follows: (Pi) x ( [ (1 standpipes) x (0.229 m radius)$^2$ ] + [ (4 standpipes) x (0.267 m radius)$^2$ ] + [ (6 standpipes) x (0.330 m radius)$^2$ ] ) + [ (8 standpipes) x (0.610 m radius)$^2$ ] ) = 12.47 m$^2$
8 Characteristic length calculated as the square root of the total surface area
9 Referenced materials provided on USEPA website and CHEMFATE provided by SRC
10 Deduction of 20 and 15 applied for calculation of atomic diffusion volumes for air and liquid, respectively (deduction applied for a hexagonal ring)

**TABLE 8**

**ESTIMATED VOC AND HAP EMISSIONS FROM SLF 12 STANDPIPES**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | Mol. Weight (g/mol) | Leachate Concentration [1] (µg/L) | Leachate Concentration (µg/m$^3$) | # Carbon Atoms | # Hydrogen Atoms | # Oxygen Atoms | # Chloride Atoms | # Fluorine Atoms | # Sulfur Atoms | # Bromine Atoms | # Nitrogen Atoms | Atomic Diffusion Volume for $D_a$ Calculation [2] | Gas Diffusion Coefficient $D_a$ [3] (m$^2$/h) | Atomic Volume for $D_l$ Calculation [4] (cm$^3$/mol) | Liquid Diffusion Coefficient $D_l$ [5] (m$^2$/h) | Schmidt Number $S_c$ [6] | Reynolds Number $R_e$ [6] | Sherwood Number $S_h$ [6] | Total Surface Area [7] (m$^2$) | Char. Length [8] (m) | $k_G$ [6] (m/h) | $k_L$ [6] (m/h) | $K_{OL}$ [6] (m/h) | Henry's Constant [9] | $K_{OG}$ [6] (m/h) | Emissions [6] (µg/hr) | Emissions (lb/hr) | Emissions (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | | | 58.08 | 362 | 362,000 | 3 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 66.86 | 3.70E-02 | 74 | 4.32E-06 | 1.5 | 11,859.6 | 83.3 | 1.55 | 1.24 | 2.48 | 6.22E-03 | 2.41E-03 | 1.59E-03 | 1.52E+00 | 1.35E+03 | 2.98E-06 | 0.03 | | | |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 10 | 10,000 | 6 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 128.24 | 2.62E-02 | 140.6 | 2.96E-06 | 2.2 | 11,859.6 | 93.5 | 1.55 | 1.24 | 1.97 | 5.14E-03 | 3.51E-03 | 5.63E-03 | 6.24E-01 | 5.43E+01 | 1.20E-07 | 0.00 | 0.00 | 0.00 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 10 | 10,000 | 4 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 87.32 | 3.21E-02 | 96.2 | 3.70E-06 | 1.8 | 11,859.6 | 87.4 | 1.55 | 1.24 | 2.26 | 5.75E-03 | 2.72E-03 | 2.28E-03 | 1.19E+00 | 4.20E+01 | 9.25E-08 | 0.00 | 0.00 | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 2280 | 2,280,000 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 59.46 | 3.67E-02 | 65.4 | 4.65E-06 | 1.5 | 11,859.6 | 83.6 | 1.55 | 1.24 | 2.46 | 6.45E-03 | 6.26E-03 | 8.93E-02 | 7.01E-02 | 2.21E+04 | 4.87E-05 | 0.43 | | 0.43 |
| Phenol [10] | 108-95-2 | X | X | 94.11 | 25 | 25,000 | 6 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 96.36 | 2.98E-02 | 103.4 | 3.55E-06 | 1.9 | 11,859.6 | 89.6 | 1.55 | 1.24 | 2.15 | 5.63E-03 | 3.47E-05 | 1.63E-05 | 2.13E+00 | 1.34E+00 | 2.96E-09 | 0.00 | 0.00 | 0.00 |
| Aroclor 1242 [10] | 53469-21-9 | X | X | 291.99 | 226 | 226,000 | 12 | 6 | 0 | 4 | 0 | 0 | 0 | 0 | 267.88 | 1.73E-02 | 271.2 | 2.01E-06 | 3.3 | 11,859.6 | 107.3 | 1.55 | 1.24 | 1.50 | 4.24E-03 | 3.74E-03 | 2.13E-02 | 1.76E-01 | 1.31E+03 | 2.88E-06 | 0.03 | 0.03 | 0.03 |
| Aroclor 1254 [10] | 11097-69-1 | X | X | 326.44 | 289 | 289,000 | 12 | 5 | 0 | 5 | 0 | 0 | 0 | 0 | 285.4 | 1.67E-02 | 289.1 | 1.94E-06 | 3.4 | 11,859.6 | 108.5 | 1.55 | 1.24 | 1.46 | 4.16E-03 | 4.02E-03 | 8.20E-02 | 4.90E-02 | 1.80E+03 | 3.96E-06 | 0.03 | 0.03 | 0.03 |
| Aroclor 1260 [10] | 11096-82-5 | X | X | 395.33 | 227 | 227,000 | 12 | 3 | 0 | 7 | 0 | 0 | 0 | 0 | 320.44 | 1.57E-02 | 324.9 | 1.81E-06 | 3.6 | 11,859.6 | 110.8 | 1.55 | 1.24 | 1.40 | 4.02E-03 | 3.96E-03 | 1.89E-01 | 2.10E-02 | 1.39E+03 | 3.06E-06 | 0.03 | 0.03 | 0.03 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | TOTALS | 0.09 | 0.51 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Notes:

1 Sample results provided by CWM Chemical Services, LLC
2 Method for calculating total diffusion volume for air taken from Fuller et al., 1966
3 Calculation method for gas diffusion coefficient referenced from *Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design* , 2008
4 Method for calculating total diffusion volume for water was taken from the LeBas Method, 1915
5 Calculation method for liquid diffusion coefficient referenced from *Water Treatment Principles and Design, Third Edition* , 2012
6 Parameter was calculated using method presented in paper: "Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools Under Simulated Indoor Environmental Conditions," December 2002
7 Total surface area of all standpipes in SLF 12 calculated as follows: (8 standpipes) x (Pi) x (0.248 m radius)$^2$ = 1.55 m$^2$
8 Characteristic length calculated as the square root of the total surface area
9 Referenced materials provided on USEPA website and CHEMFATE provided by SRC
10 Deduction of 20 and 15 applied for calculation of atomic diffusion volumes for air and liquid, respectively (deduction applied for a hexagonal ring)

**TABLE 9**

**ESTIMATED VOC AND HAP EMISSIONS FROM RMU-1 STANDPIPES**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | Mol. Weight (g/mol) | Leachate Concentration [2] (µg/L) | Leachate Concentration ($\mu g/m^3$) | # Carbon Atoms | # Hydrogen Atoms | # Oxygen Atoms | # Chloride Atoms | # Fluorine Atoms | # Sulfur Atoms | # Bromine Atoms | # Nitrogen Atoms | Atomic Diffusion Volume for $D_a$ Calculation [3] | Gas Diffusion Coefficient $D_a$ [4] ($m^2/h$) | Atomic Volume for $D_l$ Calculation [5] ($cm^3/mol$) | Liquid Diffusion Coefficient $D_l$ [6] ($m^2/h$) | Schmidt Number $S_c$ [7] | Reynolds Number $R_e$ [7] | Sherwood Number $S_h$ [7] | Total Surface Area [8] ($m^2$) | Char. Length [9] (m) | $k_G$ [7] (m/h) | $k_L$ [7] (m/h) | $K_{OL}$ [7] (m/h) | Henry's Constant [10] | $K_{OG}$ [7] (m/h) | Emissions [7] (µg/hr) | Emissions (lb/hr) | Emissions (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carbon disulfide | 75-15-0 | X | X | 76.14 | 1090 | 1,090,000 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 50.5 | 3.96E-02 | 66.00 | 4.62E-06 | 1.4 | 22,966.1 | 113.3 | 5.80 | 2.41 | 1.87 | 6.43E-03 | 6.41E-03 | 1.24E+00 | 5.17E-03 | 4.05E+04 | 8.93E-05 | 0.78 | 0.78 | 0.78 |
| Toluene [1] | 108-88-3 | X | X | 92.14 | 2050 | 2,050,000 | 7 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 111.34 | 2.81E-02 | 118.2 | 3.28E-06 | 2.0 | 22,966.1 | 127.1 | 5.80 | 2.41 | 1.48 | 5.41E-03 | 5.34E-03 | 2.71E-01 | 1.97E-02 | 6.35E+04 | 1.40E-04 | 1.23 | 1.23 | 1.23 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 6420 | 6,420,000 | 4 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 87.32 | 3.21E-02 | 96.2 | 3.70E-06 | 1.8 | 22,966.1 | 121.6 | 5.80 | 2.41 | 1.62 | 5.75E-03 | 2.25E-03 | 2.28E-03 | 9.87E-01 | 8.37E+04 | 1.85E-04 | 1.62 | 1.62 | |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 470 | 470,000 | 6 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 128.24 | 2.62E-02 | 140.6 | 2.96E-06 | 2.2 | 22,966.1 | 130.1 | 5.80 | 2.41 | 1.41 | 5.14E-03 | 3.13E-03 | 5.63E-03 | 5.55E-01 | 8.52E+03 | 1.88E-05 | 0.16 | 0.16 | 0.16 |
| Acetone | 67-64-1 | | | 58.08 | 114000 | 114,000,000 | 3 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 66.86 | 3.70E-02 | 74 | 4.32E-06 | 1.5 | 22,966.1 | 115.9 | 5.80 | 2.41 | 1.78 | 6.22E-03 | 1.95E-03 | 1.59E-03 | 1.22E+00 | 1.29E+06 | 2.84E-03 | 24.84 | | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 1780 | 1,780,000 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 59.46 | 3.67E-02 | 65.4 | 4.65E-06 | 1.5 | 22,966.1 | 116.3 | 5.80 | 2.41 | 1.77 | 6.45E-03 | 6.19E-03 | 8.93E-02 | 6.94E-02 | 6.39E+04 | 1.41E-04 | 1.23 | | 1.23 |
| Vinyl Chloride | 75-01-4 | X | X | 62.5 | 142 | 142,000 | 2 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 58.44 | 3.86E-02 | 62.3 | 4.78E-06 | 1.5 | 22,966.1 | 114.4 | 5.80 | 2.41 | 1.83 | 6.54E-03 | 6.52E-03 | 1.11E+00 | 5.87E-03 | 5.36E+03 | 1.18E-05 | 0.10 | 0.10 | 0.10 |
| 2,4-Dimethylphenol [1] | 105-67-9 | X | | 122.16 | 140 | 140,000 | 8 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 137.28 | 2.49E-02 | 147.8 | 2.87E-06 | 2.3 | 22,966.1 | 132.3 | 5.80 | 2.41 | 1.37 | 5.07E-03 | 1.10E-04 | 8.20E-05 | 1.34E+00 | 8.91E+01 | 1.96E-07 | 0.00 | 0.00 | | |
| 4-Nitrophenol | 100-02-7 | X | X | 139.11 | 500 | 500,000 | 6 | 5 | 3 | 0 | 0 | 0 | 0 | 1 | 111.03 | 2.70E-02 | 130.1 | 3.10E-06 | 2.1 | 22,966.1 | 128.9 | 5.80 | 2.41 | 1.44 | 5.26E-03 | 2.45E-08 | 1.70E-08 | 1.44E+00 | 7.11E-02 | 1.57E-10 | 0.00 | 0.00 | 0.00 |
| Phenol [1] | 108-95-2 | X | X | 94.11 | 1200 | 1,200,000 | 6 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 96.36 | 2.98E-02 | 103.4 | 3.55E-06 | 1.9 | 22,966.1 | 124.7 | 5.80 | 2.41 | 1.54 | 5.63E-03 | 2.50E-05 | 1.63E-05 | 1.53E+00 | 1.74E+02 | 3.84E-07 | 0.00 | 0.00 | 0.00 |
| Aroclor 1242 [1] | 53469-21-9 | X | X | 291.99 | 29.6 | 29,600 | 12 | 6 | 0 | 4 | 0 | 0 | 0 | 0 | 267.88 | 1.73E-02 | 271.2 | 2.01E-06 | 3.3 | 22,966.1 | 149.3 | 5.80 | 2.41 | 1.07 | 4.24E-03 | 3.58E-03 | 2.13E-02 | 1.68E-01 | 6.14E+02 | 1.35E-06 | 0.01 | 0.01 | 0.01 |
| Aroclor 1260 [1] | 11096-82-5 | X | X | 395.33 | 112 | 112,000 | 12 | 3 | 0 | 7 | 0 | 0 | 0 | 0 | 320.44 | 1.57E-02 | 324.9 | 1.81E-06 | 3.6 | 22,966.1 | 154.2 | 5.80 | 2.41 | 1.01 | 4.02E-03 | 3.94E-03 | 1.89E-01 | 2.09E-02 | 2.56E+03 | 5.63E-06 | 0.05 | 0.05 | 0.05 |

**TOTALS** **3.96** **3.57**

Notes:

1 Deduction of 20 and 15 applied for calculation of atomic diffusion volumes for air and liquid, respectively (deduction applied for a hexagonal ring)
2 Analytical results from multiple samples taken from: 1.) RMU-1 standpipes over a period of May 2006 through February 2013; 2.) Tank T-160 (RMU-1 lift station) over a period of January 31, 2012 through February 15, 2012; and 3.) Tank T-102 over a period of April 3, 2012 through April 17, 2013 (applied highest detected value for each compound in this column)
3 Method for calculating total diffusion volume for air taken from Fuller et al., 1966
4 Calculation method for gas diffusion coefficient referenced from *Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design* , 2008
5 Method for calculating total diffusion volume for water was taken from the LeBas Method, 1915
6 Calculation method for liquid diffusion coefficient referenced from *Water Treatment Principles and Design, Third Edition* , 2012
7 Parameter was calculated using method presented in paper: "Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools Under Simulated Indoor Environmental Conditions," December 2002
8 Total surface area of all standpipes in RMU-1 calculated as follows: (30 standpipes) x (Pi) x (0.248 m radius)$^2$ = 5.80 $m^2$
9 Characteristic length calculated as the square root of the total surface area
10 Referenced materials provided on USEPA website and CHEMFATE provided by SRC

**TABLE 10**

**TANK DIMENSIONS**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Tank ID# | Height (ft.) | Diameter (ft.) | Volume (gal.) | Throughput (gal/yr.) | Average Operating Temperature (F) | Comments |
|---|---|---|---|---|---|---|
| Frac Tank 3 | 11.00 | | 21,000 | 20,000 | 50 | Rectangular; 40' long by 8.5' wide |
| T-157 | 21.50 | 8.0 | 8,000 | - | | Tank out of service and closed |
| T-710 | 16.00 | 9.0 | 8,000 | 98,019 | 65 | 20% of 3 year ave of Bulk Receipt div by 3 |
| T-810 | 16.00 | 9.0 | 8,000 | 98,019 | 65 | 20% of 3 year ave of Bulk Receipt div by 3 |
| T-820 | 16.00 | 9.0 | 8,000 | 98,019 | 65 | 20% of 3 year ave of Bulk Receipt div by 3 |
| T-210 | 15.00 | 18.5 | 30,000 | 359,527 | 50 | T-1111/1112 -T-1410 divided by 3 |
| T-220 | 15.00 | 18.5 | 30,000 | 359,527 | 50 | T-1111 + T-1112 -T-1410 divided by 3 |
| T-230 | 15.00 | 18.5 | 30,000 | 359,527 | 50 | T-1111/1112 -T-1410 divided by 3 |
| T-1010 | 9.00 | 14.0 | 10,000 | 551,790 | 65 | T-100 divided by 2 - GW & Bulk Receipts |
| T-1020 | 10.00 | 12.0 | 8,000 | 551,790 | 65 | T-100 divided by 2 - GW & Bulk Receipts |
| T-310 | 38.00 | 12.0 | 30,457 | 1,963,203 | 80 | T-100 processing |
| T-320 | 38.00 | 12.0 | 30,457 | 1,963,203 | 80 | T-100 processing |
| T-1111 | 4.00 | 3.8 | 300 | 551,790 | 65 | T-100 divided by 2 - GW & Bulk Receipts |
| T-1112 | 7.00 | 3.5 | 600 | 551,790 | 65 | T-100 divided by 2 - GW & Bulk Receipts |
| T-100 | 23.00 | 35.0 | 160,545 | 1,963,203 | 80 | 3 year average + GW + Bulk Receipts |
| T-125 | 12.00 | 80.0 | 394,271 | 7,513,307 | 70 | 3 year average divided by 2 |
| T-58 | 23.50 | 81.0 | 488,529 | 7,513,307 | 70 | Sideshell is 14' high; 9.5' high dome roof |
| T-111 | 6.58 | 3.2 | 350 | 144,866 | 65 | Horizontal Tank; 3 year average |
| T-3002 | 5.66 | 5.0 | 900 | 1,963,203 | 50 | T-100 processing |
| T-3003 | 6.50 | 5.0 | 1,210 | 15,026,614 | 50 | T-100 processing |
| T-3009 | 16.00 | 8.0 | 5,000 | 250,000 | 50 | Horizontal Tank; Double Walled |
| T-3011 | 3.50 | 4.5 | 375 | 1,963,203 | 80 | T-100 processing |
| T-3012 | 3.92 | 4.0 | 375 | 1,963,203 | 80 | T-100 processing |
| Stab Rec RC-01 | | | | | | Permanently Out of Service |
| Stab Rec RC-02 | | | | | | Permanently Out of Service |
| Stab Rec RC-03 | | | | | | Permanently Out of Service |
| Stab Rec RC-04 | | | | | | Permanently Out of Service |
| Fac Ponds 1/2 | | | | 20,703,000 | | 825' by 300' wide; vol based w/1' freeboard |
| T-101 | 32 | 44 | 350,000 | 350,000 | 50 | |
| T-102 | 32 | 44 | 350,000 | 13,377,857 | 50 | SLF 12 +RMU-1 - T-101 |
| T-103 | 32 | 44 | 350,000 | 153,486 | 50 | 3 year average: SLF 1-6 - oil + gate receipts |
| T-107 | 6.58 | 3.2 | 350 | 67,283 | 65 | 3 year average |

**TABLE 10**

**TANK DIMENSIONS**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Tank ID# | Height (ft.) | Diameter (ft.) | Volume (gal.) | Throughput (gal/yr.) | Average Operating Temperature (F) | Comments |
|---|---|---|---|---|---|---|
| T-110 | 6.58 | 3.2 | 350 | 65,171 | 65 | 3 year average |
| T-109 | 8 | 8 | 3,000 | 65,171 | 65 | 3 year average |
| T-108 | 16 | 10.33 | 10,000 | 144,866 | 65 | 3 year average |
| T-105 | 8 | 8 | 3,000 | 144,648 | 65 | 3 year average |
| T-130 | 10 | 7.6 | 5,732 | 144,648 | 50 | Cone bottom; 3 year average |
| T-158 | 18 | 12 | 17,000 | 204,648 | 65 | Cone bottom; SLF 1-6 + Gate Receipts |
| T-150 | 14 | 10 | 8,000 | 974,571 | 60 | 3 year average; SLF12 + Site Waters |
| T-160 | 6.5 | 9 | 3,000 | 12,753,285 | 60 | 3 year average |
| T-830 | 8 | 6 | 2,000 | 6,000 | 65 | Ferrous Sulfate |
| T-840 | 8 | 6 | 2,000 | 6,000 | 65 | Ferrous Sulfate |
| T-1310 | 5 | 5.5 | 600 | 2,500 | 65 | Caustic Scrubber Tank |
| T-850 | 4 | 6 | 846 | 1,000 | 65 | Mix tank |
| T-1410 | 12 | 12 | 8,000 | 25,000 | 65 | Lime Slurry Tank |
| T-910 | 9.5 | 12 | 8,000 | 15,000 | 65 | Sulfuric Acid Tank |
| T-8001 | 13 | 8 | 5,000 | 733,487 | 70 | Cone bottom |
| T-8002 | 4.66 | 4 | 550 | 733,487 | 70 | Horizontal tank |
| T-8004 | 4.66 | 4 | 550 | 2,350 | 70 | Horizontal tank |
| T-8005 | 6.25 | 2.83 | 300 | 3,973 | 70 | Horizontal tank |
| T-8006 | 6.25 | 2.83 | 300 | 9,775 | 70 | Horizontal tank |
| T-8007 | 4.66 | 4 | 550 | 7,383 | 70 | Horizontal tank |
| T-8008 | 7.6 | 3.5 | 500 | 500 | 70 | Horizontal tank |
| T-8009 | 5.9 | 4.1 | 525 | 305,000 | 70 | Horizontal tank; Projected volume |
| T-8010 | 6.46 | 5.33 | 1,000 | 323,700 | 70 | Projected volume |

**TABLE 11**

**SUMMARY OF TANKS MODELING OUTPUT: LEACHATE STORAGE AND TRANSFER**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| | | | Tank # | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tank Dimensions** | | | **102** | | | **103** | | | **105** | | | **107** | | | **108** | | | **109** | | | **110** | | | **111** | | | **130** | | | **150** | | | **158** | | | **160** | | |
| *Height (ft)* | | | 32 | | | 32 | | | 8 | | | 6.58 | | | 16 | | | 8 | | | 6.58 | | | 6.58 | | | 10 | | | 14 | | | 18 | | | 6.5 | | |
| *Diameter (ft)* | | | 44 | | | 44 | | | 8 | | | 3.2 | | | 10.33 | | | 8 | | | 3.2 | | | 3.2 | | | 7.6 | | | 10 | | | 12 | | | 9 | | |
| *Volume (gal)* | | | 350,000 | | | 350,000 | | | 3,000 | | | 395 | | | 10,000 | | | 3,000 | | | 395 | | | 395 | | | 3,394 | | | 8,000 | | | 15,000 | | | 3,000 | | |
| *Throughput (gal/yr)* | | | 15,000,000 | | | 500,000 | | | 500,000 | | | 100,000 | | | 200,000 | | | 100,000 | | | 100,000 | | | 200,000 | | | 500,000 | | | 1,000,000 | | | 500,000 | | | 15,000,000 | | |
| **Pollutants** | **VOC** | **HAP** | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) |
| Acetone | | | 1.58 | | | 1.53 | | | 0.18 | | | 0.01 | | | 0.01 | | | 0.03 | | | 0.01 | | | 0.00 | | | 0.19 | | | 0.00 | | | 0.54 | | | 0.28 | | |
| Acetonitrile | X | X | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Acrylonitrile | X | X | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Aniline | X | X | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Benzene | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.01 | 0.01 | 0.01 | - | - | - | - |
| Butanol-(1) | X | | - | - | - | 0.01 | 0.01 | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Carbon Disulfide | X | X | 0.03 | 0.03 | 0.03 | - | - | - | 0.01 | 0.01 | 0.01 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | - | - | - |
| Carbon Tetrachloride | X | X | - | - | - | - | - | - | 0.01 | 0.01 | 0.01 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.01 | 0.01 | 0.01 | - | - | - | 0.02 | 0.02 | 0.02 | - | - | - | - | - | - |
| Chlorobenzene | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.01 | 0.01 | 0.01 | - | - | - | - | - | - |
| Chloroform | X | X | - | - | - | 0.01 | 0.01 | 0.01 | 0.03 | 0.03 | 0.03 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.04 | 0.04 | 0.04 | - | - | - | 0.10 | 0.10 | 0.10 | - | - | - | - | - | - |
| Cresol (-m) | X | X | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Cresol (-o) | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - |
| Cresol (-p) | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - |
| Cyclohexanone | X | | - | - | | 0.00 | 0.00 | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | |
| Dichloroethane (1,1) | X | X | - | - | - | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - |
| Dichloroethane (1,2) | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.01 | 0.01 | 0.01 | - | - | - | - | - | - |
| Dichloroethylene (-trans-1,2) | X | | - | - | | 0.00 | 0.00 | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | |
| Diethyl Ether | X | | - | - | | 0.05 | 0.05 | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | |
| Dimethyl Phthalate | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - |
| Dioxane (1,4) | X | X | - | - | - | 0.03 | 0.03 | 0.03 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ethyl Chloride | X | X | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ethylbenzene | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.01 | 0.01 | 0.01 | - | - | - | - | - | - |
| Iso-butyl Alcohol | X | | - | - | | 0.00 | 0.00 | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | |
| Methyl Alcohol | X | X | - | - | - | 0.93 | 0.93 | 0.93 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Methyl Ethyl Ketone | X | | 0.03 | 0.03 | | 0.40 | 0.40 | | 0.05 | 0.05 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.06 | 0.06 | | 0.00 | 0.00 | | 0.16 | 0.16 | | 0.01 | 0.01 | | | |
| Methylene Chloride | | X | 0.05 | | 0.05 | 0.90 | | 0.90 | 0.70 | | 0.70 | 0.01 | | 0.01 | - | | - | 0.01 | | 0.01 | 0.00 | | 0.00 | | 0.00 | 0.75 | | 0.75 | 0.00 | | 0.00 | 2.13 | | 2.13 | 1.07 | | 1.07 | | |
| Methyl Isobutyl Ketone | X | X | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | | |
| Naphthalene | X | X | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - |
| Pyridine | X | | - | - | | 0.00 | 0.00 | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | | - | - | |
| Tetrachloroethane (1,1,2,2) | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.01 | 0.01 | 0.01 | - | - | - | - | - | - |
| Tetrachloroethylene | | X | - | | - | 0.00 | | 0.00 | 0.02 | | 0.02 | - | | - | - | | - | - | | - | - | | - | - | | - | 0.02 | | 0.02 | - | | - | 0.06 | | 0.06 | - | | - | | |
| Toluene | X | X | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.05 | 0.05 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | 0.05 | 0.05 | 0.05 | 0.00 | 0.00 | 0.00 | 0.14 | 0.14 | 0.14 | 0.00 | 0.00 | 0.00 | | |
| Trichloroethane (1,1,1) | X | X | - | - | - | 0.00 | | 0.00 | 0.26 | | 0.26 | - | | - | - | | - | - | | - | - | | - | - | | - | 0.28 | | 0.28 | - | | - | 0.79 | | 0.79 | - | | - | | |
| Trichloroethane (1,1,2) | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - |
| Trichloroethylene | X | X | - | - | - | 0.01 | 0.01 | 0.01 | 0.22 | 0.22 | 0.22 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.24 | 0.24 | 0.24 | - | - | - | 0.67 | 0.67 | 0.67 | - | - | - | - | - | - |
| Vinylidene Chloride | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - |
| Water | | | 2129.27 | | | 315.99 | | | 27.34 | | | 4.44 | | | 38.18 | | | 16.77 | | | 4.44 | | | 6.85 | | | 29.29 | | | 66.42 | | | 82.90 | | | 378.01 | | | | |
| Xylenes (mixed isomers) | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | - | - | - | - | - | 0.01 | 0.01 | 0.01 | - | - | - | 0.03 | 0.03 | 0.03 | - | - | - | - | - | - |
| Aroclor 1242 | X | X | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Aroclor 1254 | X | X | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Aroclor 1260 | X | X | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **TOTAL (lbs):** | | | | 0.06 | 0.08 | | 1.47 | 1.91 | | 0.40 | 1.33 | | 0.00 | 0.01 | | 0.00 | 0.00 | | 0.00 | 0.01 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.43 | 1.43 | | 0.00 | 0.00 | | 1.22 | 4.04 | | 0.01 | 1.07 | |

**TABLE 12**

**ESTIMATED VOC AND HAP EMISSIONS FROM TANK T-165**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | Mol. Weight (g/mol) | Leachate Concentration [2] (µg/L) | Leachate Concentration (µg/m$^3$) | # Carbon Atoms | # Hydrogen Atoms | # Oxygen Atoms | # Chloride Atoms | # Fluorine Atoms | # Sulfur Atoms | # Bromine Atoms | # Nitrogen Atoms | Atomic Diffusion Volume for $D_a$ Calculation [3] | Gas Diffusion Coefficient $D_a$ [4] (m$^2$/h) | Atomic Volume for $D_l$ Calculation [5] (cm$^3$/mol) | Liquid Diffusion Coefficient $D_l$ [6] (m$^2$/h) | Schmidt Number $S_c$ [7] | Reynolds Number $R_e$ [7] | Sherwood Number $S_h$ [7] | Total Surface Area [8] (m$^2$) | Char. Length [9] (m) | $k_G$ [7] (m/h) | $k_L$ [7] (m/h) | $K_{OL}$ [7] (m/h) | Henry's Constant [10] | $K_{OG}$ [7] (m/h) | Emissions [7] (µg/hr) | Emissions (lb/hr) | Emissions (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | | | 58.08 | 0 | 0 | 3 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 66.86 | 3.70E-02 | 74 | 4.32E-06 | 1.5 | 6,350,111.1 | 1,927.9 | 357.67 | 18.91 | 3.77 | 6.22E-03 | 3.05E-03 | 1.59E-03 | 1.92E+00 | 0.00E+00 | 0.00E+00 | 0.00 | | |
| Aroclor 1242 [1] | 53469-21-9 | X | X | 291.99 | 0 | 0 | 12 | 6 | 0 | 4 | 0 | 0 | 0 | 0 | 267.88 | 1.73E-02 | 271.2 | 2.01E-06 | 3.3 | 6,350,111.1 | 2,482.7 | 357.67 | 18.91 | 2.27 | 4.24E-03 | 3.90E-03 | 2.13E-02 | 1.83E-01 | 0.00E+00 | 0.00E+00 | 0.00 | 0.00 | 0.00 |
| Aroclor 1260 [1] | 11096-82-5 | X | X | 360.88 | 0 | 0 | 12 | 4 | 0 | 6 | 0 | 0 | 0 | 0 | 302.92 | 1.62E-02 | 307 | 1.87E-06 | 3.5 | 6,350,111.1 | 2,538.5 | 357.67 | 18.91 | 2.18 | 4.09E-03 | 4.05E-03 | 1.89E-01 | 2.15E-02 | 0.00E+00 | 0.00E+00 | 0.00 | 0.00 | 0.00 |
| 2,4-Dimethylphenol [1] | 105-67-9 | X | | 122.16 | 0 | 0 | 8 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 137.28 | 2.49E-02 | 147.8 | 2.87E-06 | 2.3 | 6,350,111.1 | 2,200.5 | 357.67 | 18.91 | 2.90 | 5.07E-03 | 3.50E-03 | 3.90E-03 | 8.97E-01 | 0.00E+00 | 0.00E+00 | 0.00 | 0.00 | |
| 4-Methylphenol [1] | 106-44-5 | X | X | 108.13 | 0 | 0 | 7 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 116.82 | 2.70E-02 | 125.6 | 3.16E-06 | 2.1 | 6,350,111.1 | 2,141.1 | 357.67 | 18.91 | 3.06 | 5.32E-03 | 6.46E-08 | 2.112E-08 | 3.06E+00 | 0.00E+00 | 0.00E+00 | 0.00 | 0.00 | 0.00 |
| Phenol [1] | 108-95-2 | X | X | 94.11 | 0 | 0 | 6 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 96.36 | 2.98E-02 | 103.4 | 3.55E-06 | 1.9 | 6,350,111.1 | 2,073.0 | 357.67 | 18.91 | 3.26 | 5.63E-03 | 5.27E-05 | 1.63E-05 | 3.23E+00 | 0.00E+00 | 0.00E+00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **TOTALS** | **0.00** | **0.00** |

Notes:

1 Deduction of 20 and 15 applied for calculation of atomic diffusion volumes for air and liquid, respectively (deduction applied for a hexagonal ring)
2 Sample results provided by CWM Chemical Services, LLC
3 Method for calculating total diffusion volume for air taken from Fuller et al., 1966
4 Calculation method for gas diffusion coefficient referenced from *Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design* , 2008
5 Method for calculating total diffusion volume for water was taken from the LeBas Method, 1915
6 Calculation method for liquid diffusion coefficient referenced from *Water Treatment Principles and Design, Third Edition* , 2012
7 Parameter was calculated using method presented in paper: "Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools Under Simulated Indoor Environmental Conditions," December 2002 (wind speed of 11.8 mph assumed)
8 Total surface area of tank calculated as follows: (Pi) x (10.67 m radius)$^2$ = 357.67 m$^2$
9 Characteristic length calculated as the square root of the total surface area
10 Referenced materials provided on USEPA website and CHEMFATE provided by SRC

**TABLE 13**

**SUMMARY OF TANKS MODELING OUTPUT: GROUNDWATER EXTRACTION SYSTEM**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| | | | Tank # | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tank Dimensions** | | | **8001** | | | **8002** | | | **8004** | | | **8005** | | | **8006** | | | **8007** | | | **8008** | | | **8009** | | | **8010** | | |
| *Height (ft)* | | | 13 | | | 5 | | | 4.66 | | | 6.25 | | | 6.25 | | | 5 | | | 7.6 | | | 5.9 | | | 6.46 | | |
| *Diameter (ft)* | | | 8 | | | 4 | | | 4 | | | 3 | | | 3 | | | 4 | | | 3.5 | | | 4.1 | | | 5.33 | | |
| *Volume (gal)* | | | 5,000 | | | 470 | | | 550 | | | 300 | | | 300 | | | 470 | | | 500 | | | 525 | | | 1,000 | | |
| *Throughput (gal/yr)* | | | 1,000,000 | | | 1,000,000 | | | 5,000 | | | 10,000 | | | 10,000 | | | 10,000 | | | 1,000 | | | 500,000 | | | 500,000 | | |
| **Pollutants** | **VOC** | **HAP** | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) | **Emissions** (lb/yr) | **VOC** (lb/yr) | **HAP** (lb/yr) |
| Acetone | | | | | | | | | - | | | - | | | | | | - | | | - | | | | | | - | | |
| Benzene | X | X | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - |
| Carbon Tetrachloride | X | X | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | X | X | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 |
| Chloroform | X | X | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dibromomethane | X | | | | | | | | | | | | | | | | | | | | | | | 0.00 | 0.00 | | | 0.00 | |
| Dichlorobenzene (1,2) | X | | - | - | | - | - | | - | - | | - | - | | - | | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | - | - | |
| Dichlorobenzene (1,3) | X | | | | | | | | | | | | | | | | | 0.00 | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | |
| Dichlorobenzene (1,4) | X | X | - | - | - | - | - | - | - | - | - | - | - | - | - | | | 0.00 | 0.00 | 0.00 | - | - | - | 0.00 | 0.00 | 0.00 | - | - | - |
| 1,1-Dichloroethane | X | X | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 |
| Ethylene dibromide | X | X | | | | | | | | | | | | | | | | | | | | 0.00 | | | 0.00 | 0.00 | | 0.00 | 0.00 |
| Ethylene dichloride | X | X | 0.00 | | | 0.00 | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ethyl acetate | X | | | | | | | | | | | | | | | | | 0.00 | 0.00 | | | 0.00 | | | 0.00 | | | 0.00 | |
| Ethylbenzene | X | X | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 |
| 1,1-Dichloroethene | X | X | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | - | - | - | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2-Dichloropropane | X | X | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 |
| Methylene Chloride | | X | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | - | | - | - | | | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | - | | - |
| Methylisobutyl ketone | X | X | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 |
| Tetrachloeoethylene | | X | 0.00 | | | 0.00 | | | | | | | | | | | | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 |
| Toluene | X | X | | | | | | | 0.00 | 0.00 | 0.00 | - | - | - | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,1) | | X | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | - | | - | - | | | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | - | | - |
| Trichloro (1,1,2) trifluoroethane | X | | 0.00 | 0.00 | | 0.00 | 0.00 | | | | | - | - | | | | | 0.00 | 0.00 | | | 0.00 | | 0.00 | 0.00 | | | 0.00 | |
| Trichloroethane (1,1,2) | X | X | 0.00 | | | 0.00 | | | | | | - | - | - | - | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane(1,1,1,2) | X | | | | | | | | | | | | | | | | | | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | | 0.00 | |
| Tetrachloroethane(1,1,2,2) | X | X | 0.00 | | | 0.00 | | | | | | | | | | | | | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | X | X | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vinyl chloride | X | X | | | | | | | | | | 0.00 | 0.00 | 0.00 | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 |
| Xylenes | X | X | | | | | | | 0.00 | 0.00 | 0.00 | | | | | | | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 |
| Water | | | 57.48 | | | 27.37 | | | 1.80 | | | 2.27 | | | 2.27 | | | 2.60 | | | 1.49 | | | 15.79 | | | 19.04 | | |
| **TOTAL (lbs):** | | | | 0.01 | 0.01 | | 0.01 | 0.01 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 | | 0.00 | 0.00 |

**TABLE 14**

**SUMMARY OF TANKS MODELING OUTPUT: ATWS TANKS**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| | | | Tank # | | |

**TABLE 15**

**ESTIMATED VOC AND HAP EMISSIONS FROM BIOTOWER EXHAUST**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | Mol. Weight (g/mol) | Inluent Concentration [1] (ppb) | Midpoint Concentration [2] (ppb) | Effluent Concentration [3] (ppb) | Emission Rate ($mg/m^3$) | Emission Rate [4] (lb/hr) | Emission Rate (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 71-55-6 | | X | 133.4 | 33 | ND | ND | 0 | 0 | 0 | | 0.000 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | X | X | 167.85 | 57 | ND | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| 1,1,2-Trichloroethane | 79-00-5 | X | X | 133.4 | 100 | ND | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| 1,1-Dichloroethane | 75-34-3 | X | X | 98.96 | 130 | 0.16 | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| 1,2-Dichloroethane | 107-06-2 | X | X | 98.96 | 330 | 0.34 | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 4500 | 7.4 | ND | 0 | 0 | 0 | 0.000 | |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 950 | 0.57 | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| Acetone | 67-64-1 | | | 58.08 | 8500 | 32 | 1.9 | 0.0045104 | 1.953E-06 | 0.017 | | |
| Benzene | 71-43-2 | X | X | 78.11 | 40 | ND | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| Bromomethane | 74-83-9 | X | X | 94.94 | 38 | ND | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| Carbon disulfide | 75-15-0 | X | X | 76.14 | 200 | 0.45 | 0.31 | 0.0009647 | 4.177E-07 | 0.004 | 0.004 | 0.004 |
| Chlorobenzene | 108-90-7 | X | X | 112.56 | 20 | ND | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| Chloroform | 67-66-3 | X | X | 119.38 | 270 | 0.33 | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| Chloromethane | 74-87-3 | X | X | 50.49 | ND | 1.2 | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| cis-Dichloroethene | 156-59-2 | X | | 96.94 | 200 | 0.35 | ND | 0 | 0 | 0 | 0.000 | |
| Dichlorodifluoromethane | 75-71-8 | | | 120.91 | ND | 0.5 | ND | 0 | 0 | 0 | | |
| Xylenes | 1330-20-7 | X | X | 106.16 | 117 | 0.88 | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 13000 | 15 | 0.27 | 0.0009373 | 4.058E-07 | 0.004 | | 0.004 |
| Toluene | 108-88-3 | X | X | 92.14 | 140 | 0.42 | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| Trichloroethene | 79-01-6 | X | X | 131.39 | 270 | 0.31 | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| Trichlorofluoromethane | 75-69-4 | | | 137.37 | ND | 0.22 | ND | 0 | 0 | 0 | | |
| Vinyl Chloride | 75-01-4 | X | X | 62.5 | 63 | 0.15 | ND | 0 | 0 | 0 | 0.000 | 0.000 |
| | | | | | | | | | | | **0.004** | **0.007** |

Notes:

1 Analytical results from sample taken on March 16, 2013 prior to carbon canister
2 Analytical results from sample taken on March 16, 2013 between 2 carbon canisters
3 Analytical results from sample taken on March 16, 2013 after 2 carbon canisters; represents exhaust leaving the stack
4 Emission rate converted to lb/hr using flowrate value of 115.6 acfm measured at exhaust on April 5, 2013

**TABLE 16**

**ESTIMATED FILTER PRESS EMISSIONS**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

**Methylene chloride - release from filter press**

Feed to filter press after Fentons 9/20/12: 71.7 mg/L x 20,000 gal x 3.78 L/gal equals 5420520 mg or 5420 g or 11.9 lbs methylene chloride in feed to lime slurry/press

15,260 lbs (6928 kg) of cake produced, 70% moisture (10682 lbs or 1280 gallons of aqueous feed remains in cake)
10/6/12 second drop
26.4 mg/kg x6928 kg equals 182.9 g or 0.4 lbs methylene chloride in cake

Filtrate 9/20/12 (18,720 gallons, 1280 gal remained with cake)
30.2 mg/L x70762 L equals 2137000 mg or 2137 g or 4.7 lbs in filtrate

| Feed | minus cake | minus filtrate | equals release |
|---|---|---|---|
| 11.9 | 0.4 | 4.7 | 6.8 lbs released by press per roll-off of filter cake |

19 roll-offs of cake produced in 2012
129 lbs

**Trichloroethylene - release from filter press**

Feed to filter press after Fentons 9/20/12: less than 20.0 mg/L x 20,000 gal x 3.78 L/gal equals 1512000 mg or 1512 g or 3.33 lbs trichloroethylene in feed to lime slurry/press

15,260 lbs (6928 kg) of cake produced, 70% moisture (10682 lbs or 1280 gallons of aqueous feed remains in cake)
10/6/12 second drop
14.3 mg/kg x6928 kg equals 99.1 g or 0.2 lbs trichloroethylene in cake

Filtrate 9/20/12 (18,720 gallons, 1280 gal remained with cake)
5.17 mg/L x70762 L equals 365840 mg or 366 g or 0.8 lbs in filtrate

| Feed | minus cake | minus filtrate | equals release |
|---|---|---|---|
| 3.33 | 0.2 | 0.8 | 2.3 lbs released by press per roll-off of filter cake |

19 roll-offs of cake produced in 2012
43.7 lbs

**Methyl Ethyl Ketone - release from filter press**

Feed to filter press after Fentons 9/20/12: 155 mg/L x 20,000 gal x 3.78 L/gal equals 11718000 mg or 11718 g or 25.8 lbs MEK in feed to lime slurry/press

15,260 lbs (6928 kg) of cake produced, 70% moisture (10682 lbs or 1280 gallons of aqueous feed remains in cake)
10/6/12 second drop
100 mg/kg x6928 kg equals 692.8 g or 1.5 lbs MEK in cake

Filtrate 9/20/12 (18,720 gallons, 1280 gal remained with cake)
119 mg/L x70762 L equals 8420678 mg or 8421 g or 18.5 lbs in filtrate

| Feed | minus cake | minus filtrate | equals release |
|---|---|---|---|
| 25.8 | 1.5 | 18.5 | 5.8 lbs released by press per roll-off of filter cake |

19 roll-offs of cake produced in 2012
110.2 lbs

**Methyl Isobutyl Ketone - release from filter press**

Feed to filter press after Fentons 9/20/12: 20.2 mg/L x 20,000 gal x 3.78 L/gal equals 1527120 mg or 1527 g or 3.36 lbs MEK in feed to lime slurry/press

15,260 lbs (6928 kg) of cake produced, 70% moisture (10682 lbs or 1280 gallons of aqueous feed remains in cake)
10/6/12 second drop
less than 9.37 mg/kg x6928 kg equals 64.9 g or 0.14 lbs MEK in cake

Filtrate 9/20/12 (18,720 gallons, 1280 gal remained with cake)
12 mg/L x70762 L equals 849144 mg or 849.1 g or 1.87 lbs in filtrate

| Feed | minus cake | minus filtrate | equals release |
|---|---|---|---|
| 3.36 | 0.14 | 1.87 | 1.35 lbs released by press per roll-off of filter cake |

19 roll-offs of cake produced in 2012
25.7 lbs

**TABLE 17**

**HEATING EQUIPMENT EMISSIONS**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Unit | Comment |
|---|---|
| 1. Two Steam Boilers (AWTF) | Propane Fired 1.633 MMBtu/hr |
| 2. Hot Water Boiler | Propane Fired 1.0 MMBtu/hr |
| 3. Propane Heaters | Propane Fired 2.709 MMBtu/hr (total for facility) |
| 4. Fulton Model 50063 (Locker Room) | Propane Fired 0.506MMBtu/hr |
| 5. Copper Hydronic Boiler (Firewater Pump Bld.) | Propane Fired 1.34 MMBtu/hr |
| 6. Davo Hastings Heaters (Two - Drum Bld. Roof) | Propane Fired 0.160 MMBtu/hr each |
| 7. Stabilization Main Heaters (One - Stab. Bld. Roof) | Propane Fired 4.0 MMBtu/hr |
| 8. Pug Mill Heaters (One - Stab. Pug Mill Area) | Propane Fired 0.400 MMBtu/hr |

Emission Factors for Propane Combustion

| Emission Factors (lb/MMBtu) | |
|---|---|
| PM-10 | 0.008 |
| NOx | 0.143 |
| SOx (% s) | 0.0002 |
| CO | 0.082 |
| VOC | 0.011 |
| $CO_2$ | 137.363 |
| $CH_4$ | 0.002 |
| $N_2O$ | 0.010 |

A = weight % ash in fuel. Multiply numeric value by A to obtain emission factor.
For ex.: if ash content is 5% then A = 5. Actual value is 0.01% Ash from NOCO Data Sheet
s = weight % sulfur in fuel. Multiply numeric value by s to obtain emission factor.
For ex.: if sulfur content is 3.4%, then s = 3.4. Actual Value is 0.2% Sulfur from Buckeye Pipe Line Co. Data Sheet

| **1. Two Steam Boilers (AWTF)** | | Emissions (for two units) | |
|---|---|---|---|
| **Note: Two units run together for 1/2 year, so total 8760 hrs./yr** | Pollutant | lb/yr | TPY |
| | PM-10 | 110.04 | 0.06 |
| Rating (MMBtu/hr) 1.633 | NOx | 2043.58 | 1.02 |
| Operation (hours/year) = 8760 | SOx | 3.14 | 0.00 |
| **Exempt from Air Permitting 6NYCRR Part 201-3.2(c)(1)(i)** | CO | 1178.99 | 0.59 |
| **Stationary combustion furnace with capacity <10MMBtu/hr** | VOC | 157.20 | 0.08 |
| | $CO_2$ | 1964983.52 | 982.49 |
| | $CH_4$ | 31.44 | 0.02 |
| | $N_2O$ | 141.48 | 0.07 |

| **2. Hot Water Boiler** | | Emissions | |
|---|---|---|---|
| | Pollutant | lb/yr | TPY |
| | PM-10 | 67.38 | 0.03 |
| Rating (MMBtu/hr) 1.0 | NOx | 1251.43 | 0.63 |
| Operation (hours/year) = 8760 | SOx | 1.93 | 0.00 |
| **Exempt from Air Permitting 6NYCRR Part 201-3.2(c)(1)(i)** | CO | 721.98 | 0.36 |
| **Stationary combustion furnace with capacity <10MMBtu/hr** | VOC | 96.26 | 0.05 |
| | $CO_2$ | 1203296.70 | 601.65 |
| | $CH_4$ | 19.25 | 0.01 |
| | $N_2O$ | 86.64 | 0.04 |

| **3. Propane Heaters** | | Emissions | |
|---|---|---|---|
| | Pollutant | lb/yr | TPY |
| | PM-10 | 91.27 | 0.05 |
| Rating (MMBtu/hr) 2.709 | NOx | 1695.06 | 0.85 |
| Operation (hours/year) = 4380 | SOx | 2.61 | 0.00 |
| **Exempt from Air Permitting 6NYCRR Part 201-3.2(c)(1)(i)** | CO | 977.92 | 0.49 |
| **Stationary combustion furnace with capacity <10MMBtu/hr** | VOC | 130.39 | 0.07 |
| | $CO_2$ | 1629865.38 | 814.93 |
| | $CH_4$ | 26.08 | 0.01 |
| | $N_2O$ | 117.35 | 0.06 |

**TABLE 17**

**HEATING EQUIPMENT EMISSIONS**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| **4. Fulton Model 50063 (Locker Room)** | | Emissions | |
|---|---|---|---|
| | Pollutant | lb/yr | TPY |
| | PM-10 | 17.05 | 0.01 |
| Rating (MMBtu/hr) 0.506 | NOx | 316.61 | 0.16 |
| Operation (hours/year) = 4380 | SOx | 0.49 | 0.00 |
| **Exempt from Air Permitting 6NYCRR Part 201-3.2(c)(1)(i)** | CO | 182.66 | 0.09 |
| **Stationary combustion furnace with capacity <10MMBtu/hr** | VOC | 24.35 | 0.01 |
| | $CO_2$ | 304434.07 | 152.22 |
| | $CH_4$ | 4.87 | 0.00 |
| | $N_2O$ | 21.92 | 0.01 |

| **5. Copper Hydronic Boiler (Firewater Pump Bld.)** | | Emissions | |
|---|---|---|---|
| | Pollutant | lb/yr | TPY |
| | PM-10 | 45.15 | 0.02 |
| Rating (MMBtu/hr) 1.34 | NOx | 838.46 | 0.42 |
| Operation (hours/year) = 4380 | SOx | 1.29 | 0.00 |
| **Exempt from Air Permitting 6NYCRR Part 201-3.2(c)(1)(i)** | CO | 483.73 | 0.24 |
| **Stationary combustion furnace with capacity <10MMBtu/hr** | VOC | 64.50 | 0.03 |
| | $CO_2$ | 806208.79 | 403.10 |
| | $CH_4$ | 12.90 | 0.01 |
| | $N_2O$ | 58.05 | 0.03 |

| **6. Davo Hastings Heaters (Two - Drum Bld. Roof)** | | Emissions (for two units) | |
|---|---|---|---|
| | Pollutant | lb/yr | TPY |
| **Note: Two units run together for 1/2 year, so total 8760 hrs./yr** | PM-10 | 10.78 | 0.01 |
| Rating (MMBtu/hr) 0.160 | NOx | 200.23 | 0.10 |
| Operation (hours/year) = 8760 | SOx | 0.31 | 0.00 |
| **Exempt from Air Permitting 6NYCRR Part 201-3.2(c)(1)(i)** | CO | 115.52 | 0.06 |
| **Stationary combustion furnace with capacity <10MMBtu/hr** | VOC | 15.40 | 0.01 |
| | $CO_2$ | 192527.47 | 96.26 |
| | $CH_4$ | 3.08 | 0.00 |
| | $N_2O$ | 13.86 | 0.01 |

| **7. Stabilization Main Heaters (One - Stab. Bld. Roof)** | | Emissions | |
|---|---|---|---|
| | Pollutant | lb/yr | TPY |
| | PM-10 | 134.77 | 0.07 |
| Rating (MMBtu/hr) 4.0 | NOx | 2502.86 | 1.25 |
| Operation (hours/year) = 4380 | SOx | 3.85 | 0.00 |
| **Exempt from Air Permitting 6NYCRR Part 201-3.2(c)(1)(i)** | CO | 1443.96 | 0.72 |
| **Stationary combustion furnace with capacity <10MMBtu/hr** | VOC | 192.53 | 0.10 |
| | $CO_2$ | 2406593.41 | 1203.30 |
| | $CH_4$ | 38.51 | 0.02 |
| | $N_2O$ | 173.27 | 0.09 |

| **8. Pug Mill Heaters (One - Stab. Pug Mill Area)** | | Emissions | |
|---|---|---|---|
| | Pollutant | lb/yr | TPY |
| | PM-10 | 13.48 | 0.01 |
| Heat production (MMBtu/hr) 0.400 | NOx | 250.29 | 0.13 |
| Operation (hours/year) = 4380 | SOx | 0.39 | 0.00 |
| **Exempt from Air Permitting 6NYCRR Part 201-3.2(c)(1)(i)** | CO | 144.40 | 0.07 |
| **Stationary combustion furnace with capacity <10MMBtu/hr** | VOC | 19.25 | 0.01 |
| | $CO_2$ | 240659.34 | 120.33 |
| | $CH_4$ | 3.85 | 0.00 |
| | $N_2O$ | 17.33 | 0.01 |

| **Total Heating Equipment Combustion Emissions** | Emissions | |
|---|---|---|
| Pollutant | lb/yr | TPY |
| PM-10 | 489.92 | 0.24 |
| NOx | 9098.51 | 4.55 |
| SOx | 14.00 | 0.01 |
| CO | 5249.14 | 2.62 |
| VOC | 699.89 | 0.35 |
| $CO_2$ | 8748568.68 | 4374.28 |
| $CH_4$ | 139.98 | 0.07 |
| $N_2O$ | 629.90 | 0.31 |

**TABLE 18**

**DIESEL ENGINE EMISSIONS**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| **Unit** | **Comment** |
|---|---|
| Cummins Diesel Fire-Water Pump - Ser. No. 034302 | 187 Horsepower |

Emission Factors for Diesel Industrial Engines - From AP-42 Table 3.3.1

| Emission factors (lb/hp-hr): | |
|---|---|
| PM-10 | 0.0022 |
| NOx | 0.031 |
| SOx | 0.00205 |
| CO | 0.00668 |
| VOC | 0.0025 |
| $CO_2$ | 1.15 |

| **Cummins Diesel Fire-Water Pump - Ser. No. 034302** | | Calculated Emissions lb/yr | TPY |
|---|---|---|---|
| Refer to Section 3.3 of USEPA's AP-42 | PM-10 | 9.87 | 0.005 |
| Horsepower Output = 187 | NOx | 139.13 | 0.070 |
| Operation (hours/year) = 24 | SOx | 9.20 | 0.005 |
| **Exempt from Air Permitting 6NYCRR Part 201-3.2(c)(3)(ii)** | CO | 29.98 | 0.015 |
| **Stationary internal combustion engine <400bhp.** | VOC | 11.22 | 0.006 |
| | $CO_2$ | 5161.20 | 2.581 |

Note: Diesel engine is operated one day per month, for a maximum of 2 hours each occurrence.

**TABLE 19**

**ESTIMATED LABORATORY EMISSIONS**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

**2012 Chemical Purchases (VOCs Only)**

| Chemical Name | Units Purchased | Liters/Unit | Total Gallons/Year | Specific Gravity | Weight (pounds/year) | Actual Emissions lb/yr | Actual Emissions TPY |
|---|---|---|---|---|---|---|---|
| Acetone | 20 | 4 | 21.13 | 0.790 | 139.324 | 139.32 | 0.07 |
| n-Hexane (85%)* | 40 | 4 | 42.27 | 0.659 | 232.442 | 197.58 | 0.10 |
| Methylene Chloride* | 16 | 4 | 16.91 | 1.30 | 183.414 | 148.57 | 0.07 |

Calculated VOC emissions assumes the following evaporation rates based on records (acetone - 100%, hexane - 85%, methylene chloride - 81%)
Calculated Potential VOC emissions is based on Actual Usage x 2.
Chemicals indicated with a * are also Hazardous Air Pollutants (HAPs)

| | lb/yr | TPY |
|---|---|---|
| Potential VOC Emissions = | 395.15 | 0.49 |
| Potential HAP Emissions = | 692.28 | 0.35 |

**2012 Chemical Purchases (Non VOC)**

| Chemical Name | Units Purchased | Liters/Unit | Total Gallons/Year | Specific Gravity | Weight (pounds/year) | Actual Emissions lb/yr | Actual Emissions TPY |
|---|---|---|---|---|---|---|---|
| 30% Hydrogen Peroxide | 1 | 0.5 | 0.13 | 1.19 | 1.312 | 0.13 | 0.00 |
| Hydrochloric Acid* | 6 | 2.5 | 3.96 | 1.30 | 42.988 | 4.30 | 0.00 |
| Glacial Acetic Acid | 18 | 0.5 | 2.38 | 1.05 | 20.833 | 2.08 | 0.00 |
| Nitric Acid | 16 | 2.5 | 10.57 | 1.41 | 124.157 | 12.42 | 0.01 |
| 1N Sodium Hydroxide | 1 | 20 | 5.28 | 1.00 | 44.090 | 4.41 | 0.00 |
| Sulfuric Acid | 10 | 2.5 | 6.60 | 1.85 | 101.958 | 10.20 | 0.01 |

Calculated Non VOC emissions assumes that 10% of all chemicals purchased are evaporated when used in the laboratory.

| | lb/yr | TPY |
|---|---|---|
| Potential Emissions (as Particulates) = | 67.07 | 0.03 |
| Potential HCl (HAP) Emissions = | 8.60 | 0.00 |

Potential Emissions as Particulates is based on Actual Usage x 2, and assumes that these chemicals will be emitted as particulate matter.
Potential Emissions as Particulates does not include Hydrochloric Acid, which is calculated separately because it is a HAP.

| | Total Laboratory Potential Emissions lb/yr | Total Laboratory Potential Emissions TPY |
|---|---|---|
| Particulates | 67.07 | 0.03 |
| VOCs | 395.15 | 0.49 |
| HAPs | 700.88 | 0.49 |

**TABLE 20**

**COMPOSITION OF SLF 1-6 LEACHATE ACCORDING TO 1994 STUDY**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Compound | CAS Number | VOC | HAP | Composition (µg/L) or (ppb) | Composition (% of total) | Average (µg/L) or (ppb) | Average (% of total) |
|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | | | 340,000 | 0.0340 | 969,665 | 0.09697 |
| Anthracene | 120-12-7 | X | | 38,000 | 0.0038 | 2,873 | 0.00029 |
| Benzene | 71-43-2 | X | X | 86,000 | 0.0086 | 60,250 | 0.00603 |
| Benz(A) Anthracene | 56-55-3 | X | | 0 | 0.0000 | 2,679 | 0.00027 |
| Benzoic Acid | 65-85-0 | X | | 0 | 0.0000 | 678,085 | 0.06781 |
| Benzyl alcohol | 100-51-6 | X | | 0 | 0.0000 | 12,626 | 0.00126 |
| Bis(2-ethylhexyl)phthalate | 117-81-7 | X | X | 730,000 | 0.0730 | 355,826 | 0.03558 |
| 2-Butanone | 78-93-3 | X | | 980,000 | 0.0980 | 838,723 | 0.08387 |
| Butyl benzyl Phthalate | 85-68-7 | X | | 35,000 | 0.0035 | 6,778 | 0.00068 |
| Carbon Disulfide | 75-15-0 | X | X | 0 | 0.0000 | 25,238 | 0.00252 |
| Carbon Tetrachloride | 56-23-5 | X | X | 250,000 | 0.0250 | 71,768 | 0.00718 |
| Chlorobenzene | 108-90-7 | X | X | 2,200,000 | 0.2200 | 556,562 | 0.05566 |
| Chloroform | 67-66-3 | X | X | 570,000 | 0.0570 | 224,333 | 0.02243 |
| 1,1-Dichloroethane | 75-34-3 | X | X | 88,000 | 0.0088 | 34,440 | 0.00344 |
| 1,2-Dichloroethane | 107-06-2 | X | X | 200,000 | 0.0200 | 39,633 | 0.00396 |
| 1,1-Dichloroethene | 75-35-4 | X | X | 0 | 0.0000 | 7,686 | 0.00077 |
| 1,2-Dichloroethene | 156-59-2 | X | | 0 | 0.0000 | 17,781 | 0.00178 |
| 1,2-Dichlorobenzene | 95-50-1 | X | | 0 | 0.0000 | 441,663 | 0.04417 |
| 1,3-Dichlorobenzene | 541-73-1 | X | | 0 | 0.0000 | 14,110 | 0.00141 |
| 1,4-Dichlorobenzene | 106-46-7 | X | X | 0 | 0.0000 | 127,910 | 0.01279 |
| Diethlyphthalate | 84-66-2 | X | | 90,000 | 0.0090 | 9,084 | 0.00091 |
| Dimethlyphthalate | 131-11-3 | X | X | 0 | 0.0000 | 5,277 | 0.00053 |
| 2,4-Dimethylphenol | 105-67-9 | X | | 0 | 0.0000 | 17,208 | 0.00172 |
| Di-n-Butyl phthalate | 84-74-2 | X | | 340,000 | 0.0340 | 39,098 | 0.00391 |
| Ethylbenzene | 100-41-4 | X | X | 1,600,000 | 0.1600 | 436,369 | 0.04364 |
| Fluoranthene | 206-44-0 | X | | 0 | 0.0000 | 952 | 0.00010 |
| Hexachlorobenzene | 118-74-1 | X | X | 0 | 0.0000 | 91,774 | 0.00918 |
| Hexachlorobutadiene | 87-68-3 | X | X | 0 | 0.0000 | 53,917 | 0.00539 |
| Hexachloroethane | 67-72-1 | X | X | 0 | 0.0000 | 14,913 | 0.00149 |
| 2-Hexanone | 591-78-6 | X | | 0 | 0.0000 | 29,827 | 0.00298 |
| Isophorone | 78-59-1 | X | X | 0 | 0.0000 | 2,124 | 0.00021 |
| Methylene Chloride | 75-09-2 | | X | 5,400,000 | 0.5400 | 1,952,690 | 0.19527 |
| 2-Methylnapthalene | 91-57-6 | X | | 0 | 0.0000 | 31,547 | 0.00315 |
| 2-Methylphenol | 95-48-7 | X | X | 0 | 0.0000 | 4,867 | 0.00049 |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 1,700,000 | 0.1700 | 366,931 | 0.03669 |
| 4-Methylphenol | 106-44-5 | X | X | 0 | 0.0000 | 25,745 | 0.00257 |
| Naphthalene | 91-20-3 | X | X | 1,100,000 | 0.1100 | 30,704 | 0.00307 |
| PCB-1242 | 53469-21-9 | | X | 4,100,000 | 0.4100 | 4,418,565 | 0.44186 |
| PCB-1254 | 11097-69-1 | | X | 1,400,000 | 0.1400 | 387 | 0.00004 |
| PCB-1260 | 11096-82-5 | | X | 0 | 0.0000 | 195,144 | 0.01951 |
| Pentachlorophenol | 87-86-5 | X | X | 0 | 0.0000 | 3,327 | 0.00033 |
| Phenol | 108-95-2 | X | X | 490,000 | 0.0490 | 583,406 | 0.05834 |
| Phenanthrene | 85-01-8 | X | | 98,000 | 0.0098 | 8,172 | 0.00082 |
| Pyrene | 129-00-0 | X | | 0 | 0.0000 | 1,147 | 0.00011 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | X | X | 6,800,000 | 0.6800 | 1,286,782 | 0.12868 |
| Tetrachloroethene | 127-18-4 | | X | 4,100,000 | 0.4100 | 1,667,635 | 0.16676 |
| Toluene | 108-88-3 | X | X | 6,500,000 | 0.6500 | 2,369,878 | 0.23699 |
| 1,2,4-Trichlorobenzene | 120-82-1 | X | X | 4,800,000 | 0.4800 | 1,257,908 | 0.12579 |
| 1,1,1-Trichloroethane | 71-55-6 | | X | 6,300,000 | 0.6300 | 2,546,767 | 0.25468 |
| 1,1,2-Trichloroethane | 79-00-5 | X | X | 290,000 | 0.0290 | 90,055 | 0.00901 |
| Trichloroethene | 79-01-6 | X | X | 12,000,000 | 1.2000 | 4,520,666 | 0.45207 |
| 2,4,5-Trichlorophenol | 95-95-4 | X | X | 0 | 0.0000 | 16,061 | 0.00161 |
| 2,4,6-Trichlorophenol | 88-06-2 | X | X | 0 | 0.0000 | 8,030 | 0.00080 |
| Vinyl Chloride | 75-01-4 | X | X | 0 | 0.0000 | 1,950 | 0.00020 |
| Xylenes | 1330-20-7 | X | X | 8,900,000 | 0.8900 | 2,127,698 | 0.21277 |
| TOTALS | | | | 71,525,000 | 7.1525 | 28,705,233 | 2.87052 |
| Remaining VOCs / HAPs | | | | 928,475,000 | 92.8475 | 221,294,767 | 22.12948 |
| Remaining Water | | | | 0 | 0 | 750,000,000 | 75.00000 |

**TABLE 21**

**ESTIMATED VOC AND HAP EMISSIONS FROM SLF 1-6 LANDFILL**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Leachate Concentration [1] ($\mu g/L$) | $C_i$ | $C_i / MW_i$ | $X_i$ | $H_{ci}$ ($m^3$-atm/mol) | $P_i$ (atm) | $C_{si}$ ($g/cm^3$) | $J_i$ ($g/cm^2$-s) | $E_{1i}$ (g/s) | Diffusion $E_{1i}$ (lb/yr) | Diffusion VOC Emissions (lb/yr) | Diffusion HAP Emissions (lb/yr) | Leachate Transfer $E_{3i}$ (g/truckload) | Leachate Transfer $E_{3i}$ (lb/yr) | Leachate Transfer VOC Emissions (lb/yr) | Leachate Transfer HAP Emissions (lb/yr) | Total VOC Emissions (lb/yr) | Total HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Method 8260B VOCs* | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | | X | 133.4 | 3900 | 3.90E-06 | 2.92E-08 | 5.27E-07 | 1.72E-02 | 5.04E-04 | 2.75E-06 | 5.41E-13 | 3.07E-04 | 21.32 | | 21.32 | 2.41E-02 | 2.76E-03 | | 0.00 | | 21.32 |
| 1,1,2-Trichloro-1,2,2-trichfluoroethane | 76-13-1 | X | | 187.376 | 39 | 3.90E-08 | 2.08E-10 | 3.75E-09 | 3.33E-01 | 6.95E-05 | 5.32E-07 | 1.05E-13 | 5.94E-05 | 4.13 | 4.13 | | 2.41E-04 | 2.76E-05 | 0.00 | | 4.13 | |
| 1,1,2-Trichloroethane | 79-00-5 | X | X | 133.4 | 4800 | 4.80E-06 | 3.60E-08 | 6.49E-07 | 9.13E-04 | 3.29E-05 | 1.80E-07 | 3.54E-14 | 2.00E-05 | 1.39 | 1.39 | 1.39 | 2.96E-02 | 3.40E-03 | 0.00 | 0.00 | 1.40 | 1.40 |
| 1,1-Dichloroethane | 75-34-3 | X | X | 98.96 | 2700 | 2.70E-06 | 2.73E-08 | 4.92E-07 | 5.62E-03 | 1.54E-04 | 6.22E-07 | 1.22E-13 | 6.94E-05 | 4.82 | 4.82 | 4.82 | 1.67E-02 | 1.91E-03 | 0.00 | 0.00 | 4.82 | 4.82 |
| 1,1-Dichloroethene | 75-35-4 | X | X | 96.94 | 410 | 4.10E-07 | 4.23E-09 | 7.63E-08 | 2.61E-02 | 1.11E-04 | 4.39E-07 | 8.63E-14 | 4.89E-05 | 3.40 | 3.40 | 3.40 | 2.53E-03 | 2.90E-04 | 0.00 | 0.00 | 3.40 | 3.40 |
| 1,2-Dibromoethane | 106-93-4 | X | X | 187.86 | 560 | 5.60E-07 | 2.98E-09 | 5.38E-08 | 6.73E-04 | 2.01E-06 | 1.54E-08 | 3.04E-15 | 1.72E-06 | 0.12 | 0.12 | 0.12 | 3.46E-03 | 3.97E-04 | 0.00 | 0.00 | 0.12 | 0.12 |
| 1,2-Dichloroethane | 107-06-2 | X | X | 98.96 | 6900 | 6.90E-06 | 6.97E-08 | 1.26E-06 | 9.79E-04 | 6.84E-05 | 2.77E-07 | 5.45E-14 | 3.09E-05 | 2.15 | 2.15 | 2.15 | 4.26E-02 | 4.89E-03 | 0.00 | 0.00 | 2.15 | 2.15 |
| 1,4-Dioxane | 123-91-1 | X | X | 88.11 | 95000 | 9.50E-05 | 1.08E-06 | 1.94E-05 | 1.07E-05 | 1.16E-05 | 4.17E-08 | 8.20E-15 | 4.65E-06 | 0.32 | 0.32 | 0.32 | 5.87E-01 | 6.73E-02 | 0.07 | 0.07 | 0.39 | 0.39 |
| Acetonitrile | 75-05-8 | X | X | 41.05 | 6400 | 6.40E-06 | 1.56E-07 | 2.81E-06 | 2.93E-05 | 4.58E-06 | 7.69E-09 | 1.51E-15 | 8.57E-07 | 0.06 | 0.06 | 0.06 | 3.95E-02 | 4.53E-03 | 0.00 | 0.00 | 0.06 | 0.06 |
| Acrylonitrile | 107-13-1 | X | X | 53.06 | 160 | 1.60E-07 | 3.02E-09 | 5.44E-08 | 1.38E-04 | 4.17E-07 | 9.05E-10 | 1.78E-16 | 1.01E-07 | 0.01 | 0.01 | 0.01 | 9.88E-04 | 1.13E-04 | 0.00 | 0.00 | 0.01 | 0.01 |
| Benzene | 71-43-2 | X | X | 78.11 | 920 | 9.20E-07 | 1.18E-08 | 2.12E-07 | 5.55E-03 | 6.55E-05 | 2.09E-07 | 4.12E-14 | 2.33E-05 | 1.62 | 1.62 | 1.62 | 5.68E-03 | 6.51E-04 | 0.00 | 0.00 | 1.62 | 1.62 |
| Carbon disulfide | 75-15-0 | X | X | 76.14 | 27 | 2.70E-08 | 3.55E-10 | 6.40E-09 | 3.03E-02 | 1.08E-05 | 3.35E-08 | 6.60E-15 | 3.74E-06 | 0.26 | 0.26 | 0.26 | 1.67E-04 | 1.91E-05 | 0.00 | 0.00 | 0.26 | 0.26 |
| Chlorobenzene | 108-90-7 | X | X | 112.56 | 1000 | 1.00E-06 | 8.88E-09 | 1.60E-07 | 3.70E-03 | 3.29E-05 | 1.52E-07 | 2.99E-14 | 1.69E-05 | 1.18 | 1.18 | 1.18 | 6.18E-03 | 7.08E-04 | 0.00 | 0.00 | 1.18 | 1.18 |
| Chloroethane | 75-00-3 | X | X | 64.51 | 110 | 1.10E-07 | 1.71E-09 | 3.08E-08 | 1.11E-02 | 1.90E-05 | 5.00E-08 | 9.85E-15 | 5.58E-06 | 0.39 | 0.39 | 0.39 | 6.79E-04 | 7.79E-05 | 0.00 | 0.00 | 0.39 | 0.39 |
| Chloroform | 67-66-3 | X | X | 119.38 | 7800 | 7.80E-06 | 6.53E-08 | 1.18E-06 | 3.67E-03 | 2.40E-04 | 1.17E-06 | 2.31E-13 | 1.31E-04 | 9.10 | 9.10 | 9.10 | 4.82E-02 | 5.52E-03 | 0.01 | 0.01 | 9.10 | 9.10 |
| Chloromethane | 74-87-3 | X | X | 50.49 | 84 | 8.40E-08 | 1.66E-09 | 3.00E-08 | 8.54E-03 | 1.42E-05 | 2.94E-08 | 5.79E-15 | 3.28E-06 | 0.23 | 0.23 | 0.23 | 5.19E-04 | 5.95E-05 | 0.00 | 0.00 | 0.23 | 0.23 |
| Dibromomethane | 74-95-3 | X | | 173.83 | 3500 | 3.50E-06 | 2.01E-08 | 3.63E-07 | 8.22E-04 | 1.66E-05 | 1.18E-07 | 2.32E-14 | 1.32E-05 | 0.91 | 0.91 | | 2.16E-02 | 2.48E-03 | 0.00 | | 0.92 | |
| Ethyl ether | 60-29-7 | X | | 74.12 | 9400 | 9.40E-06 | 1.27E-07 | 2.29E-06 | 1.35E-03 | 1.72E-04 | 5.20E-07 | 1.02E-13 | 5.80E-05 | 4.03 | 4.03 | | 5.81E-02 | 6.66E-03 | 0.01 | | 4.04 | |
| Ethylbenzene | 100-41-4 | X | X | 106.17 | 170 | 1.70E-07 | 1.60E-09 | 2.89E-08 | 7.88E-03 | 1.26E-05 | 5.49E-08 | 1.08E-14 | 6.12E-06 | 0.43 | 0.43 | 0.43 | 1.05E-03 | 1.20E-04 | 0.00 | 0.00 | 0.43 | 0.43 |
| Isobutanol | 78-83-1 | X | | 74.12 | 37000 | 3.70E-05 | 4.99E-07 | 9.00E-06 | 1.19E-05 | 5.95E-06 | 1.80E-08 | 3.55E-15 | 2.01E-06 | 0.14 | 0.14 | | 2.29E-01 | 2.62E-02 | 0.03 | | 0.17 | |
| Tetrachloroethene | 127-18-4 | | X | 165.83 | 500 | 5.00E-07 | 3.02E-09 | 5.44E-08 | 1.84E-02 | 5.56E-05 | 3.77E-07 | 7.42E-14 | 4.21E-05 | 2.92 | | 2.92 | 3.09E-03 | 3.54E-04 | | 0.00 | | 2.92 |
| Toluene | 108-88-3 | X | X | 92.14 | 4800 | 4.80E-06 | 5.21E-08 | 9.40E-07 | 6.64E-03 | 3.47E-04 | 1.31E-06 | 2.57E-13 | 1.46E-04 | 10.13 | 10.13 | 10.13 | 2.96E-02 | 3.40E-03 | 0.00 | 0.00 | 10.13 | 10.13 |
| trans-1,2-Dichloroethene | 156-60-5 | X | | 96.94 | 300 | 3.00E-07 | 3.09E-09 | 5.58E-08 | 9.38E-03 | 2.91E-05 | 1.15E-07 | 2.27E-14 | 1.29E-05 | 0.89 | 0.89 | | 1.85E-03 | 2.12E-04 | 0.00 | | 0.89 | |
| Xylenes | 1330-20-7 | X | X | 106.16 | 820 | 8.20E-07 | 7.72E-09 | 1.39E-07 | 7.04E-03 | 5.45E-05 | 2.37E-07 | 4.66E-14 | 2.64E-05 | 1.83 | 1.83 | 1.83 | 5.06E-03 | 5.81E-04 | 0.00 | 0.00 | 1.84 | 1.84 |
| Cyclohexanone | 108-94-1 | X | | 98.15 | 2100 | 2.10E-06 | 2.14E-08 | 3.86E-07 | 1.20E-05 | 2.57E-07 | 1.03E-09 | 2.03E-16 | 1.15E-07 | 0.01 | 0.01 | | 1.30E-02 | 1.49E-03 | 0.00 | | 0.01 | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | X | X | 167.85 | 12000 | 1.20E-05 | 7.15E-08 | 1.29E-06 | 3.45E-04 | 2.47E-05 | 1.70E-07 | 3.34E-14 | 1.89E-05 | 1.32 | 1.32 | 1.32 | 7.41E-02 | 8.50E-03 | 0.01 | 0.01 | 1.32 | 1.32 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 550000 | 5.50E-04 | 7.63E-06 | 1.38E-04 | 1.05E-05 | 8.03E-05 | 2.37E-07 | 4.66E-14 | 2.64E-05 | 1.84 | 1.84 | | 3.40E+00 | 3.89E-01 | 0.39 | | 2.22 | |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 79000 | 7.90E-05 | 7.89E-07 | 1.42E-05 | 3.90E-04 | 3.08E-04 | 1.26E-06 | 2.49E-13 | 1.41E-04 | 9.79 | 9.79 | 9.79 | 4.88E-01 | 5.59E-02 | 0.06 | 0.06 | 9.85 | 9.85 |
| Acetone | 67-64-1 | | | 58.08 | 740000 | 7.40E-04 | 1.27E-05 | 2.30E-04 | 3.88E-05 | 4.95E-04 | 1.18E-06 | 2.32E-13 | 1.31E-04 | 9.12 | | | 4.57E+00 | 5.24E-01 | | | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 220000 | 2.20E-04 | 2.59E-06 | 4.67E-05 | 2.19E-03 | 5.69E-03 | 1.97E-05 | 3.89E-12 | 2.20E-03 | 153.12 | | 153.12 | 1.36E+00 | 1.56E-01 | | 0.16 | | 153.27 |
| Trichloroethene | 79-01-6 | X | X | 131.39 | 13000 | 1.30E-05 | 9.89E-08 | 1.78E-06 | 1.03E-02 | 1.02E-03 | 5.49E-06 | 1.08E-12 | 6.12E-04 | 42.55 | 42.55 | 42.55 | 8.03E-02 | 9.21E-03 | 0.01 | 0.01 | 42.56 | 42.56 |
| *Method 8270C SVOCs* | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4,5-Tetrachlorobenzene | 95-94-3 | X | | 215.89 | 210 | 2.10E-07 | 9.73E-10 | 1.75E-08 | 1.00E-03 | 9.75E-07 | 8.61E-09 | 1.69E-15 | 9.60E-07 | 0.07 | 0.07 | | 1.30E-03 | 1.49E-04 | 0.00 | | 0.07 | |
| 2,4-Dichlorophenol | 120-83-2 | X | | 163 | 1300 | 1.30E-06 | 7.98E-09 | 1.44E-07 | 3.16E-06 | 2.53E-08 | 1.68E-10 | 3.31E-17 | 1.88E-08 | 0.00 | 0.00 | | 8.03E-03 | 9.21E-04 | 0.00 | | 0.00 | |
| 2,4-Dimethylphenol | 105-67-9 | X | | 122.16 | 2600 | 2.60E-06 | 2.13E-08 | 3.84E-07 | 2.00E-06 | 4.27E-08 | 2.13E-10 | 4.20E-17 | 2.38E-08 | 0.00 | 0.00 | | 1.61E-02 | 1.84E-03 | 0.00 | | 0.00 | |
| 2-Chlorophenol | 95-57-8 | X | | 128.56 | 230 | 2.30E-07 | 1.79E-09 | 3.23E-08 | 3.91E-04 | 7.01E-07 | 3.69E-09 | 7.26E-16 | 4.11E-07 | 0.03 | 0.03 | | 1.42E-03 | 1.63E-04 | 0.00 | | 0.03 | |
| 2-Methylphenol | 95-48-7 | X | X | 108.14 | 2200 | 2.20E-06 | 2.03E-08 | 3.67E-07 | 1.20E-06 | 2.45E-08 | 1.08E-10 | 2.13E-17 | 1.21E-08 | 0.00 | 0.00 | 0.00 | 1.36E-02 | 1.56E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3-Methylphenol | 108-39-4 | X | X | 108.14 | 17000 | 1.70E-05 | 1.57E-07 | 2.84E-06 | 8.65E-07 | 1.36E-07 | 6.03E-10 | 1.19E-16 | 6.72E-08 | 0.00 | 0.00 | 0.00 | 1.05E-01 | 1.20E-02 | 0.01 | 0.01 | 0.02 | 0.02 |
| 4-Chloroaniline | 106-47-8 | X | | 127.57 | 3000 | 3.00E-06 | 2.35E-08 | 4.24E-07 | 3.31E-07 | 7.80E-09 | 4.07E-11 | 8.01E-18 | 4.54E-09 | 0.00 | 0.00 | | 1.85E-02 | 2.12E-03 | 0.00 | | 0.00 | |
| 4-Methylphenol | 106-44-5 | X | X | 108.13 | 17000 | 1.70E-05 | 1.57E-07 | 2.84E-06 | 7.92E-07 | 1.25E-07 | 5.52E-10 | 1.09E-16 | 6.15E-08 | 0.00 | 0.00 | 0.00 | 1.05E-01 | 1.20E-02 | 0.01 | 0.01 | 0.02 | 0.02 |
| Acetophenone | 98-86-2 | X | X | 120.15 | 3400 | 3.40E-06 | 2.83E-08 | 5.10E-07 | 1.04E-05 | 2.95E-07 | 1.45E-09 | 2.85E-16 | 1.62E-07 | 0.01 | 0.01 | 0.01 | 2.10E-02 | 2.41E-03 | 0.00 | 0.00 | 0.01 | 0.01 |
| Aniline | 62-53-3 | X | X | 93.13 | 2200 | 2.20E-06 | 2.36E-08 | 4.26E-07 | 2.01E-06 | 4.76E-08 | 1.81E-10 | 3.57E-17 | 2.02E-08 | 0.00 | 0.00 | 0.00 | 1.36E-02 | 1.56E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Diethyl phthalate | 84-66-2 | X | | 222.24 | 270 | 2.70E-07 | 1.21E-09 | 2.19E-08 | 4.50E-07 | 5.48E-10 | 4.98E-12 | 9.80E-19 | 5.55E-10 | 0.00 | 0.00 | | 1.67E-03 | 1.91E-04 | 0.00 | | 0.00 | |
| Dimethyl phthalate | 131-11-3 | X | X | 194.18 | 280 | 2.80E-07 | 1.44E-09 | 2.60E-08 | 1.10E-07 | 1.59E-10 | 1.26E-12 | 2.48E-19 | 1.41E-10 | 0.00 | 0.00 | 0.00 | 1.73E-03 | 1.98E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pentachlorobenzene | 608-93-5 | X | | 250.34 | 300 | 3.00E-07 | 1.20E-09 | 2.16E-08 | 7.03E-04 | 8.44E-07 | 8.64E-09 | 1.70E-15 | 9.64E-07 | 0.07 | 0.07 | | 1.85E-03 | 2.12E-04 | 0.00 | | 0.07 | |
| Pyridine | 110-86-1 | X | | 79.1 | 4600 | 4.60E-06 | 5.82E-08 | 1.05E-06 | 1.10E-05 | 6.41E-07 | 2.07E-09 | 4.08E-16 | 2.31E-07 | 0.02 | 0.02 | | 2.84E-02 | 3.26E-03 | 0.00 | | 0.02 | |
| Phenol | 108-95-2 | X | X | 94.11 | 140000 | 1.40E-04 | 1.49E-06 | 2.68E-05 | 3.97E-07 | 5.92E-07 | 2.28E-09 | 4.48E-16 | 2.54E-07 | 0.02 | 0.02 | 0.02 | 8.65E-01 | 9.91E-02 | 0.10 | 0.10 | 0.12 | 0.12 |
| *Method 8015B - Nonhalogenated Organic Compounds* | | | | | | | | | | | | | | | | | | | | | | |
| Methanol | 67-56-1 | X | X | 32.04 | 9.70E+05 | 9.70E-04 | 3.03E-05 | 5.46E-04 | 1.35E-04 | 4.10E-03 | 5.37E-06 | 1.06E-12 | 5.99E-04 | 41.62 | 41.62 | 41.62 | 5.99E+00 | 6.87E-01 | 0.69 | 0.69 | 42.30 | 42.30 |
| Butyl alcohol, n- | 71-36-3 | X | | 74.12 | 290000 | 2.90E-04 | 3.91E-06 | 7.06E-05 | 5.57E-06 | 2.18E-05 | 6.62E-08 | 1.30E-14 | 7.38E-06 | 0.51 | 0.51 | | 1.79E+00 | 2.05E-01 | 0.21 | | 0.72 | |
| *Method 608 - Organochloride Pesticides in Water* | | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | X | | 320.04 | 2.6 | 2.60E-09 | 8.12E-12 | 1.47E-10 | 6.60E-06 | 5.37E-11 | 7.03E-13 | 1.38E-19 | 7.84E-11 | 0.00 | 0.00 | | 1.61E-05 | 1.84E-06 | 0.00 | | 0.00 | |
| 4,4-DDT | 50-29-3 | X | | 354.49 | 2.5 | 2.50E-09 | 7.05E-12 | 1.27E-10 | 1.29E-05 | 9.12E-11 | 1.32E-12 | 2.60E-19 | 1.47E-10 | 0.00 | 0.00 | | 1.54E-05 | 1.77E-06 | 0.00 | | 0.00 | |
| alpha-BHC | 319-84-6 | X | | 290.83 | 6.2 | 6.20E-09 | 2.13E-11 | 3.85E-10 | 6.70E-06 | 1.43E-10 | 1.70E-12 | 3.35E-19 | 1.90E-10 | 0.00 | 0.00 | | 3.83E-05 | 4.39E-06 | 0.00 | | 0.00 | |
| beta-BHC | 319-85-7 | X | | 290.83 | 13 | 1.30E-08 | 4.47E-11 | 8.06E-10 | 4.40E-07 | 1.97E-11 | 2.34E-13 | 4.61E-20 | 2.61E-11 | 0.00 | 0.00 | | 8.03E-05 | 9.21E-06 | 0.00 | | 0.00 | |
| delta-BHC | 319-86-8 | X | | 290.83 | 14 | 1.40E-08 | 4.81E-11 | 8.68E-10 | 4.30E-07 | 2.07E-11 | 2.47E-13 | 4.86E-20 | 2.75E-11 | 0.00 | 0.00 | | 8.65E-05 | 9.91E-06 | 0.00 | | 0.00 | |
| Endrin | 72-20-8 | X | | 380.91 | 1.4 | 1.40E-09 | 3.68E-12 | 6.63E-11 | 7.51E-06 | 2.77E-11 | 4.31E-13 | 8.48E-20 | 4.81E-11 | 0.00 | 0.00 | | 8.65E-06 | 9.91E-07 | 0.00 | | 0.00 | |
| Lindane | 58-89-9 | X | X | 290.83 | 14 | 1.40E-08 | 4.81E-11 | 8.68E-10 | 5.14E-06 | 2.48E-10 | 2.95E-12 | 5.81E-19 | 3.29E-10 | 0.00 | 0.00 | 0.00 | 8.65E-05 | 9.91E-06 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Method 8151A - Herbicides* | | | | | | | | | | | | | | | | | | | | | | |
| 2,4-D | 94-75-7 | X | | 221.04 | 1300 | 1.30E-06 | 5.88E-09 | 1.06E-07 | 8.60E-06 | 5.07E-08 | 4.58E-10 | 9.02E-17 | 5.11E-08 | 0.00 | 0.00 | | 8.03E-03 | 9.21E-04 | 0.00 | | 0.00 | |
| *Method 8280A - Dioxins and Furans* | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin [3] | 35822-46-9 | X | | 425.31 | 2.4 | 2.40E-09 | 5.64E-12 | 1.02E-10 | 2.18E-05 | 1.23E-10 | 2.14E-12 | 4.22E-19 | 2.39E-10 | 0.00 | 0.00 | | 1.48E-05 | 1.70E-06 | 0.00 | | 0.00 | |
| OCDD | 3268-87-9 | X | | 459.75 | 1.5 | 1.50E-09 | 3.26E-12 | 5.89E-11 | 6.70E-06 | 2.19E-11 | 4.12E-13 | 8.11E-20 | 4.59E-11 | 0.00 | 0.00 | | 9.26E-06 | 1.06E-06 | 0.00 | | 0.00 | |
| OCDF | 39001-02-0 | X | | 443.75 | 1.3 | 1.30E-09 | 2.93E-12 | 5.28E-11 | 1.90E-06 | 5.58E-12 | 1.01E-13 | 1.99E-20 | 1.13E-11 | 0.00 | 0.00 | | 8.03E-06 | 9.21E-07 | 0.00 | | 0.00 | |
| *PCBs (from Tank T-130 sample)* | | | | | | | | | | | | | | | | | | | | | | |
| Aroclor 1242 | 53469-21-9 | X | X | 291.99 | 2810 | 2.81E-06 | 9.62E-09 | 1.74E-07 | 5.20E-04 | 5.02E-06 | 5.99E-08 | 1.18E-14 | 6.68E-06 | 0.46 | 0.46 | 0.46 | 1.74E-02 | 1.99E-03 | 0.00 | 0.00 | 0.47 | 0.47 |
| Aroclor 1254 | 11097-69-1 | X | X | 326.44 | 795 | 7.95E-07 | 2.44E-09 | 4.39E-08 | 2.00E-03 | 4.88E-06 | 6.52E-08 | 1.28E-14 | 7.27E-06 | 0.51 | 0.51 | 0.51 | 4.91E-03 | 5.63E-04 | 0.00 | 0.00 | 0.51 | 0.51 |
| Aroclor 1260 | 11096-82-5 | X | X | 395.33 | 690 | 6.90E-07 | 1.75E-09 | 3.15E-08 | 4.60E-03 | 8.05E-06 | 1.30E-07 | 2.56E-14 | 1.45E-05 | 1.01 | 1.01 | 1.01 | 4.26E-03 | 4.89E-04 | 0.00 | 0.00 | 1.01 | 1.01 |
| | | | | | | | | | | | | | | TOTALS | 147.38 | 312.08 | | | 1.63 | 1.15 | 149.01 | 313.23 |

Variables of Interest

| | | | |
|---|---|---|---|
| $D_{ei}$ = | 1.00E-08 | $cm^2/s$ | (PVC liner) |
| l = | 0.05 | cm | (5 feet of clay + 20-mil PVC liner) |
| A = | 14 | acres = 5.7E+08 | $cm^2$ |
| $V_{truck}$ = | 21 | $m^3$ | |
| $P_t$ = | 303 | mmHg | |
| $N_v$ = | 342.4 | mol | |
| # Trucks / year = | 52 | ıce per week) | |

Notes:
1 Analytical results provided by CWM

**TABLE 22**

**ESTIMATED VOC AND HAP EMISSIONS FROM SLF 7 LANDFILL**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Leachate Concentration [1] (µg/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $H_{ci}$ ($m^3$-atm/mol) | $P_i$ (atm) | $C_{si}$ ($g/cm^3$) | $J_i$ ($g/cm^2$-s) | $E_{1i}$ (g/s) | Diffusion $E_{1i}$ (lb/yr) | Diffusion VOC Emissions (lb/yr) | Diffusion HAP Emissions (lb/yr) | Leachate Transfer $E_{3i}$ (g/truckload) | Leachate Transfer $E_{3i}$ (lb/yr) | Leachate Transfer VOC Emissions (lb/yr) | Leachate Transfer HAP Emissions (lb/yr) | Total VOC Emissions (lb/yr) | Total HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Toluene | 108-88-3 | X | X | 92.14 | 5990 | 5.99E-06 | 6.50E-08 | 1.17E-06 | 6.64E-03 | 4.32E-04 | 1.63E-06 | 3.20E-13 | 1.45E-04 | 10.10 | 10.10 | 10.10 | 3.69E-02 | 4.23E-03 | 0.00 | 0.00 | 10.10 | 10.10 |
| Xylenes | 1330-20-7 | X | X | 106.16 | 17600 | 1.76E-05 | 1.66E-07 | 2.99E-06 | 7.04E-03 | 1.17E-03 | 5.07E-06 | 9.98E-13 | 4.52E-04 | 31.45 | 31.45 | 31.45 | 1.09E-01 | 1.24E-02 | 0.01 | 0.01 | 31.46 | 31.46 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 179000 | 1.79E-04 | 2.48E-06 | 4.47E-05 | 1.05E-05 | 2.61E-05 | 7.69E-08 | 1.51E-14 | 6.86E-06 | 0.48 | 0.48 | | 1.10E+00 | 1.27E-01 | 0.13 | | 0.60 | |
| Acetone | 67-64-1 | | | 58.08 | 180000 | 1.80E-04 | 3.10E-06 | 5.58E-05 | 3.88E-05 | 1.20E-04 | 2.86E-07 | 5.63E-14 | 2.55E-05 | 1.77 | | | 1.11E+00 | 1.27E-01 | | | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 167000 | 1.67E-04 | 1.97E-06 | 3.54E-05 | 2.19E-03 | 4.31E-03 | 1.50E-05 | 2.95E-12 | 1.34E-03 | 92.83 | | 92.83 | 1.03E+00 | 1.18E-01 | | 0.12 | | 92.95 |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 2500 | 2.50E-06 | 2.50E-08 | 4.49E-07 | 3.90E-04 | 9.74E-06 | 3.99E-08 | 7.85E-15 | 3.56E-06 | 0.25 | 0.25 | 0.25 | 1.54E-02 | 1.77E-03 | 0.00 | 0.00 | 0.25 | 0.25 |
| Phenol | 108-95-2 | X | X | 94.11 | 73000 | 7.30E-05 | 7.76E-07 | 1.40E-05 | 3.97E-07 | 3.08E-07 | 1.19E-09 | 2.33E-16 | 1.06E-07 | 0.01 | 0.01 | 0.01 | 4.50E-01 | 5.16E-02 | 0.05 | 0.05 | 0.06 | 0.06 |
| Aroclor 1242 | 53469-21-9 | X | X | 291.99 | 480 | 4.80E-07 | 1.64E-09 | 2.96E-08 | 5.20E-04 | 8.55E-07 | 1.02E-08 | 2.01E-15 | 9.11E-07 | 0.06 | 0.06 | 0.06 | 2.96E-03 | 3.39E-04 | 0.00 | 0.00 | 0.06 | 0.06 |
| | | | | | | | | | | | | | | TOTALS | 42.34 | 134.69 | | | 0.20 | 0.19 | 42.54 | 134.88 |

Variables of Interest

| | | | |
|---|---|---|---|
| $D_{ei}$ = | 1.00E-08 | $cm^2/s$ | (PVC liner) |
| l = | 0.05 | cm | (4.5 feet of clay + 20-mil PVC liner) |
| A = | 11.2 | acres = 4.53E+08 | $cm^2$ |
| $V_{truck}$ = | 21 | $m^3$ | |
| $P_t$ = | 303 | mmHg | |
| $N_v$ = | 342.4 | mol | |
| # Trucks / year = | 52 | nce per week) | |

Notes:
1 Analytical results provided by CWM

**TABLE 23**

**ESTIMATED VOC AND HAP EMISSIONS FROM SLF 10 LANDFILL**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Leachate Concentration [1] (µg/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $H_{ci}$ ($m^3$-atm/mol) | $P_i$ (atm) | $C_{si}$ (g/$cm^3$) | $J_i$ (g/$cm^2$-s) | $E_{1i}$ (g/s) | Diffusion $E_{1i}$ (lb/yr) | Diffusion VOC Emissions (lb/yr) | Diffusion HAP Emissions (lb/yr) | Leachate Transfer $E_{3i}$ (g/truckload) | Leachate Transfer $E_{3i}$ (lb/yr) | Leachate Transfer VOC Emissions (lb/yr) | Leachate Transfer HAP Emissions (lb/yr) | Total VOC Emissions (lb/yr) | Total HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 11900 | 1.19E-05 | 1.19E-07 | 2.14E-06 | 3.90E-04 | 4.63E-05 | 1.90E-07 | 3.74E-14 | 1.04E-05 | 0.73 | 0.73 | 0.73 | 7.34E-02 | 8.41E-03 | 0.01 | 0.01 | 0.73 | 0.73 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 120000 | 1.20E-04 | 1.66E-06 | 3.00E-05 | 1.05E-05 | 1.75E-05 | 5.15E-08 | 1.01E-14 | 2.83E-06 | 0.20 | 0.20 | | 7.40E-01 | 8.48E-02 | 0.08 | | 0.28 | |
| Acetone | 67-64-1 | | | 58.08 | 236000 | 2.36E-04 | 4.06E-06 | 7.32E-05 | 3.88E-05 | 1.58E-04 | 3.75E-07 | 7.37E-14 | 2.06E-05 | 1.43 | | | 1.46E+00 | 1.67E-01 | | | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 24900 | 2.49E-05 | 2.93E-07 | 5.28E-06 | 2.19E-03 | 6.42E-04 | 2.23E-06 | 4.39E-13 | 1.23E-04 | 8.53 | | 8.53 | 1.54E-01 | 1.76E-02 | | 0.02 | | 8.54 |
| Phenol | 108-95-2 | X | X | 94.11 | 28000 | 2.80E-05 | 2.98E-07 | 5.36E-06 | 3.97E-07 | 1.18E-07 | 4.55E-10 | 8.95E-17 | 2.50E-08 | 0.00 | 0.00 | 0.00 | 1.73E-01 | 1.98E-02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Aroclor 1242 | 53469-21-9 | X | X | 291.99 | 15.3 | 1.53E-08 | 5.24E-11 | 9.43E-10 | 5.20E-04 | 2.73E-08 | 3.25E-10 | 6.41E-17 | 1.79E-08 | 0.00 | 0.00 | 0.00 | 9.43E-05 | 1.08E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Aroclor 1254 | 11097-69-1 | X | X | 326.44 | 5.25 | 5.25E-09 | 1.61E-11 | 2.90E-10 | 2.00E-03 | 3.22E-08 | 4.30E-10 | 8.46E-17 | 2.36E-08 | 0.00 | 0.00 | 0.00 | 3.24E-05 | 3.71E-06 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | TOTALS | 0.93 | 9.26 | | | 0.11 | 0.05 | 1.04 | 9.30 |

Variables of Interest

| | | | |
|---|---|---|---|
| $D_{ei}$ = | 1.00E-08 | $cm^2/s$ | (PVC liner) |
| l = | 0.05 | cm | (4.5 feet of clay + 20-mil PVC liner) |
| A = | 6.9 | acres = | 2.79E+08 $cm^2$ |
| $V_{truck}$ = | 21 | $m^3$ | |
| $P_t$ = | 303 | mmHg | |
| $N_v$ = | 342.4 | mol | |
| # Trucks / year = | 52 | nce per week) | |

Notes:
1 Analytical results provided by CWM

**TABLE 24**

**ESTIMATED VOC AND HAP EMISSIONS FROM SLF 11 LANDFILL**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Leachate Concentration [1] (µg/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $H_{ci}$ ($m^3$-atm/mol) | $P_i$ (atm) | $C_{si}$ ($g/cm^3$) | $J_i$ ($g/cm^2$-s) | $E_{1i}$ (g/s) | Diffusion $E_{1i}$ (lb/yr) | Diffusion VOC Emissions (lb/yr) | Diffusion HAP Emissions (lb/yr) | Leachate Transfer $E_{3i}$ (g/truckload) | Leachate Transfer $E_{3i}$ (lb/yr) | Leachate Transfer VOC Emissions (lb/yr) | Leachate Transfer HAP Emissions (lb/yr) | Total VOC Emissions (lb/yr) | Total HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloromethane | 74-87-3 | X | X | 50.49 | 1000 | 1.00E-06 | 1.98E-08 | 3.57E-07 | 8.54E-03 | 1.69E-04 | 3.49E-07 | 2.27E-14 | 2.36E-05 | 1.64 | 1.64 | 1.64 | 6.16E-03 | 7.07E-04 | 0.00 | 0.00 | 1.64 | 1.64 |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 2580 | 2.58E-06 | 2.58E-08 | 4.64E-07 | 3.90E-04 | 1.00E-05 | 4.12E-08 | 2.67E-15 | 2.78E-06 | 0.19 | 0.19 | 0.19 | 1.59E-02 | 1.82E-03 | 0.00 | 0.00 | 0.20 | 0.20 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 14100 | 1.41E-05 | 1.96E-07 | 3.52E-06 | 1.05E-05 | 2.05E-06 | 6.06E-09 | 3.94E-16 | 4.09E-07 | 0.03 | 0.03 | | 8.69E-02 | 9.96E-03 | 0.01 | | 0.04 | |
| Acetone | 67-64-1 | | | 58.08 | 32000 | 3.20E-05 | 5.51E-07 | 9.92E-06 | 3.88E-05 | 2.14E-05 | 5.08E-08 | 3.30E-15 | 3.43E-06 | 0.24 | | | 1.97E-01 | 2.26E-02 | | | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 500 | 5.00E-07 | 5.89E-09 | 1.06E-07 | 2.19E-03 | 1.29E-05 | 4.48E-08 | 2.91E-15 | 3.03E-06 | 0.21 | | 0.21 | 3.08E-03 | 3.53E-04 | | 0.00 | | 0.21 |
| Phenol | 108-95-2 | X | X | 94.11 | 1700 | 1.70E-06 | 1.81E-08 | 3.25E-07 | 3.97E-07 | 7.17E-09 | 2.76E-11 | 1.79E-18 | 1.87E-09 | 0.00 | 0.00 | 0.00 | 1.05E-02 | 1.20E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Aroclor 1242 | 53469-21-9 | X | X | 291.99 | 457 | 4.57E-07 | 1.57E-09 | 2.82E-08 | 5.20E-04 | 8.14E-07 | 9.72E-09 | 6.32E-16 | 6.57E-07 | 0.05 | 0.05 | 0.05 | 2.82E-03 | 3.23E-04 | 0.00 | 0.00 | 0.05 | 0.05 |
| Aroclor 1254 | 11097-69-1 | X | X | 326.44 | 1590 | 1.59E-06 | 4.87E-09 | 8.77E-08 | 2.00E-03 | 9.74E-06 | 1.30E-07 | 8.45E-15 | 8.79E-06 | 0.61 | 0.61 | 0.61 | 9.80E-03 | 1.12E-03 | 0.00 | 0.00 | 0.61 | 0.61 |
| Aroclor 1260 | 11096-82-5 | X | X | 395.33 | 892 | 8.92E-07 | 2.26E-09 | 4.06E-08 | 4.60E-03 | 1.04E-05 | 1.68E-07 | 1.09E-14 | 1.13E-05 | 0.79 | 0.79 | 0.79 | 5.50E-03 | 6.30E-04 | 0.00 | 0.00 | 0.79 | 0.79 |
| | | | | | | | | | | | | | | TOTALS | 3.31 | 3.49 | | | 0.02 | 0.01 | 3.33 | 3.50 |

Variables of Interest

$D_{ei}$ = 6.5E-09 $cm^2/s$ (HDPE liner)
l = 0.1 cm (3 feet of clay + 40-mil HDPE liner)
A = 25.7 acres = 1.04E+09 $cm^2$

$V_{truck}$ = 21 $m^3$
$P_t$ = 303 mmHg
$N_v$ = 342.4 mol
# Trucks / year = 52 nce per week)

Notes:
1 Analytical results provided by CWM

**TABLE 25**

**ESTIMATED VOC AND HAP EMISSIONS FROM SLF 12 LANDFILL**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Leachate Concentration [1] (µg/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $H_{ci}$ ($m^3$-atm/mol) | $P_i$ (atm) | $C_{si}$ (g/$cm^3$) | $J_i$ (g/$cm^2$-s) | $E_{1i}$ (g/s) | Diffusion $E_{1i}$ (lb/yr) | Diffusion VOC Emissions (lb/yr) | Diffusion HAP Emissions (lb/yr) | Leachate Transfer $E_{3i}$ (g/truckload) | Leachate Transfer $E_{3i}$ (lb/yr) | Leachate Transfer VOC Emissions (lb/yr) | Leachate Transfer HAP Emissions (lb/yr) | Total VOC Emissions (lb/yr) | Total HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | | | 58.08 | 362 | 3.62E-07 | 6.23E-09 | 1.12E-07 | 3.88E-05 | 2.42E-07 | 5.74E-10 | 3.73E-17 | 3.34E-08 | 0.00 | | | 2.23E-03 | 2.56E-04 | | | | |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 10 | 1.00E-08 | 9.98E-11 | 1.80E-09 | 3.90E-04 | 3.89E-08 | 1.60E-10 | 1.04E-17 | 9.27E-09 | 0.00 | 0.00 | 0.00 | 6.16E-05 | 7.07E-06 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 10 | 1.00E-08 | 1.39E-10 | 2.50E-09 | 1.05E-05 | 1.46E-09 | 4.29E-12 | 2.79E-19 | 2.50E-10 | 0.00 | 0.00 | | 6.16E-05 | 7.07E-06 | 0.00 | | 0.00 | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 2280 | 2.28E-06 | 2.68E-08 | 4.83E-07 | 2.19E-03 | 5.88E-05 | 2.04E-07 | 1.33E-14 | 1.19E-05 | 0.83 | | 0.83 | 1.41E-02 | 1.61E-03 | | 0.00 | | 0.83 |
| Phenol | 108-95-2 | X | X | 94.11 | 25 | 2.50E-08 | 2.66E-10 | 4.78E-09 | 3.97E-07 | 1.05E-10 | 4.06E-13 | 2.64E-20 | 2.36E-11 | 0.00 | 0.00 | 0.00 | 1.54E-04 | 1.77E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Aroclor 1242 | 53469-21-9 | X | X | 291.99 | 226 | 2.26E-07 | 7.74E-10 | 1.39E-08 | 5.20E-04 | 4.02E-07 | 4.81E-09 | 3.12E-16 | 2.79E-07 | 0.02 | 0.02 | 0.02 | 1.39E-03 | 1.60E-04 | 0.00 | 0.00 | 0.02 | 0.02 |
| Aroclor 1254 | 11097-69-1 | X | X | 326.44 | 289 | 2.89E-07 | 8.85E-10 | 1.59E-08 | 2.00E-03 | 1.77E-06 | 2.36E-08 | 1.54E-15 | 1.37E-06 | 0.10 | 0.10 | 0.10 | 1.78E-03 | 2.04E-04 | 0.00 | 0.00 | 0.10 | 0.10 |
| Aroclor 1260 | 11096-82-5 | X | X | 395.33 | 227 | 2.27E-07 | 5.74E-10 | 1.03E-08 | 4.60E-03 | 2.64E-06 | 4.27E-08 | 2.78E-15 | 2.48E-06 | 0.17 | 0.17 | 0.17 | 1.40E-03 | 1.60E-04 | 0.00 | 0.00 | 0.17 | 0.17 |
| | | | | | | | | | | | | | | TOTALS | 0.29 | 1.11 | | | 0.00 | 0.00 | 0.29 | 1.12 |

Variables of Interest

| | | | |
|---|---|---|---|
| $D_{ei}$ = | 6.5E-09 | $cm^2/s$ | (HDPE liner) |
| l = | 0.1 | cm | (2 feet of clay + 40-mil HDPE liner) |
| A = | 22.1 | acres = | 8.94E+08 $cm^2$ |
| $V_{truck}$ = | 21 | $m^3$ | |
| $P_t$ = | 303 | mmHg | |
| $N_v$ = | 342.4 | mol | |
| # Trucks / year = | 52 | nce per week) | |

Notes:
1 Analytical results provided by CWM

**TABLE 26**

**ESTIMATED VOC AND HAP EMISSIONS FROM RMU-1 LANDFILL (FINAL COVER AREAS ONLY)**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Waste Concentration [1] (ppm) | $C_i$ | $C_i / MW_i$ | $X_i$ | $P_i$* (atm) | $P_i$ (atm) | $C_{si}$ ($g/cm^3$) | $J_i$ ($g/cm^2$-s) | Diffusion $E_{1i}$ (g/s) | Diffusion $E_{1i}$ (lb/yr) | Diffusion VOC Emissions (lb/yr) | Diffusion HAP Emissions (lb/yr) | Total VOC Emissions (lb/yr) | Total HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane (Methyl chloroform) | 71-55-6 | | X | 133.4 | 1.15 | 1.15E-06 | 8.60E-09 | 2.45E-06 | 1.62E-01 | 3.97E-07 | 2.17E-09 | 1.41E-16 | 2.25E-07 | 1.57E-02 | | 0.02 | | 0.02 |
| 1,1,2-Trichloroethane (Cloroethene) | 79-00-5 | X | X | 133.4 | 0.01 | 1.10E-08 | 8.27E-11 | 2.36E-08 | 3.29E-02 | 7.76E-10 | 4.23E-12 | 2.75E-19 | 4.40E-10 | 3.06E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2,4-Trichlorobenzene (unsym-Trichlorobenzene) | 120-82-1 | X | X | 181.5 | 9.99 | 9.99E-06 | 5.50E-08 | 1.57E-05 | 2.37E-04 | 3.72E-09 | 2.76E-11 | 1.79E-18 | 2.87E-09 | 1.99E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2-Dichloroethane (Ethylene dichloride, EDC) | 107-06-2 | X | X | 98.96 | 0.03 | 2.90E-08 | 2.93E-10 | 8.35E-08 | 1.05E-01 | 8.80E-09 | 3.56E-11 | 2.31E-18 | 3.70E-09 | 2.57E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,4-Dichlorobenzene (p-Dichlorobenzene) | 106-46-7 | X | X | 147 | 0.35 | 3.52E-07 | 2.39E-09 | 6.83E-07 | 1.58E-03 | 1.08E-09 | 6.49E-12 | 4.22E-19 | 6.74E-10 | 4.69E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 107-13-1 | X | X | 53.1 | 0.00 | 3.10E-10 | 5.84E-12 | 1.67E-09 | 1.50E-01 | 2.50E-10 | 5.43E-13 | 3.53E-20 | 5.65E-11 | 3.92E-06 | 0.00 | 0.00 | 0.00 | 0.00 |
| Benzene (Benzol, Coal naphhtha) | 71-43-2 | X | X | 78.1 | 0.35 | 3.46E-07 | 4.42E-09 | 1.26E-06 | 1.25E-01 | 1.58E-07 | 5.05E-10 | 3.28E-17 | 5.25E-08 | 3.65E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| bis (2-Ethylhexyl) phthalate (DEHP, Di-(2-ethylhexyl)phthalate | 117-81-7 | X | X | 390.56 | 7.33 | 7.33E-06 | 1.88E-08 | 5.36E-06 | 2.63E-10 | 1.41E-15 | 2.25E-17 | 1.46E-24 | 2.34E-15 | 1.63E-10 | 0.00 | 0.00 | 0.00 | 0.00 |
| Carbon disulfide (Carbon bisulfide) | 75-15-0 | X | X | 76.1 | 0.12 | 1.20E-07 | 1.57E-09 | 4.49E-07 | 4.82E-01 | 2.16E-07 | 6.73E-10 | 4.38E-17 | 7.00E-08 | 4.86E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Carbon tetrachloride (Tetrachloromethane) | 56-23-5 | X | X | 153.8 | 0.01 | 8.09E-09 | 5.26E-11 | 1.50E-08 | 1.49E-01 | 2.23E-09 | 1.40E-11 | 9.13E-19 | 1.46E-09 | 1.01E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chlordane | 57-74-9 | X | X | 409.8 | 0.05 | 5.43E-08 | 1.32E-10 | 3.78E-08 | 1.30E-08 | 4.91E-16 | 8.23E-18 | 5.35E-25 | 8.55E-16 | 5.95E-11 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chlorobenzene (Benzene chloride) | 108-90-7 | X | X | 112.6 | 6.77 | 6.77E-06 | 6.01E-08 | 1.71E-05 | 1.55E-02 | 2.66E-07 | 1.23E-09 | 7.97E-17 | 1.27E-07 | 8.86E-03 | 0.01 | 0.01 | 0.01 | 0.01 |
| Chloroform (Trichloromethane) | 67-66-3 | X | X | 119.38 | 0.04 | 3.93E-08 | 3.29E-10 | 9.39E-08 | 2.74E-01 | 2.57E-08 | 1.25E-10 | 8.15E-18 | 1.30E-08 | 9.06E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cresol - mixed isomers | 1319-77-3 | X | X | 108.1 | 0.00 | 9.42E-10 | 8.72E-12 | 2.49E-09 | 3.95E-04 | 9.82E-13 | 4.34E-15 | 2.82E-22 | 4.51E-13 | 3.14E-08 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dibutyl phthalate (DBP) | 84-74-2 | X | X | 278.3 | 6.01 | 6.01E-06 | 2.16E-08 | 6.17E-06 | 1.30E-07 | 8.02E-13 | 9.12E-15 | 5.93E-22 | 9.48E-13 | 6.59E-08 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dichloromethane (Methylene chloride, DCM) | 75-09-2 | | X | 85 | 0.72 | 7.16E-07 | 8.42E-09 | 2.40E-06 | 5.76E-01 | 1.39E-06 | 4.82E-09 | 3.13E-16 | 5.00E-07 | 3.48E-02 | | 0.03 | | 0.03 |
| Ethyl benzene (Phenylethane) | 100-41-4 | X | X | 106.2 | 3.48 | 3.48E-06 | 3.27E-08 | 9.34E-06 | 1.15E-03 | 1.07E-08 | 4.65E-11 | 3.02E-18 | 4.83E-09 | 3.36E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ethylene glycol | 107-21-1 | X | X | 62.08 | 0.27 | 2.68E-07 | 4.32E-09 | 1.23E-06 | 1.66E-04 | 2.04E-10 | 5.19E-13 | 3.37E-20 | 5.39E-11 | 3.75E-06 | 0.00 | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone (MEK) | 78-93-3 | X | | 72.1 | 1.99 | 1.99E-06 | 2.76E-08 | 7.88E-06 | 1.32E-01 | 1.04E-06 | 3.06E-09 | 1.99E-16 | 3.18E-07 | 2.21E-02 | 0.02 | | 0.02 | |
| Naphthalene (and Methylnaphthalenes) | 91-20-3 | X | X | 128.2 | 5.26 | 5.26E-06 | 4.11E-08 | 1.17E-05 | 3.03E-04 | 3.55E-09 | 1.86E-11 | 1.21E-18 | 1.93E-09 | 1.34E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Phenol (Benzenol, Carbolic acid) | 108-95-2 | X | X | 94.1 | 0.00 | 8.81E-10 | 9.36E-12 | 2.67E-09 | 4.49E-04 | 1.20E-12 | 4.61E-15 | 3.00E-22 | 4.79E-13 | 3.33E-08 | 0.00 | 0.00 | 0.00 | 0.00 |
| Polynuclear Aromatic Hydrocarbons (Generic PAHs) | 206-44-0 | X | X | 147 | 15.04 | 1.50E-05 | 1.02E-07 | 2.92E-05 | 3.02E-05 | 8.82E-10 | 5.30E-12 | 3.45E-19 | 5.51E-10 | 3.83E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pyridine | 110-86-1 | X | | 79.1 | 0.00 | 7.17E-10 | 9.06E-12 | 2.59E-09 | 2.63E-02 | 6.81E-11 | 2.20E-13 | 1.43E-20 | 2.29E-11 | 1.59E-06 | 0.00 | | 0.00 | |
| Tetrachloroethylene (Antisol 1, Carbon dichloride, Perchloroethylene) | 127-18-4 | | X | 165.83 | 0.90 | 9.00E-07 | 5.43E-09 | 1.55E-06 | 2.50E-02 | 3.87E-08 | 2.63E-10 | 1.71E-17 | 2.73E-08 | 1.90E-03 | | 0.00 | | 0.00 |
| Toluene (Methylbenzene) | 108-88-3 | X | X | 92.4 | 13.55 | 1.36E-05 | 1.47E-07 | 4.19E-05 | 3.95E-02 | 1.65E-06 | 6.24E-09 | 4.06E-16 | 6.49E-07 | 4.51E-02 | 0.05 | 0.05 | 0.05 | 0.05 |
| Trichloroethylene (Acetylene trichloride) | 79-01-6 | X | X | 131.4 | 0.60 | 6.02E-07 | 4.58E-09 | 1.31E-06 | 9.87E-02 | 1.29E-07 | 6.93E-10 | 4.51E-17 | 7.20E-08 | 5.01E-03 | 0.01 | 0.01 | 0.01 | 0.01 |
| Vinyl chloride (Chloroethene, Monochloride ethylene) | 75-01-4 | X | X | 62.6 | 0.01 | 1.00E-08 | 1.60E-10 | 4.57E-08 | 3.50E+00 | 1.60E-07 | 4.10E-10 | 2.66E-17 | 4.26E-08 | 2.96E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Xylene (mixed isomers) | 1330-20-7 | X | X | 106.16 | 10.26 | 1.03E-05 | 9.66E-08 | 2.76E-05 | 1.12E-02 | 3.08E-07 | 1.34E-09 | 8.70E-17 | 1.39E-07 | 9.67E-03 | 0.01 | 0.01 | 0.01 | 0.01 |
| Polychlorinated Biphenyls (PCB's) | 1336-36-3 | X | X | 292 | 1,715.17 | 1.72E-03 | 5.87E-06 | 1.68E-03 | 5.40E-06 | 9.04E-09 | 1.08E-10 | 7.02E-18 | 1.12E-08 | 7.80E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Anthracene | 120-12-7 | X | | 178.23 | 1.60 | 1.60E-06 | 9.00E-09 | 2.57E-06 | 1.71E-09 | 4.39E-15 | 3.20E-17 | 2.08E-24 | 3.33E-15 | 2.31E-10 | 0.00 | | 0.00 | |
| Phenathrene | 85-01-8 | X | | 178.23 | 5.54 | 5.54E-06 | 3.11E-08 | 8.87E-06 | 6.80E-04 | 6.03E-09 | 4.39E-11 | 2.86E-18 | 4.57E-09 | 3.17E-04 | 0.00 | | 0.00 | |
| benzo(ghi)perylene | 191-24-2 | X | | 276.33 | 0.14 | 1.43E-07 | 5.18E-10 | 1.48E-07 | 1.32E-13 | 1.95E-20 | 2.20E-22 | 1.43E-29 | 2.29E-20 | 1.59E-15 | 0.00 | | 0.00 | |
| 2,4-Dimethylphenol | 105-67-9 | X | | 122.16 | 0.00 | 4.81E-09 | 3.94E-11 | 1.12E-08 | 1.33E-02 | 1.50E-10 | 7.47E-13 | 4.86E-20 | 7.76E-11 | 5.40E-06 | 0.00 | | 0.00 | |
| p-phenylenediamine | 106-50-3 | X | X | 108.14 | 0.01 | 1.14E-08 | 1.05E-10 | 3.00E-08 | 6.10E-06 | 1.83E-13 | 8.09E-16 | 5.26E-23 | 8.41E-14 | 5.85E-09 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mercury | 7439-97-6 | X | X | 200.59 | 0.03 | 2.58E-08 | 1.29E-10 | 3.68E-08 | 1.70E-06 | 6.25E-14 | 5.13E-16 | 3.33E-23 | 5.33E-14 | 3.70E-09 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2,4-Trimethylbenzene | 95-63-6 | X | | 120.19 | 0.00 | 1.27E-09 | 1.06E-11 | 3.02E-09 | 6.00E-03 | 1.81E-11 | 8.89E-14 | 5.78E-21 | 9.24E-12 | 6.42E-07 | 0.00 | | 0.00 | |
| | | | | | | | | | | | | | | TOTALS | 0.11 | 0.14 | 0.11 | 0.14 |

Variables of Interest

| | | | |
|---|---|---|---|
| $D_{eli}$ = | 6.5E-09 | $cm^2/s$ | (HDPE liner) |
| l = | 0.1 | cm | (GCL + 40-mil HDPE liner) |
| A = | 39.5 | acres = 1.6E+09 $cm^2$ | (final cover area only) |
| $V_{truck}$ = | 21 | $m^3$ | |
| $P_t$ = | 303 | mmHg | |
| $N_v$ = | 342.4 | mol | |
| # Trucks / year = | 52 | ıce per week) | |

Notes:
1 Analytical results provided by CWM

**TABLE 27**

**ESTIMATED VOC AND HAP EMISSIONS FROM TRUCKING OF T-8004 GROUNDWATER**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Leachate Concentration [1] (µg/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $E_{3i}$ (g/truckload) | Transfer by Tanker Trucks $E_{3i}$ (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylene chloride | 75-09-2 | | X | 84.93 | 13300 | 1.33E-05 | 1.57E-07 | 2.82E-06 | 8.20E-02 | 9.40E-03 | | 0.01 |
| Trichloroethane (1,1,1) | 71-55-6 | | X | 133.4 | 23800 | 2.38E-05 | 1.78E-07 | 3.21E-06 | 1.47E-01 | 1.68E-02 | | 0.02 |
| Trichloroethylene | 79-01-6 | X | X | 131.39 | 7280 | 7.28E-06 | 5.54E-08 | 9.97E-07 | 4.49E-02 | 5.14E-03 | 0.01 | 0.01 |
| Xylenes | 1330-20-7 | X | X | 106.16 | 9550 | 9.55E-06 | 9.00E-08 | 1.62E-06 | 5.89E-02 | 6.75E-03 | 0.01 | 0.01 |
| Toluene | 108-88-3 | X | X | 92.14 | 5460 | 5.46E-06 | 5.93E-08 | 1.07E-06 | 3.37E-02 | 3.86E-03 | 0.00 | 0.00 |
| | | | | | | | | | | TOTALS | 0.02 | 0.04 |

Variables of Interest

| | | |
|---|---|---|
| $V_{truck}$ = | 21 | $m^3$ |
| $P_t$ = | 303 | mmHg |
| $N_v$ = | 342.4 | mol |
| # Trucks / year = | 52 | (once per week) |

Notes:

1 Analytical results provided by CWM

**TABLE 28**

**ESTIMATED VOC AND HAP EMISSIONS FROM TRUCKING OF T-8005 GROUNDWATER**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| | | | | | | | | | **Transfer by Tanker Trucks** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detected Compounds** | **CAS Number** | **VOC** | **HAP** | **$MW_i$ (g/mol)** | **Leachate Concentration [1] (µg/L)** | **$C_i$** | **$C_i / MW_i$** | **$X_i$** | **$E_{3i}$ (g/truckload)** | **$E_{3i}$ (lb/yr)** | **VOC Emissions (lb/yr)** | **HAP Emissions (lb/yr)** |
| Trichloroethene | 79-01-6 | X | X | 131.39 | 15400 | 1.54E-05 | 1.17E-07 | 2.11E-06 | 9.49E-02 | 1.09E-02 | 0.01 | 0.01 |
| Vinyl chloride | 75-01-4 | X | X | 62.498 | 6.7 | 6.70E-09 | 1.07E-10 | 1.93E-09 | 4.13E-05 | 4.73E-06 | 0.00 | 0.00 |
| | | | | | | | | | | TOTALS | 0.01 | 0.01 |

Variables of Interest

| | | |
|---|---|---|
| $V_{truck}$ = | 21 | $m^3$ |
| $P_t$ = | 303 | mmHg |
| $N_v$ = | 342.4 | mol |
| # Trucks / year = | 52 | (once per week) |

Notes:
1 Analytical results provided by CWM

**TABLE 29**

**ESTIMATED VOC AND HAP EMISSIONS FROM TRUCKING OF T-8006 GROUNDWATER**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| | | | | | | | | | **Transfer by Tanker Trucks** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detected Compounds** | **CAS Number** | **VOC** | **HAP** | **$MW_i$ (g/mol)** | **Leachate Concentration [1] (µg/L)** | **$C_i$** | **$C_i / MW_i$** | **$X_i$** | **$E_{3i}$ (g/truckload)** | **$E_{3i}$ (lb/yr)** | **VOC Emissions (lb/yr)** | **HAP Emissions (lb/yr)** |
| Carbon tetrachloride | 56-23-5 | X | X | 153.81 | 116000 | 1.16E-04 | 7.54E-07 | 1.36E-05 | 7.15E-01 | 8.20E-02 | 0.08 | 0.08 |
| Chloroform | 67-66-3 | X | X | 119.38 | 8710 | 8.71E-06 | 7.30E-08 | 1.31E-06 | 5.37E-02 | 6.15E-03 | 0.01 | 0.01 |
| | | | | | | | | | | TOTALS | 0.09 | 0.09 |

Variables of Interest

| | | |
|---|---|---|
| $V_{truck}$ = | 21 | $m^3$ |
| $P_t$ = | 303 | mmHg |
| $N_v$ = | 342.4 | mol |
| # Trucks / year = | 52 | (once per week) |

Notes:
1 Analytical results provided by CWM

**TABLE 30**

**ESTIMATED VOC AND HAP EMISSIONS FROM TRUCKING OF T-8007 GROUNDWATER**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| | | | | | | | | | Transfer by Tanker Trucks | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detected Compounds** | **CAS Number** | **VOC** | **HAP** | **$MW_i$ (g/mol)** | **Leachate Concentration [1] (µg/L)** | **$C_i$** | **$C_i / MW_i$** | **$X_i$** | **$E_{3i}$ (g/truckload)** | **$E_{3i}$ (lb/yr)** | **VOC Emissions (lb/yr)** | **HAP Emissions (lb/yr)** |
| Chlorobenzene | 108-90-7 | X | X | 112.56 | 3380 | 3.38E-06 | 3.00E-08 | 5.41E-07 | 2.08E-02 | 2.39E-03 | 0.00 | 0.00 |
| Methylene chloride | 75-09-2 | | X | 84.93 | 2900 | 2.90E-06 | 3.41E-08 | 6.15E-07 | 1.79E-02 | 2.05E-03 | | 0.00 |
| Trichloro (1,1,2) trifluoroethane | 76-13-1 | X | | 187.376 | 2900 | 2.90E-06 | 1.55E-08 | 2.79E-07 | 1.79E-02 | 2.05E-03 | 0.00 | |
| Trichloroethane (1,1,1) | 71-55-6 | | X | 133.4 | 2200 | 2.20E-06 | 1.65E-08 | 2.97E-07 | 1.36E-02 | 1.55E-03 | | 0.00 |
| Trichloroethylene | 79-01-6 | X | X | 131.39 | 3840 | 3.84E-06 | 2.92E-08 | 5.26E-07 | 2.37E-02 | 2.71E-03 | 0.00 | 0.00 |
| Dichloroethane(1,1) | 75-34-3 | X | X | 98.96 | 390 | 3.90E-07 | 3.94E-09 | 7.09E-08 | 2.40E-03 | 2.76E-04 | 0.00 | 0.00 |
| Dichloroethene(1,1) | 75-35-4 | X | X | 96.94 | 250 | 2.50E-07 | 2.58E-09 | 4.64E-08 | 1.54E-03 | 1.77E-04 | 0.00 | 0.00 |
| Ethylene dichloride | 107-06-2 | X | X | 98.95 | 270 | 2.70E-07 | 2.73E-09 | 4.91E-08 | 1.66E-03 | 1.91E-04 | 0.00 | 0.00 |
| Dichloropropane(1,2) | 78-87-5 | X | X | 112.98 | 25 | 2.50E-08 | 2.21E-10 | 3.98E-09 | 1.54E-04 | 1.77E-05 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 108-10-1 | X | X | 100.16 | 57 | 5.70E-08 | 5.69E-10 | 1.02E-08 | 3.51E-04 | 4.03E-05 | 0.00 | 0.00 |
| Benzene | 71-43-2 | X | X | 78.11 | 69 | 6.90E-08 | 8.83E-10 | 1.59E-08 | 4.25E-04 | 4.88E-05 | 0.00 | 0.00 |
| Carbon Tetrachloride | 56-23-5 | X | X | 153.84 | 930 | 9.30E-07 | 6.05E-09 | 1.09E-07 | 5.73E-03 | 6.57E-04 | 0.00 | 0.00 |
| Chloroform | 67-66-3 | X | X | 119.38 | 520 | 5.20E-07 | 4.36E-09 | 7.84E-08 | 3.21E-03 | 3.67E-04 | 0.00 | 0.00 |
| Ethylbenzene | 100-41-4 | X | X | 106.17 | 48 | 4.80E-08 | 4.52E-10 | 8.14E-09 | 2.96E-04 | 3.39E-05 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 1330-20-7 | X | X | 106.16 | 276 | 2.76E-07 | 2.60E-09 | 4.68E-08 | 1.70E-03 | 1.95E-04 | 0.00 | 0.00 |
| Tetrachloroethylene | 127-18-4 | | X | 165.83 | 52 | 5.20E-08 | 3.14E-10 | 5.64E-09 | 3.21E-04 | 3.67E-05 | | 0.00 |
| Toluene | 108-88-3 | X | X | 92.14 | 130 | 1.30E-07 | 1.41E-09 | 2.54E-08 | 8.01E-04 | 9.19E-05 | 0.00 | 0.00 |
| Chloroethene | 75-01-4 | X | X | 62.498 | 190 | 1.90E-07 | 3.04E-09 | 5.47E-08 | 1.17E-03 | 1.34E-04 | 0.00 | 0.00 |
| Ethyl acetate | 141-78-6 | X | | 88.11 | 45 | 4.50E-08 | 5.11E-10 | 9.19E-09 | 2.77E-04 | 3.18E-05 | 0.00 | |
| o-Dichlorobenzene | 95-50-1 | X | | 147.01 | 11300 | 1.13E-05 | 7.69E-08 | 1.38E-06 | 6.96E-02 | 7.98E-03 | 0.01 | |
| m-Dichlorobenzene | 541-73-1 | X | | 147 | 390 | 3.90E-07 | 2.65E-09 | 4.78E-08 | 2.40E-03 | 2.76E-04 | 0.00 | |
| p-Dichlorobenzene | 104-46-7 | X | X | 147 | 2720 | 2.72E-06 | 1.85E-08 | 3.33E-07 | 1.68E-02 | 1.92E-03 | 0.00 | 0.00 |
| Water | | | | 18 | 1.00E+09 | 1.00E+00 | 5.56E-02 | 1.00E+00 | | | | |
| | | | | | | | | | | TOTALS | 0.02 | 0.01 |

Variables of Interest

| | | |
|---|---|---|
| $V_{truck}$ = | 21 | $m^3$ |
| $P_t$ = | 303 | mmHg |
| $N_v$ = | 342.4 | mol |
| # Trucks / year = | 52 | (once per week) |

Notes:

1 Analytical results provided by CWM

**TABLE 31**

**ESTIMATED VOC AND HAP EMISSIONS FROM TRUCKING OF T-8008 GROUNDWATER EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Leachate Concentration [1] (µg/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | Transfer by Tanker Trucks $E_{3i}$ (g/truckload) | Transfer by Tanker Trucks $E_{3i}$ (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chlorobenzene | 108-90-7 | X | X | 112.56 | 2500 | 2.50E-06 | 2.22E-08 | 4.00E-07 | 1.54E-02 | 1.77E-03 | 0.00 | 0.00 |
| Methylene chloride | 75-09-2 | | X | 84.93 | 29000 | 2.90E-05 | 3.41E-07 | 6.15E-06 | 1.79E-01 | 2.05E-02 | | 0.02 |
| Tetrachloroethane(1,1,1,2) | 630-20-6 | X | X | 167.85 | 7300 | 7.30E-06 | 4.35E-08 | 7.83E-07 | 4.50E-02 | 5.16E-03 | 0.01 | 0.01 |
| Trichloroethane(1,1,2) | 79-00-5 | X | X | 133.4 | 880 | 8.80E-07 | 6.60E-09 | 1.19E-07 | 5.42E-03 | 6.22E-04 | 0.00 | 0.00 |
| Trichloroethane (1,1,1) | 71-55-6 | | X | 133.4 | 12000 | 1.20E-05 | 9.00E-08 | 1.62E-06 | 7.40E-02 | 8.48E-03 | | 0.01 |
| Trichloroethylene | 79-01-6 | X | X | 131.39 | 18000 | 1.80E-05 | 1.37E-07 | 2.47E-06 | 1.11E-01 | 1.27E-02 | 0.01 | 0.01 |
| Dichloroethene(1,1) | 75-35-4 | X | X | 96.94 | 1600 | 1.60E-06 | 1.65E-08 | 2.97E-07 | 9.86E-03 | 1.13E-03 | 0.00 | 0.00 |
| Ethylene dichloride | 107-06-2 | X | X | 98.95 | 400 | 4.00E-07 | 4.04E-09 | 7.28E-08 | 2.47E-03 | 2.83E-04 | 0.00 | 0.00 |
| Benzene | 71-43-2 | X | X | 78.11 | 600 | 6.00E-07 | 7.68E-09 | 1.38E-07 | 3.70E-03 | 4.24E-04 | 0.00 | 0.00 |
| Chloroform | 67-66-3 | X | X | 119.38 | 1100 | 1.10E-06 | 9.21E-09 | 1.66E-07 | 6.78E-03 | 7.77E-04 | 0.00 | 0.00 |
| Ethylbenzene | 100-41-4 | X | X | 106.17 | 2400 | 2.40E-06 | 2.26E-08 | 4.07E-07 | 1.48E-02 | 1.70E-03 | 0.00 | 0.00 |
| Tetrachloroethylene | 127-18-4 | | X | 165.83 | 37000 | 3.70E-05 | 2.23E-07 | 4.02E-06 | 2.28E-01 | 2.61E-02 | | 0.03 |
| Toluene | 108-88-3 | X | X | 92.14 | 10000 | 1.00E-05 | 1.09E-07 | 1.95E-06 | 6.16E-02 | 7.07E-03 | 0.01 | 0.01 |
| Chloroethene | 75-01-4 | X | X | 62.498 | 1200 | 1.20E-06 | 1.92E-08 | 3.46E-07 | 7.40E-03 | 8.48E-04 | 0.00 | 0.00 |
| o-Dichlorobenzene | 95-50-1 | X | | 147.01 | 4300 | 4.30E-06 | 2.92E-08 | 5.27E-07 | 2.65E-02 | 3.04E-03 | 0.00 | |
| | | | | | | | | | | TOTALS | 0.04 | 0.09 |

Variables of Interest

| | | |
|---|---|---|
| $V_{truck}$ = | 21 | $m^3$ |
| $P_t$ = | 303 | mmHg |
| $N_v$ = | 342.4 | mol |
| # Trucks / year = | 52 | (once per week) |

Notes:
1 Analytical results provided by CWM

**TABLE 32**

**ESTIMATED VOC AND HAP EMISSIONS FROM TRUCKING OF T-8009 GROUNDWATER EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| | | | | | | | | | Transfer by Tanker Trucks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detected Compounds** | **CAS Number** | **VOC** | **HAP** | **$MW_i$ (g/mol)** | **Leachate Concentration [1] (µg/L)** | **$C_i$** | **$C_i / MW_i$** | **$X_i$** | **$E_{3i}$ (g/truckload)** | **$E_{3i}$ (lb/yr)** | **VOC Emissions (lb/yr)** | **HAP Emissions (lb/yr)** |
| Acetone | 67-64-1 | | | 58.08 | 1000 | 1.00E-06 | 1.72E-08 | 3.10E-07 | 6.16E-03 | 7.07E-04 | | |
| Carbon tetrachloride | 56-23-5 | X | X | 153.84 | 13000 | 1.30E-05 | 8.45E-08 | 1.52E-06 | 8.01E-02 | 9.19E-03 | 0.01 | 0.01 |
| Chlorobenzene | 108-90-7 | X | X | 112.6 | 2920 | 2.92E-06 | 2.59E-08 | 4.67E-07 | 1.80E-02 | 2.06E-03 | 0.00 | 0.00 |
| Chloroform | 67-66-3 | X | X | 119.39 | 4100 | 4.10E-06 | 3.43E-08 | 6.18E-07 | 2.53E-02 | 2.90E-03 | 0.00 | 0.00 |
| Methylene chloride | 75-09-2 | | X | 84.94 | 8000 | 8.00E-06 | 9.42E-08 | 1.70E-06 | 4.93E-02 | 5.65E-03 | | 0.01 |
| Trichloroethane (1,1,2) | 79-00-5 | X | X | 133.4 | 1800 | 1.80E-06 | 1.35E-08 | 2.43E-07 | 1.11E-02 | 1.27E-03 | 0.00 | 0.00 |
| Trichloroethylene | 79-01-6 | X | X | 131.4 | 8480 | 8.48E-06 | 6.45E-08 | 1.16E-06 | 5.23E-02 | 5.99E-03 | 0.01 | 0.01 |
| Tetrachloroethane(1,1,1,2) | 630-20-6 | X | | 167.848 | 230 | 2.30E-07 | 1.37E-09 | 2.47E-08 | 1.42E-03 | 1.63E-04 | 0.00 | |
| Trichloroethane(1,1,1) | 71-55-6 | | X | 133.4 | 590 | 5.90E-07 | 4.42E-09 | 7.96E-08 | 3.64E-03 | 4.17E-04 | | 0.00 |
| Tetrachloroethane(1,1,2,2) | 79-34-5 | X | X | 167.848 | 520 | 5.20E-07 | 3.10E-09 | 5.58E-08 | 3.21E-03 | 3.67E-04 | 0.00 | 0.00 |
| Dichloroethene(1,1) | 75-35-4 | X | X | 96.94 | 66 | 6.60E-08 | 6.81E-10 | 1.23E-08 | 4.07E-04 | 4.66E-05 | 0.00 | 0.00 |
| Ethylene dichloride | 107-06-2 | X | X | 98.95 | 1200 | 1.20E-06 | 1.21E-08 | 2.18E-07 | 7.40E-03 | 8.48E-04 | 0.00 | 0.00 |
| Benzene | 71-43-2 | X | X | 78.11 | 120 | 1.20E-07 | 1.54E-09 | 2.77E-08 | 7.40E-04 | 8.48E-05 | 0.00 | 0.00 |
| Dibromomethane | 74-95-3 | X | | 187.86 | 470 | 4.70E-07 | 2.50E-09 | 4.50E-08 | 2.90E-03 | 3.32E-04 | 0.00 | |
| Ethylbenzene | 100-41-4 | X | X | 106.17 | 200 | 2.00E-07 | 1.88E-09 | 3.39E-08 | 1.23E-03 | 1.41E-04 | 0.00 | 0.00 |
| Ethylene dibromide | 106-93-4 | X | X | 187.86 | 1500 | 1.50E-06 | 7.98E-09 | 1.44E-07 | 9.25E-03 | 1.06E-03 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 1330-20-7 | X | X | 106.16 | 160 | 1.60E-07 | 1.51E-09 | 2.71E-08 | 9.86E-04 | 1.13E-04 | 0.00 | 0.00 |
| Tetrachloroethylene | 127-18-4 | | X | 165.83 | 730 | 7.30E-07 | 4.40E-09 | 7.92E-08 | 4.50E-03 | 5.16E-04 | | 0.00 |
| Toluene | 108-88-3 | X | X | 92.14 | 1130 | 1.13E-06 | 1.23E-08 | 2.21E-07 | 6.96E-03 | 7.98E-04 | 0.00 | 0.00 |
| Chloroethene | 75-01-4 | X | X | 62.498 | 180 | 1.80E-07 | 2.88E-09 | 5.18E-08 | 1.11E-03 | 1.27E-04 | 0.00 | 0.00 |
| Trichloro(1,1,2)trifluoroethane | 76-13-1 | X | | 187.376 | 1800 | 1.80E-06 | 9.61E-09 | 1.73E-07 | 1.11E-02 | 1.27E-03 | 0.00 | |
| o-Dichlorobenzene | 95-50-1 | X | | 147.01 | 4550 | 4.55E-06 | 3.10E-08 | 5.57E-07 | 2.80E-02 | 3.21E-03 | 0.00 | |
| p-Dichlorobenzene | 104-46-7 | X | X | 147 | 1100 | 1.10E-06 | 7.48E-09 | 1.35E-07 | 6.78E-03 | 7.77E-04 | 0.00 | 0.00 |
| | | | | | | | | | | TOTALS | 0.03 | 0.03 |

Variables of Interest

| | | |
|---|---|---|
| $V_{truck}$ = | 21 | $m^3$ |
| $P_t$ = | 303 | mmHg |
| $N_v$ = | 342.4 | mol |
| # Trucks / year = | 52 | (once per week) |

Notes:
1 Analytical results provided by CWM

**TABLE 33**

**ESTIMATED VOC AND HAP EMISSIONS FROM TRUCKING OF T-8010 GROUNDWATER EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| | | | | | | | | | | Transfer by Tanker Trucks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detected Compounds** | **CAS Number** | **VOC** | **HAP** | **$MW_i$ (g/mol)** | **Leachate Concentration [1] (µg/L)** | **$C_i$** | **$C_i / MW_i$** | **$X_i$** | **$E_{3i}$ (g/truckload)** | **$E_{3i}$ (lb/yr)** | **VOC Emissions (lb/yr)** | **HAP Emissions (lb/yr)** |
| Carbon tetrachloride | 56-23-5 | X | X | 153.84 | 1.3 | 1.30E-09 | 8.45E-12 | 1.52E-10 | 8.01E-06 | 9.19E-07 | 0.00 | 0.00 |
| Chloroform | 67-66-3 | X | X | 119.39 | 13.8 | 1.38E-08 | 1.16E-10 | 2.08E-09 | 8.51E-05 | 9.75E-06 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 79-00-5 | X | X | 133.4 | 0.69 | 6.90E-10 | 5.17E-12 | 9.31E-11 | 4.25E-06 | 4.88E-07 | 0.00 | 0.00 |
| Trichloroethylene | 79-01-6 | X | X | 131.4 | 49 | 4.90E-08 | 3.73E-10 | 6.71E-09 | 3.02E-04 | 3.46E-05 | 0.00 | 0.00 |
| Tetrachloroethane(1,1,1,2) | 630-20-6 | X | | 167.848 | 1.3 | 1.30E-09 | 7.75E-12 | 1.39E-10 | 8.01E-06 | 9.19E-07 | 0.00 | |
| Dichloroethene(1,1) | 75-35-4 | X | X | 96.94 | 0.61 | 6.10E-10 | 6.29E-12 | 1.13E-10 | 3.76E-06 | 4.31E-07 | 0.00 | 0.00 |
| Ethylene dichloride | 107-06-2 | X | X | 98.95 | 0.72 | 7.20E-10 | 7.28E-12 | 1.31E-10 | 4.44E-06 | 5.09E-07 | 0.00 | 0.00 |
| Tetrachloroethylene | 127-18-4 | | X | 165.83 | 1.1 | 1.10E-09 | 6.63E-12 | 1.19E-10 | 6.78E-06 | 7.77E-07 | | 0.00 |
| Toluene | 108-88-3 | X | X | 92.14 | 11.9 | 1.19E-08 | 1.29E-10 | 2.32E-09 | 7.33E-05 | 8.41E-06 | 0.00 | 0.00 |
| | | | | | | | | | | TOTALS | 0.00 | 0.00 |

Variables of Interest

| | | |
|---|---|---|
| $V_{truck}$ = | 21 | $m^3$ |
| $P_t$ = | 303 | mmHg |
| $N_v$ = | 342.4 | mol |
| # Trucks / year = | 52 | (once per week) |

Notes:
1 Analytical results provided by CWM

**TABLE 34**

**STABILIZATION FACILITY EMISSIONS**
**EMISSION INVENTORY**
**CWM CHEMCIAL SERVICES, LLC**

**Quantities of chemicals processed in Stabilization**

| | 2012 (pounds) | % of waste & reagent | lbs released in particulate | | 2008 (pounds) | % of waste & reagent | lbs released in particulate |
|---|---|---|---|---|---|---|---|
| arsenic compounds | 82.8 | 3.09945E-06 | 0.000697376 | | 116.6 | 2.67547E-06 | 0.000751807 |
| cadmium compounds | 32.5 | 1.21657E-06 | 0.000273729 | | 0 | 0 | 0 |
| chromium compounds | 17,131 | 0.000641264 | 0.144284403 | | 1273 | 2.92099E-05 | 0.008207978 |
| lead compounds | 5,377 | 0.000201277 | 0.045287329 | | 75,647 | 0.001735774 | 0.487752465 |
| manganese compounds | 804.2 | 3.01036E-05 | 0.006773307 | | 1458 | 3.34548E-05 | 0.00940081 |
| nickel compounds | 1665 | 6.23259E-05 | 0.014023322 | | 149,338 | 0.003426666 | 0.962893143 |
| PACs | 79.8 | 2.98715E-06 | 0.000672109 | POM | 41.4 | 9.49952E-07 | 0.000266937 |
| ethylbenzene | 2.54 | 9.50797E-08 | | | 5 | 1.17023E-07 | |
| 2,4-dimethylphenol | 0 | | | | 2.35 | 5.39224E-08 | |
| p-cresol | 0 | | | | 0.46 | 1.0555E-08 | |
| p-phenylenediamine | 0 | | | | 5.50 | 1.26201E-07 | |
| ethylene glycol | 0 | | | | 131.00 | 3.00589E-06 | |
| m-cresol | 0 | | | | 0.12 | 2.75348E-09 | |
| 1,3-phenylenediamine | 0 | | | | 5.50 | 1.26201E-07 | |
| toluene | 0.965 | 3.61228E-08 | | | 36.80 | 8.44402E-07 | |
| chlorobenzene | 0.827 | 3.09571E-08 | | | 0.95 | 2.17984E-08 | |
| di(2-ethylhexyl) phthalate | 91.9 | 3.44009E-06 | 0.00077402 | POM | 13.00 | 2.98294E-07 | 8.38207E-05 |
| phenol | 0 | | | | 0.43 | 9.86665E-09 | |
| pyridine | 0 | | | | 0.35 | 8.031E-09 | |
| anthracene | 5.15 | 1.9278E-07 | 4.33754E-05 | POM | 1.80 | 4.13023E-08 | 1.16059E-05 |
| 1,1,2-trichloroethane | 0 | | | | 0.27 | 6.19534E-09 | |
| 1,1,2,2-tetrachloroethane | 0 | | | | 0.00 | 0 | |
| 1,2-dichloroethane | 0 | | | | 0.00 | 0 | |
| tetrachloroethylene | 0 | | | | 24.20 | 5.55286E-07 | |
| xylenes | 10.65 | 3.98661E-07 | | | 30.30 | 6.95255E-07 | |
| PCBs | 830.5 | 3.10881E-05 | 0.006994816 | | 2,209 | 5.06871E-05 | 0.014243066 |
| benzo(ghi)perylene | 3.7 | 1.38502E-07 | 3.11629E-05 | POM | 1.47 | 3.37302E-08 | 9.47818E-06 |
| carbon tetrachloride | 0 | | | | 0.13 | 2.98294E-09 | |
| chlordane | 0 | | | | 0.23 | 5.27751E-09 | |
| chloroform | 0 | | | | 0.086 | 1.97333E-09 | |
| 1,2-dichloroethylene | 0.19 | 7.11226E-09 | | | 0 | 0 | |
| benzene | 0.59 | 2.20854E-08 | | | 0.46 | 1.0555E-08 | |
| 1,1,1-trichloroethane | 0 | | | | 0.13 | 2.98294E-09 | |
| mercury | 16.1 | 6.02671E-07 | | | 12.5 | 2.86821E-07 | |
| methylene chloride | 0.1 | 3.7433E-09 | | | 0.73 | 1.67504E-08 | |
| methyl ethyl ketone | 0 | | | | 2.02 | 4.63503E-08 | |
| 1,1,2-trichloroethane | 0 | | | | | | |
| trichloroethylene | 1.1 | 4.11763E-08 | | | 25.6 | 5.8741E-07 | |
| phenanthrene | 25.8 | 9.6577E-07 | 0.000217298 | POM | 5.18 | 1.18859E-07 | 3.33993E-05 |
| n-methyl-2-pyrrolidone | 0.6 | 2.24598E-08 | | | 0 | 0 | |
| naphthalene | 2.88 | 1.07807E-07 | 2.42566E-05 | POM | 0.81 | 1.8586E-08 | |
| o-cresol | 0 | | | | 0.123 | 2.82232E-09 | |
| 1,2-dichlorobenzene | 0 | | | | 1.23 | 2.82232E-08 | |
| 1,2-phenylenediamine | 0 | | | | 5.5 | 1.26201E-07 | |
| 1,2,4-trimethylbenzene | 0 | | | | 0.62 | 1.42263E-08 | |
| cumene | 1.19 | 4.45452E-08 | | | 0 | 0 | |
| acetophenone | 0.16 | 5.98927E-09 | | | 0 | 0 | |
| | | | 0.008757038 | Ttl POM | | | |

2008 = highest organics in past 5 years.

| | Approach |
|---|---|
| CC Compound | 100% emitted in stabilization facility |
| Non-CC Compound | 50% emitted in stabilization facility |
| Mix of Both | 75% emitted in stabilization facility |

| Compound | VOC | HAP | Class | Factor | Emissions (lb) | PTE (lb) [3] | Total VOC | Total HAP |
|---|---|---|---|---|---|---|---|---|
| PACs [2] | X | X | Both | 0.75 | 31.1 | 316.7 | 316.7 | 316.7 |
| ethylbenzene | X | X | CC | 1 | 5.1 | 52.0 | 52.02 | 52.02 |
| 2,4-dimethylphenol | X | | Non-CC | 0.5 | 1.2 | 12.0 | 11.99 | |
| p-cresol | X | X | Non-CC | 0.5 | 0.2 | 2.3 | 2.35 | 2.35 |
| p-phenylenediamine | X | X | Non-CC | 0.5 | 2.8 | 28.1 | 28.05 | 28.05 |
| ethylene glycol | X | X | Non-CC | 0.5 | 65.5 | 668.1 | 668.10 | 668.10 |
| m-cresol | X | X | Non-CC | 0.5 | 0.1 | 0.6 | 0.61 | 0.61 |
| 1,3-phenylenediamine | X | | Non-CC | 0.5 | 2.8 | 28.1 | 28.05 | |
| toluene | X | X | CC | 1 | 36.8 | 375.4 | 375.36 | 375.36 |
| chlorobenzene | X | X | CC | 1 | 1.0 | 9.7 | 9.69 | 9.69 |
| di(2-ethylhexyl) phthalate | X | X | Non-CC | 0.5 | 6.5 | 66.3 | 66.30 | 66.30 |
| phenol | X | X | Non-CC | 0.5 | 0.2 | 2.2 | 2.19 | 2.19 |
| pyridine | X | | CC | 1 | 0.4 | 3.6 | 3.57 | |
| anthracene | X | | CC | 1 | 1.8 | 18.4 | 18.36 | |
| 1,1,2-trichloroethane | X | X | CC | 1 | 0.3 | 2.8 | 2.75 | 2.75 |
| 1,1,2,2-tetrachloroethane | X | X | CC | 1 | 0.0 | 0.0 | 0.00 | 0.00 |
| 1,2-dichloroethane | X | X | CC | 1 | 0.0 | 0.0 | 0.00 | 0.00 |
| tetrachloroethylene | | X | CC | 1 | 24.2 | 246.8 | | 246.84 |
| xylenes | X | X | CC | 1 | 30.3 | 309.1 | 309.06 | 309.06 |
| PCBs [1] | X | X | --- | 4E-04 | 1.0 | 9.9 | 9.91 | 9.91 |
| benzo(ghi)perylene | X | | Non-CC | 0.5 | 0.7 | 7.5 | 7.50 | |
| carbon tetrachloride | X | X | CC | 1 | 0.1 | 1.3 | 1.33 | 1.33 |
| chlordane | X | X | CC | 1 | 0.2 | 2.3 | 2.35 | 2.35 |
| chloroform | X | X | CC | 1 | 0.1 | 0.9 | 0.88 | 0.88 |
| 1,2-dichloroethylene | X | | CC | 1 | 0.0 | 0.0 | 0.00 | |
| benzene | X | X | CC | 1 | 0.5 | 4.7 | 4.69 | 4.69 |
| 1,1,1-trichloroethane | | X | CC | 1 | 0.1 | 1.3 | | 1.33 |
| mercury | X | X | CC | 0.003 | 0.0 | 0.4 | 0.38 | 0.38 |
| methylene chloride | | X | CC | 1 | 0.7 | 7.4 | | 7.45 |
| methyl ethyl ketone | X | | CC | 1 | 2.0 | 20.6 | 20.60 | |
| 1,1,2-trichloroethane | X | X | CC | 1 | 0.0 | 0.0 | 0.00 | 0.00 |
| trichloroethylene | X | X | CC | 1 | 25.6 | 261.1 | 261.12 | 261.12 |
| phenanthrene | X | | CC | 1 | 5.2 | 52.8 | 52.84 | |
| n-methyl-2-pyrrolidone | X | | CC | 1 | 0.0 | 0.0 | 0.00 | |
| naphthalene | X | X | CC | 1 | 0.8 | 8.3 | 8.26 | 8.26 |
| o-cresol | X | X | Non-CC | 0.5 | 0.1 | 0.6 | 0.63 | 0.63 |
| 1,2-dichlorobenzene | X | | CC | 1 | 1.2 | 12.5 | 12.55 | |
| 1,2-phenylenediamine | X | | Non-CC | 0.5 | 2.8 | 28.1 | 28.05 | |
| 1,2,4-trimethylbenzene | X | | CC | 1 | 0.6 | 6.3 | 6.32 | |
| cumene | X | X | CC | 1 | 0.0 | 0.0 | 0.00 | 0.00 |
| acetophenone | X | X | CC | 1 | 0.0 | 0.0 | 0.00 | 0.00 |
| | | | | **TOTAL** | | | **2312.6** | **2378.4** |

1 Release rate for PCBs based on laboratory study (March 31, 2000)
2 PACs contain a mix of CC and non-CC compounds; therefore, a 75% factor was assumed for PACs
3 PTE calculated based on cap of 150,000 TPY for stabilization facility

**TABLE 35**

**FUGITIVE EMISSIONS FROM PIPE VALVES/FLANGES**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| | | | | Correlation rate from Table 2-10 [1] | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | # | hours/year | EF | 10 ppm X EF | kg/hr/source | kg/year | lb/yr | |
| Valves | Light liquid | 139 | 8,760 | 2.29E-06 | 5.57 | 1.28E-05 | 15.54 | 34.25 | |
| Pump Seals | Light liquid | 4 | 8,760 | 5.03E-05 | 4.07 | 2.05E-04 | 7.18 | 15.83 | |
| Compressor Seals | Gas | 0 | 8,760 | 1.36E-05 | 3.88 | 5.28E-05 | - | - | |
| Pressure Relief Valves | Gas | 2 | 8,760 | 1.36E-05 | 3.88 | 5.28E-05 | 0.92 | 2.04 | |
| Connectors | All | 475 | 8,760 | 1.53E-06 | 5.43 | 8.31E-06 | 34.59 | 76.25 | |
| | | | | | | | 58.23 | 128.37 | |
| | | | | | | | | 12.84 | 10% Volatile |

Notes:

1 The values from Table 2-10 (Petroleum Industry Leak Rate/ Screening Value Correlations) were selected since these values more closely fit the waste profile at the CWM facility versus the SOCMI values presented in Table 2-9.

**TABLE 36A**

**FACULTATIVE POND 1-2 EMISSIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

Mass Balance - Equation 5-30 from *Air Emission Models for Waste and Wastewater (November 1994)* :

$E = f_{air} * Q * C_i$, where,

$f_{air}$ = fraction emitted to air (assumed to equal 1 for conservative purposes)

Q = Rate of effluent discharge to facultative ponds = approx. 15,000,000 gallons / year

$C_i$ = concentration of pollutant in effluent discharge (from laboratory analysis)

| | | $C_i$ | | | | |
|---|---|---|---|---|---|---|
| | MDL | 0.5*MDL | E | E | VOC | HAP |
| Compound | (µg/L) | (µg/L) | (µg/yr) | (lb/yr) | (lb/yr) | (lb/yr) |
| Vinyl Chloride | 0.3 | 0.15 | 8.52E+06 | 0.018777 | 0.02 | 0.02 |
| Diethyl ether | Not Analyzed | --- | --- | | 0.00 | |
| 1,1,2-Trichloro-1,2,2-triflourorethane | Not Analyzed | --- | --- | | 0.00 | |
| Acetone | 1.8 | 0.9 | 5.11E+07 | 0.112661 | | |
| Methylene chloride | 0.65 | 0.325 | 1.85E+07 | 0.040683 | | 0.04 |
| 1,1-Dichloroethane | 0.31 | 0.155 | 8.80E+06 | 0.019403 | 0.02 | 0.02 |
| 2-Butanone | 2.2 | 1.1 | 6.25E+07 | 0.137697 | 0.14 | |
| Chloroform | 0.29 | 0.145 | 8.23E+06 | 0.018151 | 0.02 | 0.02 |
| 1,1,1-Trichloroethane | 0.3 | 0.15 | 8.52E+06 | 0.018777 | | 0.02 |
| Carbon Tetrachloride | 0.33 | 0.165 | 9.37E+06 | 0.020655 | 0.02 | 0.02 |
| 1,2-Dichloroethane | 0.36 | 0.18 | 1.02E+07 | 0.022532 | 0.02 | 0.02 |
| Benzene | 0.31 | 0.155 | 8.80E+06 | 0.019403 | 0.02 | 0.02 |
| Trichloroethene | 0.33 | 0.165 | 9.37E+06 | 0.020655 | 0.02 | 0.02 |
| 4-Methyl-2-Pentanone | 2.4 | 1.2 | 6.81E+07 | 0.150215 | 0.15 | 0.15 |
| Toluene | 0.35 | 0.175 | 9.94E+06 | 0.021906 | 0.02 | 0.02 |
| 1,1,2-Trichloroethane | 0.34 | 0.17 | 9.65E+06 | 0.02128 | 0.02 | |
| Tetrachloroethene | 0.38 | 0.19 | 1.08E+07 | 0.023784 | | 0.02 |
| Chlorobenzene | 0.32 | 0.16 | 9.08E+06 | 0.020029 | 0.02 | 0.02 |
| Xylenes (total) | Not Analyzed | --- | --- | | 0.00 | 0.00 |
| 1,1,2,2-Tetrachloroethane | 0.35 | 0.175 | 9.94E+06 | 0.021906 | 0.02 | 0.02 |
| 1,4-Dichlorobenzene | 0.85 | 0.425 | 2.41E+07 | 0.053201 | 0.05 | 0.05 |
| 1,2-Dichlorobenzene | 0.75 | 0.375 | 2.13E+07 | 0.046942 | 0.05 | |
| PCBs | --- | 0.2 | 1.14E+07 | 0.025036 | 0.03 | 0.03 |
| | | | **TOTAL** | **0.7** | **0.6** | **0.5** **lb/yr** |

**TABLE 36B**

**FACULTATIVE POND 3 EMISSIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERIVCES, LLC**

Mass Balance - Equation 5-30 from *Air Emission Models for Waste and Wastewater (November 1994)* :

$E = f_{air} * Q * C_i$, where,

$f_{air}$ = fraction emitted to air (assumed to equal 1 for conservative purposes)

Q = Rate of effluent discharge to facultative ponds = approx. 15,000,000 gallons / year

$C_i$ = concentration of pollutant in effluent discharge (from laboratory analysis)

| Compound | MDL (µg/L) | $C_i$ 0.5*MDL (µg/L) | VOC? | HAP? | E (µg/yr) | E (lb/yr) | VOC (lb/yr) | HAP (lb/yr) | |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl Chloride | 0.3 | 0.15 | X | X | 8.52E+06 | 0.019 | 0.02 | 0.02 | |
| Diethyl ether | Not Analyzed | --- | X | | --- | | 0.00 | | |
| 1,1,2-Trichloro-1,2,2-triflourorethane | Not Analyzed | --- | X | | --- | | 0.00 | | |
| Acetone | 1.8 | 0.9 | | | 5.11E+07 | 0.113 | | | |
| Methylene chloride | 0.65 | 0.325 | | X | 1.85E+07 | 0.041 | | 0.04 | |
| 1,1-Dichloroethane | 0.31 | 0.155 | X | X | 8.80E+06 | 0.019 | 0.02 | 0.02 | |
| 2-Butanone | 2.2 | 1.1 | X | | 6.25E+07 | 0.138 | 0.14 | | |
| Chloroform | 0.29 | 0.145 | X | X | 8.23E+06 | 0.018 | 0.02 | 0.02 | |
| 1,1,1-Trichloroethane | 0.3 | 0.15 | | X | 8.52E+06 | 0.019 | | 0.02 | |
| Carbon Tetrachloride | 0.33 | 0.165 | X | X | 9.37E+06 | 0.021 | 0.02 | 0.02 | |
| 1,2-Dichloroethane | 0.36 | 0.18 | X | X | 1.02E+07 | 0.023 | 0.02 | 0.02 | |
| Benzene | 0.31 | 0.155 | X | X | 8.80E+06 | 0.019 | 0.02 | 0.02 | |
| Trichloroethene | 0.33 | 0.165 | X | X | 9.37E+06 | 0.021 | 0.02 | 0.02 | |
| 4-Methyl-2-Pentanone | 2.4 | 1.2 | X | X | 6.81E+07 | 0.15 | 0.15 | 0.15 | |
| Toluene | 0.35 | 0.175 | X | X | 9.94E+06 | 0.022 | 0.02 | 0.02 | |
| 1,1,2-Trichloroethane | 0.34 | 0.17 | X | | 9.65E+06 | 0.021 | 0.02 | | |
| Tetrachloroethene | 0.38 | 0.19 | | X | 1.08E+07 | 0.024 | | 0.02 | |
| Chlorobenzene | 0.32 | 0.16 | X | X | 9.08E+06 | 0.02 | 0.02 | 0.02 | |
| Xylenes (total) | Not Analyzed | --- | X | X | --- | | 0.00 | 0.00 | |
| 1,1,2,2-Tetrachloroethane | 0.35 | 0.175 | X | X | 9.94E+06 | 0.022 | 0.02 | 0.02 | |
| 1,4-Dichlorobenzene | 0.85 | 0.425 | X | X | 2.41E+07 | 0.053 | 0.05 | 0.05 | |
| 1,2-Dichlorobenzene | 0.75 | 0.375 | X | | 2.13E+07 | 0.047 | 0.05 | | |
| PCBs | --- | 0.2 | X | X | 1.14E+07 | 0.025 | 0.03 | 0.03 | |
| | | | | | **TOTAL** | **0.7** | **0.6** | **0.5** | **lb/yr** |

**TABLE 37**

**EMISSIONS FROM DRUM SPILLS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

Month end inventory (includes drums in Drum Warehouse, PCB Warehouse and AWT dock)

| | | 12/31/2015 | 11/30/2015 | 10/30/2015 | 9/30/2015 | 8/31/2015 | 7/31/2015 | 6/30/2015 | 5/31/2015 | 4/30/2015 | 3/31/2015 | 2/27/2015 | 1/31/2015 | TOTAL | percent of drums | MONTHLY AVERAGE NUMBER | ANNUAL AVERAGE NUMBER | ANNUAL THRUPUT (Mg/yr) | EMISSIONS (Mg/yr) | (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| American | asbestos, petroleum soil | | 138 | 149 | 50 | 112 | 29 | 13 | 19 | 62 | 33 | 24 | 30 | 659 | 5.84 | | | | | |
| Arlington | | | 381 | 449 | 147 | 181 | 112 | 10 | | | | | | 1280 | 11.35 | | | | | |
| AWT | aqueous waste | | 33 | 88 | 82 | 56 | 38 | 46 | 81 | 195 | 139 | 156 | 181 | 1095 | 9.71 | 99.5 | 1,195 | 258.4041 | 0.00129202 | 2.848388 |
| Emelle | | | | | | 3 | 110 | 108 | 83 | 104 | 109 | 189 | 145 | 851 | 7.54 | | | | | |
| EQ | | | 21 | 18 | 6 | | | | | | | | | 45 | 0.40 | | | | | |
| Fuels | oil, solvent, paint | | 22 | 14 | 24 | 35 | 35 | 58 | 32 | 72 | 42 | 53 | 41 | 428 | 3.79 | 38.9 | 467 | 101.0018 | 0.000505009 | 1.113343 |
| Lamptracker | fluorescent bulbs | | 37 | 42 | 40 | 21 | 16 | 80 | 81 | 67 | 126 | 111 | 77 | 698 | | | | | | |
| Luminaire | PCB ballasts | | 6 | 5 | 5 | 11 | 11 | 30 | 26 | 20 | 9 | 10 | 9 | 142 | | | | | | |
| micro | debris | | | | | 8 | 27 | 13 | 116 | 34 | 6 | 56 | 53 | 313 | | | | | | |
| PCB TKR | PCB liquids to be bulked | | 23 | 10 | 10 | 7 | 27 | 17 | 13 | 39 | 33 | 41 | 44 | 264 | 2.34 | 24 | 288 | 62.30016 | 0.000311501 | 0.686735 |
| PTA | PCB incinerables | | 134 | 156 | 144 | 103 | 99 | 110 | 109 | 98 | 90 | 135 | 195 | 1373 | 12.17 | 124.8 | 1,498 | 324.008 | 0.00162004 | 3.571541 |
| Repack | lab packs | | 11 | 35 | 36 | 29 | 32 | 34 | 38 | 51 | 24 | 27 | 25 | 342 | | | | | | |
| RMU-1 | | | | | | 2 | 10 | 9 | 51 | 30 | 19 | 89 | 102 | 312 | | | | | | |
| Ross | non-PCB incinerables | | 28 | 125 | 48 | 120 | 164 | 133 | 165 | 96 | 65 | 128 | 102 | 1174 | 10.41 | 106.7 | 1,281 | 277.0469 | 0.001385235 | 3.053888 |
| SRR | paint sludge | | | | 5 | 4 | 6 | 6 | 5 | 5 | 3 | 3 | 3 | 40 | 0.35 | 4.4 | 53 | 11.53707 | 5.76853E-05 | 0.127173 |
| Stabilization | | | | | | 5 | 93 | 140 | 193 | 124 | 120 | 161 | 234 | 1070 | | | | | | |
| Stablex | HF & other acid waste | | 19 | 101 | 100 | 19 | 103 | 40 | 99 | 52 | 34 | 84 | 57 | 708 | | | | | | |
| Sunnking | electronics | | 18 | 18 | 18 | 3 | 3 | 3 | | 34 | 8 | 8 | 7 | 120 | | | | | | |
| TWI | (gas cylinders, odd items) | | 1 | 1 | 12 | 13 | 12 | 8 | 7 | 8 | 5 | 5 | 4 | 76 | | | | | | |
| Veolia | mercury articles, batteries | | 2 | 41 | 39 | 33 | 30 | 25 | 24 | 16 | 14 | 13 | 6 | 243 | | | | | | |
| WTI | non-PCB incinerables | | 3 | 2 | 9 | 8 | 6 | 5 | 5 | 3 | 2 | 2 | 2 | 47 | 0.42 | 4.3 | 51 | 11.09132 | 5.54566E-05 | 0.12226 |
| | | | 877 | 1254 | 775 | 773 | 963 | 888 | 1147 | 1110 | 881 | 1295 | 1317 | 11280 | | | | | | |
| | | | | | | | | | | | | | | | | 11.5 | | | | |

Parking containment areas:

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| macro box X00299 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | |
| Filtercake X00106 | | | | 1 | | 2 | 2 | 1 | 1 | 4 | 3 | 2 | |
| NY296240 tanker | pretreated leachate for Vickery | | 2 | | 1 | | 2 | 2 | 1 | | 1 | | |
| X00264 | AWT tank sludge | | 1 | | 2 | 4 (T-165, ) | 1 | | 1 | 1 (T3001) | 1 (T3001) | 1 (T3001) | |
| X00427 | Spent carbon PCBs 51 ppm | | 1 | | | | | 1 | | | | | |
| 192419 | | | 1 | 2 | | 1 | 1 | | | | | | |
| X00257 tanker | PCB liquid | | | 1 | | 2 (4000, 2500 gal) | | | 1(4615 gal) | 1 (4615 gal) | 1 (4615 gal) | 1 (4615 gal) | |
| X00458 | AWT tank sludge (VOCs <500 ppm) | | | 2 (T-125) | | | | | | | | | |
| NY305747 | Soil 56 ppm PCBs OFFS | | | | 1 | | | | | | | | |
| AA09094 tanker | non-chlor fuel | | | | 1 (2033 gal) | 1 (2033 gal) | | 1 (5300 gal) | | 1 (3087 gal) | 1 (3087 gal) | 1 (3087 gal) | |
| X00024 tanker | DNAPL | | | | 1 (2537 gal) | | | | | | | | |
| stab residues | | | | | | 8 | 3 | 3 | 7 | | | 5 | |
| X00314 | Soil from T-101 spill | | | | | | | | | | 1 | 1 | |

# Attachments

# Attachment 1
# Calculation of Fugitive PM-10 Emissions

**$PM_{10}$ CALCULATIONS**
**TRUCK AND WASTE SUMMARY**
**CWM CHEMICAL SERVICES, LLC**

**Truck and Waste Summary**

| Vehicle Type | Code | Average Vehicle Weight (tons) Gross Weight | Empty Weight | Payload | Total Vehicles | Vehicle Route |
|---|---|---|---|---|---|---|
| Dump Truck | DT | 43.9 | 17.0 | 26.8 | 5,318 | Landfill |
| Rolloff Truck | CM | 33.4 | 21.1 | 12.2 | 946 | Landfill |
| Tanker Truck | TT | 30.8 | 17.4 | 13.4 | 94 | AWTS |
| Rolloff Truck | CM | 32.1 | 21.7 | 10.3 | 331 | Stabilization |
| Dump Truck | DT | 39.9 | 17.1 | 22.9 | 261 | Stabilization |
| Off-Road Truck | --- | 33.0 | 19.0 | 14.0 | 1,184 | Post-Stabilization [a] |
| Drum Truck | --- | 26.4 | 17.5 | 8.9 | 500 | Drum Building |
| Site Vehicles | --- | 2.5 | 2.5 | --- | 5,200 | AWTS |
| Delivery Trucks | --- | 5.0 | 5.0 | --- | 1,300 | AWTS |
| Personal Vehicles | --- | 1.5 | 1.5 | --- | 1,300 | AWTS |
| Personal Vehicles | --- | 1.5 | 1.5 | --- | 5,200 | Main Office |

Notes:

a Assumes 2 loaded vehicles for each stabilization vehicle

b Total # vehicles equals twice the actual amount of vehicles since each transship load requires 2 round trips

Total Bulk Waste = 173,583 tpy

**$PM_{10}$ CALCULATIONS**
**LANDFILL OPERATIONS**
**CWM CHEMICAL SERVICES, LLC**

## Landfill Operation

### Waste Unloading

Batch Drop equation from AP-42, Section 13.2.4 (11/06):

$$E = k\ (0.0032)\ \frac{(u / 5)^{1.3}}{(M / 2)^{1.4}}$$

where:
E = emission factor (lb/ton)
k = 0.35 (for $PM_{10}$)
u = mean wind speed (mph) = 6.8 (2006 average wind speed - Model City, NY)
M = % moisture in clay/dirt mix = 14 (from AP-42, Table 13.2.4-1)

$$E = k\ (0.0032)\ \frac{(6.8 / 5)^{1.3}}{(14 / 2)^{1.4}} = 1.089E\text{-}04 \text{ lb/ton}$$

| | | | |
|---|---|---|---|
| Total Waste Unloaded = | 173,583 | tons/year | (Includes stabilization materials) |
| Total Emissions = | 18.9 | lb/year | |
| Total Emissions (90% Control)[1] = | 1.89 | lb/year | |
| Total Emissions (90% Control)[1] = | 0.001 | tons/year | |

### Waste Compaction

Compaction by Bulldozing equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = \frac{(0.75)\ (1.0)\ (\text{silt\%})^{1.5}}{(\text{moisture\%})^{1.4}}$$

where: E = Emission rate of $PM_{10}$ in lb/hr

From Table 13.2.4-1 of AP-42 (11/06):

Clay/dirt mix:
Silt % = 9.2
Moisture % = 14

$$E = \frac{(0.75)\ (1.0)\ (9.2)^{1.5}}{(14)^{1.4}} = 0.520 \text{ lb/hr}$$

| | | |
|---|---|---|
| Total Operation hours / year = | 2080 | |
| Total Bulldozers Operating = | 2 | |
| Total Emissions = | 1.1 | tons/year |
| Total Emissions (90% Control)[1] = | 0.11 | tons/year |

Notes:
1 During disposal of identified dusty wastes, CWM Model City applies a water spray to minimize dust emissions. In addition, a dust suppressant material called Con-Cover is used to cover the waste on a daily basis. A 90% control efficiency is used to account for the reduction in PM emissions due to these operational procedures which are required by the Facility's permit.

## Landfill Construction

Landfill Unit: RMU-1

## Material Requirements

*Cover Construction*

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Soils | 27,100 | 26,707 |
| Coarse Stone | 500 | 722 |

Material Densities (Appendix A-9 of AP-40, Second Edition)

| Material | Density ($lb/ft^3$) |
|---|---|
| Coarse Stone | 107 |
| Soils | 73 |

*Cover Construction Materials (2011-2012)*

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Soils | 27,100 | 26,707 |
| Coarse Stone | 500 | 722 |

Landfill Activity Span = 9 phases of cover
Total Landfill Life = 18 years (1995 - 2012)

Truck nominal payload = 20 tons

$$\text{Trucks/year} = \frac{27{,}429 \text{ tpy}}{20 \text{ tons / truck}} = 1{,}371.5 \text{ trucks/year} = 1{,}372 \text{ trucks/year}$$

## Material Loading / Unloading Emissions

Batch Drop equation from AP-42, Section 13.2.4 (11/06):

$$E = k\,(0.0032)\,\frac{(u/5)^{1.3}}{(M/2)^{1.4}}$$

where:

| | | | |
|---|---|---|---|
| E = | emission factor (lb/ton) | | |
| k = | 0.35 (for $PM_{10}$) | | |
| u = | mean wind speed (mph) = | 6.8 | (2006 average wind speed - Model City, NY) |
| $M_{stone}$ = | % moisture in stone = | 0.7 | (from AP-42, Table 13.2.4-1) |
| $M_{topsoil/dirt}$ = | % moisture in topsoil/dirt mix = | 12 | (from AP-42, Table 13.2.4-1) |

$$E_{(stone)} = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(0.7/2)^{1.4}} = 7.217E\text{-}03 \text{ lb/ton}$$

$$E_{(topsoil/dirt)} = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(12/2)^{1.4}} = 1.351E\text{-}04 \text{ lb/ton}$$

*Summary - Cover Construction*

| Material | Usage/Year (tons) | EF (lb/ton) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils | 26,707 | 1.351E-04 | 3.6 |
| Coarse Stone | 722 | 7.217E-03 | 5.2 |

## Bulldozing Emissions

Compaction by Bulldozing equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = \frac{(0.75)\ (1.0)\ (\text{silt}\%)^{1.5}}{(\text{moisture}\%)^{1.4}}$$

where: E = Emission rate of $PM_{10}$ in lb/hr

From Table 13.2.4-1 of AP-42 (11/06):

Stone:
Silt % = 1.6
Moisture % = 0.7

Topsoil/Dirt:
Silt % = 9
Moisture % = 12

$$E_{(\text{stone})} = \frac{(0.75)\ (1.0)\ (1.6)^{1.5}}{(0.7)^{1.4}} = 2.501\text{E+00}\ \text{lb/hr}$$

$$E_{(\text{topsoil/dirt})} = \frac{(0.75)\ (1.0)\ (9)^{1.5}}{(12)^{1.4}} = 6.246\text{E-01}\ \text{lb/hr}$$

Total Cover Construction hours / year = 600
Total Bulldozers Operating / Activity = 2

*Summary - Cover Construction*

| Material | Hours/Year | EF (lb/hr) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils | 600 | 6.246E-01 | 729.7 |
| Coarse Stone | 600 | 2.501E+00 | 79.0 |

## Grading Emissions

Grading equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = (0.60)\ (0.51)\ (\text{veh speed})^2$$

Assume avg. grader speed = 7.39 mph (650 fpm)

E = 16.711 lb / VMT (independent of material being graded)

Assume equipment blades are 10 feet wide
Assume grading depth of 0.5 feet (6 inches)

1 cubic yard of material graded every 5.4 feet
1 VMT (grader) = 977.8 $yd^3$ of material graded

EF = 0.017 lb $PM_{10}$ / $yd^3$

*Summary - Cover Construction*

| Material | Usage/Year ($yd^3$) | EF (lb/$yd^3$) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils | 27,100 | 1.709E-02 | 463.2 |
| Coarse Stone | 500 | 1.709E-02 | 8.5 |

**$PM_{10}$ CALCULATIONS**
**PAVED / UNPAVED ROAD DUST**
**CWM CHEMICAL SERVICES, LLC**

**Paved / Unpaved Roads - RMU-1**

| Road Segment # | Vehicles on Segment | NO. OF VEHICLES [a] PER YEAR | AVERAGE FULL VEHICLE WEIGHT [b] (tons) | AVERAGE EMPTY VEHICLE WEIGHT [b] (tons) | ACTUAL MEAN VEHICLE WEIGHT [b] (tons) | MILES TRAVELED (c) (MILES) | SILT CONTENT [d] ($g/m^2$) | PM10 Emission Rate (lb/VMT) [f] | Uncontrolled PM10 (TPY) | Efficiency (%) [g] PM10 (TPY) | Controlled PM10 [h] (TPY) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PAVED** | | | | | | | | | | **PAVED** | |
| 1-2 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 5,096.6 | 7.4 | | | | |
| | AWTS | 94 | 30.8 | 17.4 | 24.1 | 76.5 | 7.4 | | | | |
| | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 481.7 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 406.8 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 4,230.9 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 1,057.7 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 5,288.6 | 7.4 | | | | |
| Total/Average | | 20,450 | | | 12.1 | 16,638.9 | 7.4 | 0.172 | 1.434 | 90 | 0.14 |
| 2-3 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 4,095.3 | 7.4 | | | | |
| | AWTS | 94 | 30.8 | 17.4 | 24.1 | 61.5 | 7.4 | | | | |
| | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 387.0 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 326.9 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 3,399.7 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 849.9 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 4,249.6 | 7.4 | | | | |
| Total/Average | | 20,450 | | | 12.1 | 13,370.0 | 7.4 | 0.172 | 1.152 | 90 | 0.12 |
| 4-10 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 1,511.4 | 7.4 | | | | |
| | AWTS | 94 | 30.8 | 17.4 | 24.1 | 22.7 | 7.4 | | | | |
| | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 142.8 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 120.6 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,254.7 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 313.7 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 1,568.4 | 7.4 | | | | |
| Total/Average | | 20,450 | | | 12.1 | 4,934.3 | 7.4 | 0.172 | 0.425 | 90 | 0.04 |
| 5-6 | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 161.2 | 7.4 | | | | |
| Total/Average | | 592 | | | 27.6 | 161.2 | 7.4 | 0.401 | 0.032 | 90 | 0.00 |
| 7-8 | Post-Stabilization | 1,184 | 33.0 | 19.0 | 26.0 | 351.2 | 7.4 | | | | |
| Total/Average | | 1,184 | | | 26.0 | 351.2 | 7.4 | 0.377 | 0.066 | 90 | 0.01 |
| 8-14 | Post-Stabilization | 1,184 | 33.0 | 19.0 | 26.0 | 213.5 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 90.2 | 7.4 | | | | |
| Total/Average | | 1,684 | | | 24.8 | 303.6 | 7.4 | 0.360 | 0.055 | 90 | 0.01 |
| 10-11 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 1,029.8 | 7.4 | | | | |
| | AWTS | 94 | 30.8 | 17.4 | 24.1 | 15.5 | 7.4 | | | | |
| | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 97.3 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 82.2 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 854.8 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 213.7 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 1,068.6 | 7.4 | | | | |
| Total/Average | | 20,450 | | | 12.1 | 3,361.9 | 7.4 | 0.172 | 0.290 | 90 | 0.03 |
| 11-12 | AWTS | 94 | 30.8 | 17.4 | 24.1 | 25.4 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,402.4 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 350.6 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 350.6 | 7.4 | | | | |
| Total/Average | | 7,894 | | | 3.0 | 2,129.0 | 7.4 | 0.042 | 0.044 | 90 | 0.00 |
| 11-13 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 1,134.2 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 90.5 | 7.4 | | | | |
| Total/Average | | 6,764 | | | 29.4 | 1,224.7 | 7.4 | 0.428 | 0.262 | 90 | 0.03 |
| 13-14 | Drums | 500 | 26.4 | 17.5 | 22.0 | 129.5 | 7.4 | | | | |
| Total/Average | | 500 | | | 22.0 | 129.5 | 7.4 | 0.318 | 0.021 | 90 | 0.00 |
| 15-16 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 3,694.3 | 7.4 | | | | |
| | Post-Stabilization | 1,184 | 33.0 | 19.0 | 26.0 | 698.3 | 7.4 | | | | |
| | Construction | 1,372 | 36.8 | 16.8 | 26.8 | 809.2 | 7.4 | | | | |
| Total/Average | | 8,820 | | | 28.9 | 5,201.8 | 7.4 | 0.421 | 1.095 | 90 | 0.11 |
| 16-17 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 1,689.4 | 7.4 | | | | |
| | Construction | 1,372 | 36.8 | 16.8 | 26.8 | 370.0 | 7.4 | | | | |
| Total/Average | | 7,636 | | | 29.4 | 2,059.4 | 7.4 | 0.428 | 0.440 | 90 | 0.04 |
| 18-19 | Construction | 1,372 | 36.8 | 16.8 | 26.8 | 523.9 | 7.4 | | | | |
| Total/Average | | 1,372 | | | 26.8 | 523.9 | 7.4 | 0.388 | 0.102 | 90 | 0.01 |
| | | | | | | | | | | **Total** | **0.54** |

**$PM_{10}$ CALCULATIONS**
**PAVED / UNPAVED ROAD DUST**
**CWM CHEMICAL SERVICES, LLC**

| UNPAVED | | | | | | | | | | UNPAVED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-4 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 1,746.3 | 6.4 | | | | |
| | AWTS | 94 | 30.8 | 17.4 | 24.1 | 26.2 | 6.4 | | | | |
| | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 165.0 | 6.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 139.4 | 6.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,449.7 | 6.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 362.4 | 6.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 1,812.1 | 6.4 | | | | |
| Total/Average | | 20,450 | | | 12.1 | 5,701.2 | 6.4 | 1.593 | 4.542 | 90 | 0.45 |
| | | | | | | | | | | | |
| 4-5 | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 156.1 | 6.4 | | | | |
| Total/Average | | 592 | | | 27.6 | 156.1 | 6.4 | 2.313 | 0.181 | 90 | 0.02 |
| | | | | | | | | | | | |
| 14-16 | Post-Stabilization | 1,184 | 33.0 | 19.0 | 26.0 | 476.3 | 6.4 | | | | |
| Total/Average | | 1,184 | | | 26.0 | 476.3 | 6.4 | 2.251 | 0.536 | 90 | 0.05 |
| | | | | | | | | | | | |
| 13-17 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 2,489.0 | 6.4 | | | | |
| Total/Average | | 6,264 | | | 30.0 | 2,489.0 | 6.4 | 2.400 | 2.987 | 90 | 0.30 |
| | | | | | | | | | | | |
| 17-18 | Construction | 1,372 | 36.8 | 16.8 | 26.8 | 797.2 | 6.4 | | | | |
| Total/Average | | 1,372 | | | 26.8 | 797.2 | 6.4 | 2.280 | 0.909 | 90 | 0.09 |
| | | | | | | | | | | | |
| 19-20 | Construction | 1,372 | 36.8 | 16.8 | 26.8 | 1,331.5 | 6.4 | | | | |
| Total/Average | | 1,372 | | | 26.8 | 1,331.5 | 6.4 | 2.280 | 1.518 | 90 | 0.15 |
| | | | | | | | | | | **Total** | **1.07** |

EQUATIONS:

A Fugitive emissions from paved site roads are based on emission factors from AP-42 Section 13.2.1.3 (Equation 1 for paved roads).
Constant 'k' (particle size multiplier) from AP-42 Table 13.2-1.1.

Calculations

$E\ (lb/VMT) = [k(sL)^{.91}(W)^{1.02}]$

$E(TPY) = E(lb/VMT)*(VMT/truck)*(truck/d)*(d/week)*(week/yr)/2000$

Variables/Constants

k = particle size multiplier (dimensionless)
K(PM10) = 0.0022 lb/VMT
W = Average weight of vehicle in tons
sL = silt loading sL = 7.4 $g/m^2$

B Fugitive emissions from trucks driving on unpaved surfaces, will use emission factor equation in AP-42 Section 13.2.2.4 (Equation 1a for unpaved roads)

Calculations

$E\ (lb/VMT) = [k(s/12)^{a}(W/3)^{b}]$

$E(TPY) = E(lb/VMT)*(VMT/truck)*(truck/yr)/2000$

Variables/Constants

k = particle size multiplier (dimensionless)
k(PM10) = 1.5 lb/VMT

a = Constant a(PM10) = 0.9
b = Constant b(PM10) = 0.45
s = silt content (%)
(measured or estimated - varies for different sources/materials - see below)
s = 6.4 %

NOTES:

a Number of vehicles information was provided by Site specific data which was supplied by the Site (July 2006 - June 2007)
b Vehicle weight information was provided by Site specific data which was supplied by the Site (July 2006 - June 2007)
c The round-trip distance traveled on the roads determined from analysis of CAD drawing of site (See Below)
d Silt content was referenced from Section 13.2.1 or 13.2.2 from AP-42.
f PM emissions were calculated using equations as shown above.
g Control efficiencies for paved and unpaved roads (and surfaces treated as unpaved roads) were referenced from Table B.2-3 of Appendix B of AP-42; water trucks are used at the Facility to control dust emissions from paved and unpaved roads, and are required by the Facility's permit.
h Controlled PM emissions were calculated by applying the control efficiency to the calculated PM-TPY value.

***Distances determined from AutoCAD analysis of Site Drawing***

| Segment | Length (ft) |
|---|---|
| 1-2 | 2148 |
| 2-3 | 1726 |
| 4-10 | 637 |
| 5-6 | 719 |
| 7-8 | 783 |
| 8-14 | 476 |
| 10-11 | 434 |
| 11-12 | 712 |
| 11-13 | 478 |
| 13-14 | 684 |
| 15-16 | 1557 |
| 16-17 | 712 |
| 18-19 | 1008 |
| 3-4 | 736 |
| 4-5 | 696 |
| 9-10 | 405 |
| 14-16 | 1062 |
| 13-17 | 1049 |
| 17-18 | 1534 |
| 19-20 | 2562 |

**$PM_{10}$ CALCULATIONS**
**SILO LOADING / STABILIZATION BAGHOUSES**
**CWM CHEMICAL SERVICES, LLC**

**Cement Kiln Silo Loading**

- Cement Kiln Silo

Total Waste Stabilized at Facility = 150,000.0 tons/year

- Assume that 15% CKD is added to treat waste

CKD Consumption = 22,500.0 tons/year

* Section 11.12 of AP-42 (6/06) lists controlled emission factor for cement loading to elevated storage silo (pneumatic) as 0.00099 lb/ton loaded (Table 11.12-2)

** Assume that all particulate matter is $PM_{10}$ to be conservative

$PM_{10}$ emissions = 22.28 lb/year
$PM_{10}$ emissions = 0.011 TPY

**Lime Silo (AWTS Facility)**

From Facility Records:

2005 Lime Consumption = 110 tons
2006 Lime Consumption = 110 tons

* Section 11.17 of AP-42 (2/98) lists emission factor for lime loading (enclosed truck) as:
0.61 lb/ton (Table 11.17-4)

** Assume that all particulate matter is $PM_{10}$ to be conservative

$PM_{10}$ emissions = 67.10 lb/year
$PM_{10}$ emissions = 0.03 TPY

**Stabilization Baghouses**

- 2 stabilization baghouses in operation

- Facility records indicate that approximately 200 lb of particulates are removed from hoppers every 2 weeks

Collected PM = 5,200 lb/year

- Assume 99 percent capture efficiency in stabilization baghouse
- Assume that all particulate matter is $PM_{10}$

$PM_{10}$ Emissions = 52.5 lb/year (Controlled emissions)

Baghouse Flowrates:

| | | | Fraction of Total |
|---|---|---|---|
| Baghouse 1 = | 90,000 | cfm | 0.643 |
| Baghouse 2 = | 50,000 | cfm | 0.357 |

- Proportion emissions according to flowrate in each baghouse and adjust to 150,000 TPY

Baghouse #1 Emissions = 344.4 lb/year
Baghouse #1 Emissions = 0.17 tons/year
Baghouse #2 Emissions = 191.3 lb/year
Baghouse #2 Emissions = 0.10 tons/year

**$PM_{10}$ CALCULATIONS**
**LANDFILL TOTALS**
**CWM CHEMICAL SERVICES, LLC**

**Totals**

| *Process* | **$PM_{10}$ Emissions (lb/year)** | **$PM_{10}$ Emissions (TPY)** |
|---|---|---|
| *Landfill Operation* | | |
| Waste Unloading | 1.9 | 0.00 |
| Waste Compaction | 216.4 | 0.11 |
| Paved Roads | 1,083.7 | 0.54 |
| Unpaved Roads | 2,134.6 | 1.07 |
| **Totals** | **3,436.6** | **1.72** |
| *Landfill Construction (RMU-1)* | | |
| Material Loading/Unloading | 8.8 | 0.00 |
| Bulldozing/Compaction | 808.8 | 0.40 |
| Grading | 471.7 | 0.24 |
| **Totals** | **1,289.3** | **0.64** |
| *Silo Loading* | | |
| Cement Kiln Silo | 22.3 | 0.011 |
| Lime Silo (AWTS Facility) | 67.1 | 0.03 |
| **Totals** | **89.4** | **0.04** |
| *Stabilization Baghouses* | | |
| Baghouse # 1 | 344.4 | 0.17 |
| Baghouse # 2 | 191.3 | 0.10 |
| **Totals** | **535.8** | **0.27** |
| **Facility Totals** | **5,351.0** | **2.68** |

# Attachment 2
# Calculation of Fugitive PM2.5 Emissions

**$PM_{2.5}$ CALCULATIONS**
**TRUCK AND WASTE SUMMARY**
**CWM CHEMICAL SERVICES, LLC**

**Truck and Waste Summary**

| | | Average Vehicle Weight (tons) | | | | |
|---|---|---|---|---|---|---|
| **Vehicle Type** | **Code** | **Gross Weight** | **Empty Weight** | **Payload** | **Total Vehicles** | **Vehicle Route** |
| Dump Truck | DT | 43.9 | 17.0 | 26.8 | 5,318 | Landfill |
| Rolloff Truck | CM | 33.4 | 21.1 | 12.2 | 946 | Landfill |
| Tanker Truck | TT | 30.8 | 17.4 | 13.4 | 94 | AWTS |
| Rolloff Truck | CM | 32.1 | 21.7 | 10.3 | 331 | Stabilization |
| Dump Truck | DT | 39.9 | 17.1 | 22.9 | 261 | Stabilization |
| Off-Road Truck | --- | 33.0 | 19.0 | 14.0 | 1,184 | Post-Stabilization [a] |
| Drum Truck | --- | 26.4 | 17.5 | 8.9 | 500 | Drum Building |
| Site Vehicles | --- | 2.5 | 2.5 | --- | 5,200 | AWTS |
| Delivery Trucks | --- | 5.0 | 5.0 | --- | 1,300 | AWTS |
| Personal Vehicles | --- | 1.5 | 1.5 | --- | 1,300 | AWTS |
| Personal Vehicles | --- | 1.5 | 1.5 | --- | 5,200 | Main Office |

Notes:
a Assumes 2 loaded vehicles for each stabilization vehicle
b Total # vehicles equals twice the actual amount of vehicles since each transship load requires 2 rou

Total Bulk Waste = 173,583 tpy

**$PM_{2.5}$ CALCULATIONS**
**LANDFILL OPERATIONS**
**CWM CHEMICAL SERVICES, LLC**

## Landfill Operation

### Waste Unloading

Batch Drop equation from AP-42, Section 13.2.4 (11/06):

$$E = k\,(0.0032)\,\frac{(u / 5)^{1.3}}{(M / 2)^{1.4}}$$

where:
E = emission factor (lb/ton)
k = 0.053 (for $PM_{2.5}$)
u = mean wind speed (mph) = 6.8 (2006 average wind speed - Model City, NY)
M = % moisture in clay/dirt mix = 14 (from AP-42, Table 13.2.4-1)

$$E = k\,(0.0032)\,\frac{(6.8 / 5)^{1.3}}{(14 / 2)^{1.4}} = 1.649E\text{-}05 \text{ lb/ton}$$

| | | | |
|---|---|---|---|
| Total Waste Unloaded = | 173,583 | tons/year | (Includes stabilization materials) |
| Total Emissions = | 2.9 | lb/year | |
| Total Emissions (90% Control)[1] = | 0.29 | lb/year | |
| Total Emissions (90% Control)[1] = | 0.000 | tons/year | |

### Waste Compaction

Compaction by Bulldozing equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = \frac{(0.105)\,(5.7)\,(\text{silt}\%)^{1.2}}{(\text{moisture}\%)^{1.3}}$$

where: E = Emission rate of $PM_{2.5}$ in lb/hr

From Table 13.2.4-1 of AP-42 (11/06):

Clay/dirt mix:
Silt % = 9.2
Moisture % = 14

$$E = \frac{(0.105)\,(5.7)\,(9.2)^{1.2}}{(14)^{1.3}} = 0.278 \text{ lb/hr}$$

| | | | |
|---|---|---|---|
| Total Operation hours / year = | 2080 | | |
| Total Bulldozers Operating = | 2 | | |
| Total Emissions = | 0.6 | tons/year | |
| Total Emissions (90% Control)[1] = | 0.06 | tons/year | |

Notes:
1 During disposal of identified dusty wastes, CWM Model City applies a water spray to minimize dust emissions. In addition, a dust suppressant material called Con-Cover is used to cover the waste on a daily basis. A 90% control efficiency is used to account for the reduction in PM emissions due to these operational procedures which are required by the Facility's permit.

**$PM_{2.5}$ CALCULATIONS**
**LANDFILL CONSTRUCTION - RMU-1 LANDFILL**
**CWM CHEMICAL SERVICES, LLC**

**Landfill Construction**
Landfill Unit: RMU-1

**Material Requirements**
*Cover Construction*

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Soils | 27,100 | 26,707 |
| Coarse Stone | 500 | 722 |

Material Densities (Appendix A-9 of AP-40, Second Edition)

| Material | Density ($lb/ft^3$) |
|---|---|
| Coarse Stone | 107 |
| Soils | 73 |

*Cover Construction Materials (2011-2012)*

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Soils | 27,100 | 26,707 |
| Coarse Stone | 500 | 722 |

Landfill Activity Span = 9 phases of cover
Total Landfill Life = 18 years (1995 - 2012)

Truck nominal payload = 20 tons

$$\text{Trucks/year} = \frac{27{,}429 \text{ tpy}}{20 \text{ tons / truck}} = 1{,}371.5 \text{ trucks/year} = 1{,}372 \text{ trucks/year}$$

**$PM_{2.5}$ CALCULATIONS**
**LANDFILL CONSTRUCTION - RMU-1 LANDFILL**
**CWM CHEMICAL SERVICES, LLC**

**Material Loading / Unloading Emissions**

Batch Drop equation from AP-42, Section 13.2.4 (11/06):

$$E = k\,(0.0032)\,\frac{(u/5)^{1.3}}{(M/2)^{1.4}}$$

where:

| | | | |
|---|---|---|---|
| E = | emission factor (lb/ton) | | |
| k = | 0.053 (for $PM_{2.5}$) | | |
| u = | mean wind speed (mph) = | 6.8 | (2006 average wind speed - Model City, NY) |
| $M_{stone}$ = | % moisture in stone = | 0.7 | (from AP-42, Table 13.2.4-1) |
| $M_{topsoil/dirt}$ = | % moisture in topsoil/dirt mix = | 12 | (from AP-42, Table 13.2.4-1) |

$$E_{(stone)} = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(0.7/2)^{1.4}} = 1.093E\text{-}03 \text{ lb/ton}$$

$$E_{(topsoil/dirt)} = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(12/2)^{1.4}} = 2.046E\text{-}05 \text{ lb/ton}$$

*Summary - Cover Construction*

| Material | Usage/Year (tons) | EF (lb/ton) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils | 26,707 | 2.046E-05 | 0.5 |
| Coarse Stone | 722 | 1.093E-03 | 0.8 |

**$PM_{2.5}$ CALCULATIONS**
**LANDFILL CONSTRUCTION - RMU-1 LANDFILL**
**CWM CHEMICAL SERVICES, LLC**

**Bulldozing Emissions**

Compaction by Bulldozing equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = \frac{(0.105)\ (5.7)\ (\text{silt}\%)^{1.2}}{(\text{moisture}\%)^{1.3}}$$

where: E = Emission rate of $PM_{2.5}$ in lb/hr

From Table 13.2.4-1 of AP-42 (11/06):

Stone:
Silt % = 1.6
Moisture % = 0.7

Topsoil/Dirt:
Silt % = 9
Moisture % = 12

$$E_{(\text{stone})} = \frac{(0.105)\ (5.7)\ (1.6)^{1.2}}{(0.7)^{1.3}} = 1.673\text{E+00}\ \text{lb/hr}$$

$$E_{(\text{topsoil/dirt})} = \frac{(0.105)\ (5.7)\ (9)^{1.2}}{(12)^{1.3}} = 3.305\text{E-01}\ \text{lb/hr}$$

Total Cover Construction hours / year = 600
Total Bulldozers Operating / Activity = 2

*Summary - Cover Construction*

| Material | Hours/Year | EF (lb/hr) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils | 600 | 3.305E-01 | 386.2 |
| Coarse Stone | 600 | 1.673E+00 | 52.8 |

**$PM_{2.5}$ CALCULATIONS**
**LANDFILL CONSTRUCTION - RMU-1 LANDFILL**
**CWM CHEMICAL SERVICES, LLC**

**Grading Emissions**

Grading equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = (0.031)\ (0.040)\ (\text{veh speed})^{2.5}$$

Assume avg. grader speed = 7.39 mph (650 fpm)

E = 0.184 lb / VMT (independent of material being graded)

Assume equipment blades are 10 feet wide
Assume grading depth of 0.5 feet (6 inches)

1 cubic yard of material graded every 5.4 feet
1 VMT (grader) = 977.8 $yd^3$ of material graded

EF = 0.0002 lb $PM_{2.5}$ / $yd^3$

*Summary - Cover Construction*

| Material | Usage/Year ($yd^3$) | EF (lb/$yd^3$) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils | 27,100 | 1.883E-04 | 5.1 |
| Coarse Stone | 500 | 1.883E-04 | 0.1 |

**$PM_{2.5}$ CALCULATIONS**
**PAVED / UNPAVED ROAD DUST**
**CWM CHEMICAL SERVICES, LLC**

**Paved / Unpaved Roads - RMU-1**

| Road Segment # | Vehicles on Segment | NO. OF VEHICLES [a] PER YEAR | AVERAGE FULL VEHICLE WEIGHT [b] (tons) | AVERAGE EMPTY VEHICLE WEIGHT [b] (tons) | ACTUAL MEAN VEHICLE WEIGHT [b] (tons) | MILES TRAVELED (c) (MILES) | SILT CONTENT [d] ($g/m^2$) | PM2.5 Emission Rate (lb/VMT) [f] | Uncontrolled PM2.5 (TPY) | Efficiency (%) [g] PM2.5 (TPY) | Controlled PM2.5 [h] (TPY) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PAVED** | | | | | | | | | | **PAVED** | |
| 1-2 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 5,096.6 | 7.4 | | | | |
| | AWTS | 94 | 30.8 | 17.4 | 24.1 | 76.5 | 7.4 | | | | |
| | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 481.7 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 406.8 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 4,230.9 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 1,057.7 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 5,288.6 | 7.4 | | | | |
| Total/Average | | 20,450 | | | 12.1 | 16,638.9 | 7.4 | 0.042 | 0.352 | 40 | 0.21 |
| 2-3 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 4,095.3 | 7.4 | | | | |
| | AWTS | 94 | 30.8 | 17.4 | 24.1 | 61.5 | 7.4 | | | | |
| | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 387.0 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 326.9 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 3,399.7 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 849.9 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 4,249.6 | 7.4 | | | | |
| Total/Average | | 20,450 | | | 12.1 | 13,370.0 | 7.4 | 0.042 | 0.283 | 40 | 0.17 |
| 4-10 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 1,511.4 | 7.4 | | | | |
| | AWTS | 94 | 30.8 | 17.4 | 24.1 | 22.7 | 7.4 | | | | |
| | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 142.8 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 120.6 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,254.7 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 313.7 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 1,568.4 | 7.4 | | | | |
| Total/Average | | 20,450 | | | 12.1 | 4,934.3 | 7.4 | 0.042 | 0.104 | 40 | 0.06 |
| 5-6 | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 161.2 | 7.4 | | | | |
| Total/Average | | 592 | | | 27.6 | 161.2 | 7.4 | 0.099 | 0.008 | 40 | 0.00 |
| 7-8 | Post-Stabilization | 1,184 | 33.0 | 19.0 | 26.0 | 351.2 | 7.4 | | | | |
| Total/Average | | 1,184 | | | 26.0 | 351.2 | 7.4 | 0.093 | 0.016 | 40 | 0.01 |
| 8-14 | Post-Stabilization | 1,184 | 33.0 | 19.0 | 26.0 | 213.5 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 90.2 | 7.4 | | | | |
| Total/Average | | 1,684 | | | 24.8 | 303.6 | 7.4 | 0.088 | 0.013 | 40 | 0.01 |
| 10-11 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 1,029.8 | 7.4 | | | | |
| | AWTS | 94 | 30.8 | 17.4 | 24.1 | 15.5 | 7.4 | | | | |
| | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 97.3 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 82.2 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 854.8 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 213.7 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 1,068.6 | 7.4 | | | | |
| Total/Average | | 20,450 | | | 12.1 | 3,361.9 | 7.4 | 0.042 | 0.071 | 40 | 0.04 |
| 11-12 | AWTS | 94 | 30.8 | 17.4 | 24.1 | 25.4 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,402.4 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 350.6 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 350.6 | 7.4 | | | | |
| Total/Average | | 7,894 | | | 3.0 | 2,129.0 | 7.4 | 0.010 | 0.011 | 40 | 0.01 |
| 11-13 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 1,134.2 | 7.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 90.5 | 7.4 | | | | |
| Total/Average | | 6,764 | | | 29.4 | 1,224.7 | 7.4 | 0.105 | 0.064 | 40 | 0.04 |
| 13-14 | Drums | 500 | 26.4 | 17.5 | 22.0 | 129.5 | 7.4 | | | | |
| Total/Average | | 500 | | | 22.0 | 129.5 | 7.4 | 0.078 | 0.005 | 40 | 0.00 |
| 15-16 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 3,694.3 | 7.4 | | | | |
| | Post-Stabilization | 1,184 | 33.0 | 19.0 | 26.0 | 698.3 | 7.4 | | | | |
| | Construction | 1,372 | 36.8 | 16.8 | 26.8 | 809.2 | 7.4 | | | | |
| Total/Average | | 8,820 | | | 28.9 | 5,201.8 | 7.4 | 0.103 | 0.269 | 40 | 0.16 |
| 16-17 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 1,689.4 | 7.4 | | | | |
| | Construction | 1,372 | 36.8 | 16.8 | 26.8 | 370.0 | 7.4 | | | | |
| Total/Average | | 7,636 | | | 29.4 | 2,059.4 | 7.4 | 0.105 | 0.108 | 40 | 0.06 |
| 18-19 | Construction | 1,372 | 36.8 | 16.8 | 26.8 | 523.9 | 7.4 | | | | |
| Total/Average | | 1,372 | | | 26.8 | 523.9 | 7.4 | 0.095 | 0.025 | 40 | 0.01 |
| | | | | | | | | | | **Total** | **0.80** |

**$PM_{2.5}$ CALCULATIONS**
**PAVED / UNPAVED ROAD DUST**
**CWM CHEMICAL SERVICES, LLC**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **UNPAVED** | | | | | | | | **UNPAVED** | |
| 3-4 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 1,746.3 | 6.4 | | | | |
| | AWTS | 94 | 30.8 | 17.4 | 24.1 | 26.2 | 6.4 | | | | |
| | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 165.0 | 6.4 | | | | |
| | Drums | 500 | 26.4 | 17.5 | 22.0 | 139.4 | 6.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,449.7 | 6.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 362.4 | 6.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 1,812.1 | 6.4 | | | | |
| Total/Average | | 20,450 | | | 12.1 | 5,701.2 | 6.4 | 0.159 | 0.454 | 40 | 0.27 |
| | | | | | | | | | | | |
| 4-5 | Stabilization | 592 | 35.6 | 19.7 | 27.6 | 156.1 | 6.4 | | | | |
| Total/Average | | 592 | | | 27.6 | 156.1 | 6.4 | 0.231 | 0.018 | 40 | 0.01 |
| | | | | | | | | | | | |
| 14-16 | Post-Stabilization | 1,184 | 33.0 | 19.0 | 26.0 | 476.3 | 6.4 | | | | |
| Total/Average | | 1,184 | | | 26.0 | 476.3 | 6.4 | 0.225 | 0.054 | 40 | 0.03 |
| | | | | | | | | | | | |
| 13-17 | Landfill Disposal | 6,264 | 42.3 | 17.7 | 30.0 | 2,489.0 | 6.4 | | | | |
| Total/Average | | 6,264 | | | 30.0 | 2,489.0 | 6.4 | 0.240 | 0.299 | 40 | 0.18 |
| | | | | | | | | | | | |
| 17-18 | Construction | 1,372 | 36.8 | 16.8 | 26.8 | 797.2 | 6.4 | | | | |
| Total/Average | | 1,372 | | | 26.8 | 797.2 | 6.4 | 0.228 | 0.091 | 40 | 0.05 |
| | | | | | | | | | | | |
| 19-20 | Construction | 1,372 | 36.8 | 16.8 | 26.8 | 1,331.5 | 6.4 | | | | |
| Total/Average | | 1,372 | | | 26.8 | 1,331.5 | 6.4 | 0.228 | 0.152 | 40 | 0.09 |
| | | | | | | | | | | **Total** | **0.64** |

EQUATIONS:

A Fugitive emissions from paved site roads are based on emission factors from AP-42 Section 13.2.1.3 (Equation 1 for paved roads).
Constant 'k' (particle size multiplier) from AP-42 Table 13.2-1.1.

Calculations

$E\ (lb/VMT) = [k(sL)^{.91}(W)^{1.02}]$

E(TPY) = E(lb/VMT)*(VMT/truck)*(truck/d)*(d/week)*(week/yr)/2000

Variables/Constants

k = particle size multiplier (dimensionless)
K(PM2.5) = 0.00054 lb/VMT
W = Average weight of vehicle in tons
sL = silt loading sL = 7.4 $g/m^2$

B Fugitive emissions from trucks driving on unpaved surfaces, will use emission factor equation in AP-42 Section 13.2.2.4
(Equation 1a for unpaved roads)

Calculations

$E\ (lb/VMT) = [k(s/12)^{a}(W/3)^{b}]$

E(TPY) = E(lb/VMT)*(VMT/truck)*(truck/yr)/2000

Variables/Constants

k = particle size multiplier (dimensionless)
k(PM2.5) = 0.15 lb/VMT

a = Constant a(PM2.5) = 0.9
b = Constant b(PM2.5) = 0.45
s = silt content (%)
(measured or estimated - varies for different sources/materials - see below)
s = 6.4 %

NOTES:

a Number of vehicles information was provided by Site specific data which was supplied by the Site (July 2006 - June 2007)
b Vehicle weight information was provided by Site specific data which was supplied by the Site (July 2006 - June 2007)
c The round-trip distance traveled on the roads determined from analysis of CAD drawing of site (See Below)
d Silt content was referenced from Section 13.2.1 or 13.2.2 from AP-42.
f PM emissions were calculated using equations as shown above.
g Control efficiencies for paved and unpaved roads (and surfaces treated as unpaved roads) were referenced from Table B.2-3 of Appendix B of AP-42; water trucks are used at the Facility to control dust emissions from paved and unpaved roads, and are required by the Facility's permit.
h Controlled PM emissions were calculated by applying the control efficiency to the calculated PM-TPY value.

***Distances determined from AutoCAD analysis of Site Drawing***

| **Segment** | **Length (ft)** |
|---|---|
| 1-2 | 2148 |
| 2-3 | 1726 |
| 4-10 | 637 |
| 5-6 | 719 |
| 7-8 | 783 |
| 8-14 | 476 |
| 10-11 | 434 |
| 11-12 | 712 |
| 11-13 | 478 |
| 13-14 | 684 |
| 15-16 | 1557 |
| 16-17 | 712 |
| 18-19 | 1008 |
| 3-4 | 736 |
| 4-5 | 696 |
| 9-10 | 405 |
| 14-16 | 1062 |
| 13-17 | 1049 |
| 17-18 | 1534 |
| 19-20 | 2562 |

**$PM_{2.5}$ CALCULATIONS**
**SILO LOADING AND STABILIZATION BAGHOUSES**
**CWM CHEMICAL SERVICES, LLC**

**Cement Kiln Silo Loading**

- Cement Kiln Silo

Total Waste Stabilized at Facility = 150,000.0 tons/year

- Assume that 15% CKD is added to treat waste

CKD Consumption = 22,500.0 tons/year

* Section 11.12 of AP-42 (6/06) lists controlled emission factor for cement loading to elevated storage silo (pneumatic) as 0.00099 lb/ton loaded (Table 11.12-2)

** Assume that all particulate matter is $PM_{2.5}$ to be conservative

$PM_{2.5}$ emissions = 22.28 lb/year
$PM_{2.5}$ emissions = 0.011 TPY

**Lime Silo (AWTS Facility)**

From Facility Records:

2005 Lime Consumption = 110 tons
2006 Lime Consumption = 110 tons

* Section 11.17 of AP-42 (2/98) lists emission factor for lime loading (enclosed truck) as:
0.61 lb/ton (Table 11.17-4)

** Assume that all particulate matter is $PM_{2.5}$ to be conservative

$PM_{2.5}$ emissions = 67.10 lb/year
$PM_{2.5}$ emissions = 0.03 TPY

**Stabilization Baghouses**

- 2 stabilization baghouses in operation

- Facility records indicate that approximately 200 lb of particulates are removed from hoppers every 2 weeks

Collected PM = 5,200 lb/year

- Assume 99 percent capture efficiency in stabilization baghouse
** Assume that all particulate matter is $PM_{2.5}$ to be conservative

$PM_{2.5}$ Emissions = 52.5 lb/year (Controlled emissions)

Baghouse Flowrates:

| | | | Fraction of Total |
|---|---|---|---|
| Baghouse 1 = | 90,000 | cfm | 0.643 |
| Baghouse 2 = | 50,000 | cfm | 0.357 |

- Proportion emissions according to flowrate in each baghouse and adjust to 150,000 TPY

Baghouse #1 Emissions = 344.4 lb/year
Baghouse #1 Emissions = 0.17 tons/year
Baghouse #2 Emissions = 191.3 lb/year
Baghouse #2 Emissions = 0.10 tons/year

**$PM_{2.5}$ CALCULATIONS**
**LANDFILL TOTALS**
**CWM CHEMICAL SERVICES, LLC**

**Totals**

| *Process* | **$PM_{2.5}$ Emissions (lb/year)** | **$PM_{2.5}$ Emissions (TPY)** |
|---|---|---|
| *Landfill Operation* | | |
| Waste Unloading | 0.3 | 0.00 |
| Waste Compaction | 115.5 | 0.06 |
| Paved Roads | 1,596.0 | 0.80 |
| Unpaved Roads | 1,280.8 | 0.64 |
| **Totals** | **2,992.6** | **1.50** |
| *Landfill Construction (RMU-1)* | | |
| Material Loading/Unloading | 1.3 | 0.00 |
| Bulldozing/Compaction | 439.0 | 0.22 |
| Grading | 5.2 | 0.00 |
| **Totals** | **445.6** | **0.22** |
| *Silo Loading* | | |
| Cement Kiln Silo | 22.3 | 0.011 |
| Lime Silo (AWTS Facility) | 67.1 | 0.03 |
| **Totals** | **89.4** | **0.04** |
| *Stabilization Baghouses* | | |
| Baghouse # 1 | 344.4 | 0.17 |
| Baghouse # 2 | 191.3 | 0.10 |
| **Totals** | **535.8** | **0.27** |
| **Facility Totals** | **4,063.3** | **2.03** |

# Attachment 3

# USEPA Paper *"Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools under Simulated Indoor Environmental Conditions"*

*Ann. occup. Hyg.*, Vol. 47, No. 4, pp. 279–286, 2003
Published by Oxford University Press
DOI: 10.1093/annhyg/meg035

# Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools under Simulated Indoor Environmental Conditions

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Received 5 August 2002; in final form 20 December 2002

**Small chamber tests were conducted to experimentally determine the overall mass transfer coefficient for pollutant emissions from still aqueous solutions under simulated indoor (residential or occupational) environmental conditions. The tests covered six organic compounds with a Henry's constant range from $3.33 \times 10^{-7}$ to $3.67 \times 10^{-3}$ (atm m$^3$/mol). The estimated overall liquid phase mass transfer coefficients for still solutions varied from $1.8 \times 10^{-6}$ to $5.7 \times 10^{-3}$ m/h; the estimated liquid phase mass transfer coefficients were $9.7 \times 10^{-3}$ m/h for the reference compound (oxygen) and $5.00 \times 10^{-3}$ to $6.04 \times 10^{-3}$ m/h for the test compounds. An empirical model is proposed to estimate the overall mass transfer coefficient, which can be used to predict pollutant emissions from still aqueous solutions (e.g. pools and puddles) in indoor environments.**

*Keywords:* aqueous solution; emission; indoor environment; mass transfer coefficient; water

## INTRODUCTION

The overall mass transfer coefficient, also known as the total transfer velocity, is a key parameter in predicting the rate of pollutant emissions from aqueous solutions. It is well established that, based on the classic two-resistance theory, the emission rate can be estimated by equation (1) or, equivalently, equation (2) (Lyman *et al.*, 1990).

$$R = SK_{OL}(C_L - C_G/H) \quad (1)$$

$$R = SK_{OG}(C_L H - C_G) \quad (2)$$

where $R$ is the emission rate (μg/h), $S$ is the source area (m$^2$), $K_{OL}$ is the overall liquid phase mass transfer coefficient (m/h), $K_{OG}$ is the overall gas phase mass transfer coefficient (m/h), $C_L$ is the pollutant concentration in the liquid (μg/m$^3$), $C_G$ is the pollutant concentration in air (μg/m$^3$) and $H$ is the dimensionless Henry's constant $[(\mu g/m^3)_{air}/(\mu g/m^3)_{liquid}]$. The two overall mass transfer coefficients, $K_{OL}$ and $K_{OG}$, are defined by equations (3) and (4), respectively.

$$1/K_{OL} = (1/k_L) + (1/k_G H) \quad (3)$$

$$1/K_{OG} = (H/k_L) + (1/k_G) \quad (4)$$

where $k_L$ is the liquid phase mass transfer coefficient (m/h) and $k_G$ is the gas phase mass transfer coefficient (m/h). $K_{OL}$ and $K_{OG}$ are so closely related that one can regard them as the measurement of the same physical property on different scales, a case similar to weighing an object in kilograms and pounds. The conversion factor between $K_{OL}$ and $K_{OG}$ is the Henry's constant (equation 5).

$$K_{OL} = HK_{OG} \quad (5)$$

The difference between the phase mass transfer coefficient ($k_L$ or $k_G$) and the overall mass transfer coefficient ($K_{OL}$ or $K_{OG}$) is that the former considers the transfer velocity in a single phase (either liquid or

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Table 1. Selected properties of the test compounds at 25°C

| Compound | Formula | Molecular weight | Vapor pressure[a] (mmHg) | Henry's constant[b] | | $D_a$[c] ($m^2$/h) | $D_L$[d] ($m^2$/h) |
|---|---|---|---|---|---|---|---|
| | | | | (atm $m^3$/mol) | (dimensionless) | | |
| Chloroform | $CHCl_3$ | 119.4 | 198 | $3.67 \times 10^{-3}$ | $1.50 \times 10^{-1}$ | $3.28 \times 10^{-2}$ | $3.90 \times 10^{-6}$ |
| Butyl acetate | $CH_3COOC_4H_9$ | 116.2 | 11.6 | $2.81 \times 10^{-4}$ | $1.15 \times 10^{-2}$ | $2.61 \times 10^{-2}$ | $2.79 \times 10_{-6}$ |
| Ethyl acetate | $CH_3COOC_2H_5$ | 88.10 | 93.6 | $1.34 \times 10^{-4}$ | $5.48 \times 10^{-3}$ | $3.14 \times 10^{-2}$ | $3.45 \times 10^{-6}$ |
| 1-Butanol | $C_4H_9OH$ | 74.12 | 7.07 | $8.81 \times 10^{-6}$ | $3.60 \times 10^{-4}$ | $3.24 \times 10^{-2}$ | $3.54 \times 10^{-6}$ |
| 1-Propanol | $C_3H_7OH$ | 60.09 | 20.8 | $7.41 \times 10^{-6}$ | $3.03 \times 10^{-4}$ | $3.71 \times 10^{-2}$ | $4.08 \times 10^{-6}$ |
| Phenol | $C_6H_5OH$ | 94.11 | 0.53 | $3.33 \times 10^{-7}$ | $1.36 \times 10^{-5}$ | $3.07 \times 10^{-2}$ | $3.55 \times 10^{-6}$ |

[a]From Yaws (1994).
[b]From Howard and Meylan (1997).
[c]$D_a$ is diffusivity in air, calculated with the method of Fuller *et al.* (1966).
[d]$D_L$ is diffusivity in water, calculated with the method of Hayduk and Laudie (1974).

gas) while the latter considers both phases. In other words, the overall mass transfer coefficient represents the combined effects of $k_L$, $k_G$ and $H$.

Since Henry's constants are available in the literature for most compounds of interest, estimation of either overall mass transfer coefficient becomes the main issue for predicting pollutant emissions from aqueous solutions. Ways to estimate the phase mass transfer coefficients ($k_L$ and $k_G$) have been thoroughly studied in the ambient environment, in which the sources of interest include oceans, lakes, rivers and waste water treatment facilities. Excellent summaries on this subject are given by Lyman *et al.* (1990) and Schwarzenbach *et al.* (1993). For example, Southworth (1979) used equations (6) and (7) to calculate $k_L$ and $k_G$, respectively.

$$k_L = 23.51(V_{curr}^{0.969}/Z^{0.673})\sqrt{32/M} \quad (6)$$

$$k_G = 1137.5(V_{wind} + V_{curr})\sqrt{18/M} \quad (7)$$

where $k_G$ and $k_L$ are in cm/h, $V_{curr}$ is the river current velocity (m/s), $V_{wind}$ is the wind speed (m/s), $Z$ is the depth of water (m) and $M$ is the molecular weight of the chemical of interest (g/mol). The applicability of these ambient models to indoor environments is doubtful, however, because the conditions in the latter environments, occupational or residential, can be drastically different from those found outdoors. For instance, the velocity (or speed) of indoor air is usually much lower, typically 5–10 cm/s, and source areas are much smaller too. If the water is virtually still, equation (6) gives 0 for $k_L$.

In a comprehensive study on emissions from water use to indoor air (EPA, 2000), lumped overall mass transfer coefficients ($SK_{OL}$) were reported for washing machine, dishwasher, shower and bathtub. The absolute values of $k_G$ and $k_L$ were not determined, however.

This study concerns pollutant emissions from still aqueous solutions in the indoor environment. Examples of such emission sources include buckets of water-based hard surface cleaners used by janitors, water-based cleaners applied to horizontal surfaces and puddles of water-based insecticides applied to the floor. A more complex case is the emission of organic solvents from latex paint applied to a wall. The objective of this work was two-fold: (i) to experimentally determine the overall mass transfer coefficients for organic compounds with a wide range of Henry's constants under simulated indoor environmental conditions; (ii) to develop an empirical model to estimate the overall mass transfer coefficients for still aqueous solutions. The results of this work can be used to predict pollutant emissions from aqueous solutions in the forms of pools, puddles and films in residential and occupational environments.

## METHODS

Six test compounds were selected (Table 1). They cover a range of Henry's constant from $3.33 \times 10^{-7}$ to $3.67 \times 10^{-3}$ (atm $m^3$/mol) or $1.36 \times 10^{-5}$ to $1.50 \times 10^{-1}$ (dimensionless). Their dilute solutions, ranging from $3.99 \times 10^{-6}$ to $5.65 \times 10^{-3}$ mol/l, were prepared one day before the chamber tests by dissolving a known amount of pure compound in deionized water. Prior to the start of chamber tests, the concentration of the stock solution was analyzed by flash vaporization of the liquid onto Tenax sorbent tubes with subsequent analysis by gas chromatography–mass spectroscopy (GC/MS). The source containers were identical circular pools made from stainless steel. They had an inside diameter of 7.4 cm, an outside diameter (including the edges at the top) of 8.9 cm and a depth of 3.1 cm. The emissions tests were conducted in two identical 53 l stainless steel environmental chambers (Tichenor *et al.*, 1990) with a ventilation rate of 1 air change/h, a temperature of 23.5°C and a relative humidity of inlet air of 20%. Temperature was measured by thermocouples (model E49008U-00-04; Inotek Technologies) and relative humidity by humidity probes (model HHT-2WC-RP-TTB; HyCal Sensing Products). Controlled by small circulation fans, the air speeds in the chambers were measured with a calibrated hot-wire anemometer (1213 Indoor Climate

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Analyzer; Brüel & Kjær) at five locations, 1 cm over the pool. The two chambers differed only in air speeds: 12.6 ± 4.5 cm/s in chamber 1 and 21.6 ± 7.9 cm/s in chamber 2. Prior to a test, the source container was filled with test solution and then placed at the center of the chamber bottom. The test start time was recorded as the chamber door closed. Air samples were collected onto Tenax TA sorbent tubes (Supelco) with mass flow controllers and analyzed by GC with a mass selective detector (6890/5973; Hewlett Packard) equipped with a 30 m DB624 column (0.25 mm i.d. × 1.4 μm film thickness). Samples collected on the sorbents were introduced into the GC by a multitube thermal desorption unit (ATD 400; Perkin Elmer).

## RESULTS

### *Summary of test parameters*

A total of 14 chamber tests were conducted, including one duplicate in each chamber. The test conditions are summarized in Table 2.

### *Time–concentration profiles*

The time–concentration profiles were strongly affected by the Henry's constants. For chloroform, which has the largest Henry's constant among the test compounds, the two chambers had almost identical results, indicating that the emissions were limited by the liquid phase mass transfer. In addition, the emission rates decreased significantly over time due to exhaustion of the source (Fig. 1). For phenol, which has the smallest Henry's constant among the test compounds, the difference between the two chambers was significant, indicating that the emissions were limited by the gas phase mass transfer (Fig. 2). The time–concentration profiles for the remaining compounds were between these two extreme cases.

### *Estimation of the overall liquid phase mass transfer coefficient ($K_{OL}$)*

The overall liquid phase mass transfer coefficient ($K_{OL}$) was estimated by fitting the following mass balance model (equations 8–10) to the chamber concentration data with $K_{OL}$ being the only unknown parameter.

$$V(dC_G/dt) = SK_{OL}(C_L - C_G/H) - QC_G \quad (8)$$

$$dW_L/dt = -SK_{OL}(C_L - C_G/H) \quad (9)$$

$$C_L = W_L/[V_L - (r_w t/\rho_w)] \quad (10)$$

where $V$ is the chamber volume ($m^3$), $t$ is the time (h), $Q$ is the air exchange flow rate ($m^3$/h), $W_L$ is the amount of test compound in the liquid (μg), $V_L$ is the initial volume of liquid ($m^3$), $r_w$ is the water evaporation rate (g/h) and $\rho_w$ is the density of water ($g/m^3$). Data fitting software SCIENTIST (MicroMath Scientific Software, Salt Lake City, UT) was used for the non-linear regression, and the initial conditions were $t = 0$, $C_G = 0$ and $W_L = C_{L0} \times V_L$, where $C_{L0}$ is the initial concentration in the liquid. The estimated $K_{OL}$ values and their associated standard errors for the non-linear regression are given in the last column of Table 2.

## AN EMPIRICAL MODEL FOR ESTIMATING $K_{OL}$ AND $K_{OG}$

### *Approach*

In order to use equations (1) and (2) as predictive models, one must know how to estimate the overall mass transfer coefficient for a given compound. The objective here is to develop a parameter estimation method for pollutant emissions from still aqueous solutions under indoor environmental conditions. The proposed model calculates the overall mass transfer coefficient ($K_{OL}$ or $K_{OG}$) in three steps: (i) calculate the gas phase mass transfer coefficient ($k_G$) from the Sherwood number; (ii) calculate the liquid phase mass transfer coefficient ($k_L$) from that for a reference compound; (iii) calculate the overall mass transfer coefficient from equation (3) or (4). Details are discussed below.

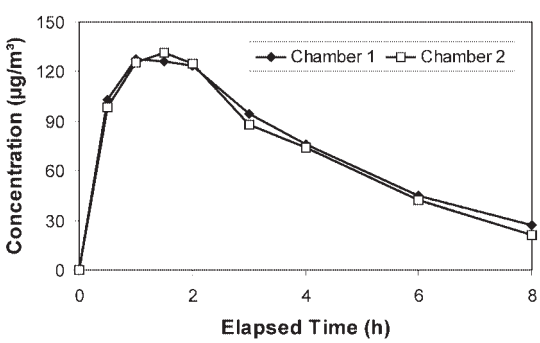



**Fig. 1.** Time–concentration profile for chloroform.

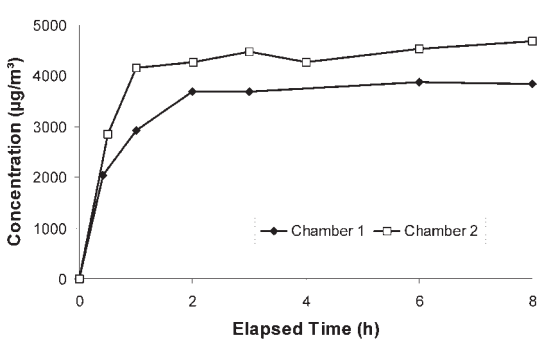



**Fig. 2.** Time–concentration profile for phenol.

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Table 2. Conditions of 14 chamber tests and estimated overall liquid phase mass transfer coefficients[a]

| Test no. | Chemical | Chamber ID[b] | Ach (per h) | $C_{L0}$ (mol/l) | $V_L$ (ml) | $T$ (°C) | RH (%) | | $r_w$ (g/h) | Estimated $K_{OL}$ (m/h) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Inlet | Outlet | | |
| 1 | Chloroform | 1 | 1.05 | $3.99 \times 10^{-6}$ | 98.3 | 23.3 ± 0.03 | 14.0 ± 0.10 | 62.0 ± 0.86 | 0.524 | $(5.68 \pm 0.47) \times 10^{-3}$ |
| 2 | Chloroform | 2 | 1.05 | $3.99 \times 10^{-6}$ | 98.1 | 23.5 ± 0.03 | 14.2 ± 0.12 | 69.7 ± 0.79 | 0.625 | $(5.60 \pm 0.52) \times 10^{-3}$ |
| 3 | Butyl acetate | 1 | 1.05 | $5.23 \times 10^{-5}$ | 96.7 | 23.4 ± 0.10 | 13.7 ± 0.13 | 60.3 ± 1.2 | 0.510 | $(5.17 \pm 0.27) \times 10^{-3}$ |
| 4 | Butyl acetate | 2 | 1.07 | $5.23 \times 10^{-5}$ | 97.4 | 23.5 ± 0.07 | 13.7 ± 0.09 | 69.8 ± 1.7 | 0.649 | $(5.00 \pm 0.26) \times 10^{-3}$ |
| 5 | Butyl acetate | 1 | 1.06 | $5.61 \times 10^{-5}$ | 95.8 | 23.3 ± 0.06 | 12.7 ± 0.13 | 57.8 ± 2.0 | 0.540 | $(4.02 \pm 0.26) \times 10^{-3}$ |
| 6 | Butyl acetate | 2 | 1.08 | $5.61 \times 10^{-5}$ | 99.5 | 23.5 ± 0.04 | 12.6 ± 0.15 | 68.8 ± 1.3 | 0.644 | $(4.41 \pm 0.29) \times 10^{-3}$ |
| 7 | Ethyl acetate | 1 | 1.05 | $7.54 \times 10^{-5}$ | 95.7 | 23.3 ± 0.03 | 14.0 ± 0.40 | 61.0 ± 0.89 | 0.555 | $(5.03 \pm 0.22) \times 10^{-3}$ |
| 8 | Ethyl acetate | 2 | 1.06 | $7.54 \times 10^{-5}$ | 98.6 | 23.5 ± 0.03 | 13.8 ± 0.25 | 69.4 ± 0.89 | 0.680 | $(5.28 \pm 0.26) \times 10^{-3}$ |
| 9 | 1-Butanol | 1 | 1.05 | $1.33 \times 10^{-3}$ | 92.6 | 23.4 ± 0.25 | 14.5 ± 0.17 | 58.8 ± 1/86 | 0.541 | $(1.44 \pm 0.06) \times 10^{-3}$ |
| 10 | 1-Butanol | 2 | 1.05 | $1.33 \times 10^{-3}$ | 96.3 | 23.6 ± 0.14 | 14.1 ± 0.15 | 71.3 ± 1.4 | 0.669 | $(1.52 \pm 0.10) \times 10^{-3}$ |
| 11 | 1-Propanol | 1 | 1.05 | $9.78 \times 10^{-3}$ | 101 | 23.3 ± 0.03 | 13.6 ± 0.15 | 59.6 ± 1.15 | 0.555 | $(1.33 \pm 0.05) \times 10^{-3}$ |
| 12 | 1-Propanol | 2 | 1.06 | $9.78 \times 10–^{3}$ | 98.0 | 23.5 ± 0.03 | 13.5 ± 0.10 | 69.0 ± 2.5 | 0.660 | $(1.85 \pm 0.09) \times 10^{-3}$ |
| 13 | Phenol | 1 | 1.05 | $5.65 \times 10–^{3}$ | 93.1 | 23.6 ± 0.30 | 14.7 ± 0.16 | 59.8 ± 1.94 | 0.565 | $(1.80 \pm 0.06) \times 10^{-4}$ |
| 14 | Phenol | 2 | 1.05 | $5.65 \times 10–^{3}$ | 93.3 | 23.7 ± 0.15 | 14.7 ± 0.19 | 69.4 ± 2.4 | 0.634 | $(2.68 \pm 0.11) \times 10^{-4}$ |

Ach, air exchange rate; $C_{L0}$, initial concentration in liquid; $V_L$, initial volume of liquid; $T$, temperature; RH, relative humidity; $r_w$, water evaporation rate.
[a]The test duration was 4 h for tests 3 and 4 and 8 h for the rest.
[b]The air speed was 12.6 ± 4.5 cm/s in chamber 1 and 21.6 ± 7.9 cm/s in chamber 2.

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*Estimation of gas phase mass transfer coefficient ($k_G$)*

Several methods have been developed to estimate the gas phase mass transfer coefficient in indoor environments. A brief review of these methods is given by Guo (2002). The method used here is based on the Sherwood number ($S_h$), which is a dimensionless number related to $k_G$ (equation 11) and can be correlated to Schmidt and Reynolds numbers ($S_c$ and $R_e$). A series of correlations have been developed between $S_h$, $S_c$ and $R_e$ (Bennet and Myers, 1982; White, 1988). For example, equation (12) applies to laminar flow conditions and is often used for indoor environments.

$$S_h = (k_G L)/D_a \quad (11)$$

where $L$ is the characteristic length (m), calculated from the square root of the source area, and $D_a$ is the diffusivity in air ($m^2$/h).

$$S_h = 0.664 S_c^{1/3} R_e^{1/2} \quad (12)$$

where $S_c$ and $R_e$ are defined by equations (13) and (14), respectively.

$$S_c = \mu/(\rho D_a) \quad (13)$$

$$R_e = (Lu\rho)/\mu \quad (14)$$

where $u$ is the air velocity (m/h), $\rho$ is the density of air ($g/m^3$) and $\mu$ is the viscosity of air (g/m/h). The accuracy of this method was evaluated by using the water evaporation data from the 14 chamber tests (column 10 in Table 2). The $k_G$ values for water evaporation were estimated from equation (15).

$$r_w = S k_G (C_{sw} - C_w) \quad (15)$$

where $r_w$ is the experimental water evaporation rate (g/h), $C_{sw}$ is the saturation concentration for water vapor at chamber temperature, converted from vapor pressure ($g/m^3$), and $C_w$ is the experimental water vapor concentration in the chamber, converted from relative humidity ($g/m^3$). As shown in Table 3, the calculated gas phase mass transfer coefficients agreed well with the experimental results.

*Estimation of liquid phase mass transfer coefficient ($k_L$)*

With the overall liquid phase mass transfer coefficient ($K_{OL}$) presented in Table 2, the gas phase mass transfer coefficient ($k_G$) calculated from the Sherwood number and Henry's constant ($H$) from Table 1, the liquid phase mass transfer coefficients ($k_L$) can be calculated from equation (3). This direct calculation approach worked well for compounds with dimensionless Henry's constants $>10^{-3}$. With smaller Henry's constants, however, the calculation failed (see column 4 in Table 4) due to error propagation: the calculation involves subtraction between two large numbers to yield a small number.

The authors then used a different method to estimate $k_L$. It has been reported that $k_L$ is proportional to

Table 3. Experimental and calculated gas phase mass transfer coefficients ($k_G$ ) for water evaporation from small pools

| Chamber | $k_G$ (m/h) | | Relative error (%) |
|---|---|---|---|
| | Experimental | Calculated (equation 11) | |
| 1 | 14.2 ± 0.92 ($n$ = 7) | 16.8 | 17 |
| 2 | 22.3 ± 0.88 ($n$ = 7) | 22.0 | –1.3 |

Table 4. Estimated liquid phase mass transfer coefficient ($k_L$) from experimental $K_{OL}$

| Test no. | Compound | Chamber | Estimated $k_L$ (m/h) | |
|---|---|---|---|---|
| | | | Direct from equation (3) | From equation (18) |
| 1 | Chloroform | 1 | $5.71 \times 10^{-3}$ | $5.91 \times 10^{-3}$ |
| 2 | Chloroform | 2 | $5.62 \times 10^{-3}$ | $5.91 \times 10^{-3}$ |
| 3 | Butyl acetate | 1 | $5.52 \times 10^{-3}$ | $5.00 \times 10^{-3}$ |
| 4 | Butyl acetate | 2 | $5.84 \times 10^{-3}$ | $5.00 \times 10^{-3}$ |
| 5 | Butyl acetate | 1 | $4.23 \times 10^{-3}$ | $5.00 \times 10^{-3}$ |
| 6 | Butyl acetate | 2 | $4.60 \times 10^{-3}$ | $5.00 \times 10^{-3}$ |
| 7 | Ethyl acetate | 1 | $5.68 \times 10^{-3}$ | $5.55 \times 10^{-3}$ |
| 8 | Ethyl acetate | 2 | $6.42 \times 10^{-3}$ | $5.55 \times 10^{-3}$ |
| 9 | 1-Butanol | 1 | $2.80 \times 10^{-3}$ | $5.63 \times 10^{-3}$ |
| 10 | 1-Butanol | 2 | $2.49 \times 10^{-3}$ | $5.63 \times 10^{-3}$ |
| 11 | 1-Propanol | 1 | $2.60 \times 10^{-3}$ | $6.04 \times 10^{-3}$ |
| 12 | 1-Propanol | 2 | $3.83 \times 10^{-3}$ | $6.04 \times 10^{-3}$ |
| 13 | Phenol | 1 | $-2.71 \times 10^{-4}$ | $5.63 \times 10^{-3}$ |
| 14 | Phenol | 2 | $-3.00 \times 10^{-4}$ | $5.63 \times 10^{-3}$ |

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the square root of the molecular diffusivity in water (Mackay and Yeun, 1983). Since the diffusivity can be readily calculated by existing methods (Hayduk and Laudie, 1974), the problem is reduced to selecting a reference compound and estimating its $k_L$. The liquid phase mass transfer coefficient for a given compound X can then be calculated from equation (16), in which oxygen was chosen as the reference compound. It should be pointed out that any compound can serve as the reference. The only reason to select oxygen here is for comparison with the literature values.

$$k_L(X) = k_L(O_2)\sqrt{\frac{D_L(X)}{D_L(O_2)}} \quad (16)$$

Substituting equation (16) into equation (3) yields:

$$k_L(O_2) = \frac{k_G H K_{OL}}{k_G H - K_{OL}}\sqrt{\frac{D_L(O_2)}{D_L(X)}} \quad (17)$$

A single value of $k_L(O_2)$ was estimated by applying equation (17) to the 14 experimental $K_{OL}$ values (Table 2). Other input data included $H$ and $D_L(X)$ from Table 1, $k_G$ from the Sherwood number and $D_L(O_2) = 1.07 \times 10^{-5}$ m$^2$/h at 23.5°C from the Hayduk and Laudie (1974) method. The non-linear regression yielded a $k_L(O_2)$ value of $(9.78 \pm 0.36) \times 10^{-3}$ m/h. This value is fairly close to the literature value of 0.0144 m/h for ambient water bodies suggested by Schwarzenbach *et al.* (1993). This agreement suggests that the area of the source does not affect $k_L$ if the water is still.

Substituting the values for $k_L(O_2)$ and $D_L(O_2)$ into equation (16) gives:

$$k_L(X) = 2.99\sqrt{D_L(X)} \quad (18)$$

where $k_L(X)$ and $D_L(X)$ are in m/h and m$^2$/h, respectively. Equation (18) can be used to estimate $k_L$ for any chemical emissions from still water. The estimated $k_L$ values for the test compounds are presented in the last column of Table 4.

*Calculation of $K_{OL}$*

Using $k_G$ from the Sherwood number and $k_L$ from equation (18), one can calculate $K_{OL}$ from equation (3). Figure 3 compares the calculated $K_{OL}$ with the experimental values. On average, the relative predictive error was 22.1%. In general, compounds with smaller Henry's constants tend to have greater relative errors. A complete example of estimating $K_{OL}$ is provided in the Appendix.

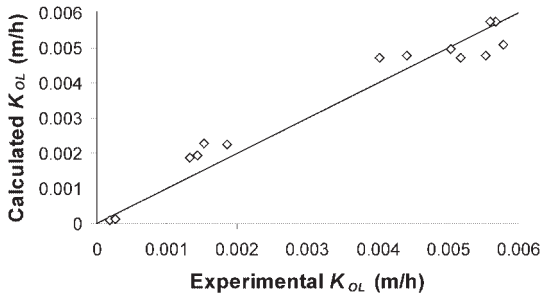



**Fig. 3.** Comparison between experimental and calculated overall liquid phase mass transfer coefficients. The solid line represents linearity.

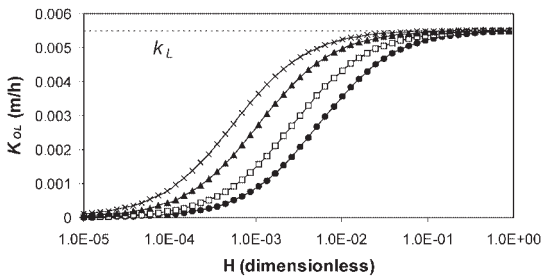



**Fig. 4.** Overall liquid phase mass transfer coefficient ($K_{OL}$) as a function of Henry's constant ($H$) and gas phase mass transfer coefficient ($k_G$). The curves from left to right are for $k_G$ = 1, 2, 5 and 10 m/h, respectively.

## DISCUSSION

Independent estimation of $k_G$ and $k_L$ allows one to study the effect of the Henry's constant on the overall mass transfer coefficient by using equation (3) or (4). Figure 4 shows $K_{OL}$ as a function of $H$ and $k_G$, assuming that the diffusivity in water is $3.6 \times 10^{-6}$ m$^2$/h, which is roughly the average for the test compounds. When the Henry's constant becomes large, all curves converge to a single value of $k_L$. The curves do not converge to a single value, however, when the Henry's constant becomes very small. Assuming that the gas phase mass transfer coefficient typically varies from 1 to 10 m/h in indoor environments, the $k_G/k_L$ ratio for still aqueous solutions would be in the range 180–1800. These values are significantly higher than the reported values (54–78) for a bathtub with a simulated person present (EPA, 2000).

As a practical matter, researchers often want to know under what conditions $K_{OL}$ can be approximated by either $k_L$ or $k_G$. There have been many discussions on this matter for the ambient environment (e.g. Munz and Roberts, 1989). In general, it depends on whether the gas or liquid phase mass transfer resistance is dominant in the overall mass transfer resistance ($1/K_{OL}$ or $1/K_{OL}$). Using the results of this work, Fig. 5 illustrates the contribution of the gas phase mass transfer resistance $1/(Hk_G)$ to $1/K_{OL}$

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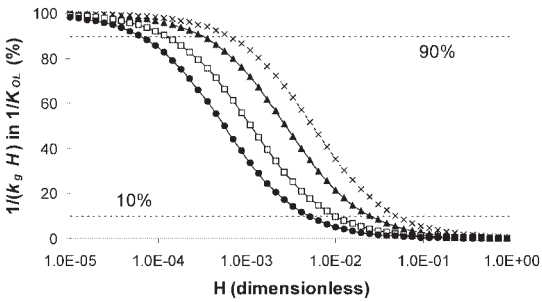



**Fig. 5.** Contribution of the gas phase mass transfer resistance $[1/(k_G H)]$ to the overall mass transfer resistance $(1/K_{OL})$. The curves from left to right are for $k_G$ = 10, 5, 2 and 1 m/h, respectively.

as a function of $H$ and $k_G$. For still water under indoor environmental conditions, the authors suggest that $K_{OL}$ be approximated by $k_L$ when $H > 10^{-1}$ and by $k_G$ when $H < 10^{-4}$, where $H$ is dimensionless.

Previous studies (for example, Schwarzenbach *et al.*, 1993) indicate that the depth of the water pool affects the liquid phase mass transfer coefficient. Thus, the applicability of equation (18) to liquid puddles and films is yet to be further evaluated. On the other hand, according to Schwarzenbach *et al.* (1993), the values of $k_L$ for still water imply a 'stagnant water film' of no greater than 200 μm. We therefore speculate that equation (18) can be applied to liquid puddles and films with a depth >200 μm.

## CONCLUSION

The emissions of six volatile organic compounds from pools of dilute aqueous solutions were tested under simulated indoor environmental conditions. These compounds cover a range of Henry's constant from $3.33 \times 10^{-7}$ to $3.67 \times 10^{-3}$ atm m$^3$/mol. The experimentally determined overall liquid phase mass transfer coefficient ($K_{OL}$) ranged from $2.68 \times 10^{-4}$ to $5.68 \times 10^{-3}$ m/h. Using these values, the liquid phase mass transfer coefficient ($k_L$) for still water was estimated to be $(9.78 \pm 0.36) \times 10^{-3}$ m/h for the reference compound ($O_2$). An empirical model was proposed to estimate $K_{OL}$ and $K_{OG}$ based on equations (3) and (4), respectively, with $k_L$ calculated from equation (18) and $k_G$ from the Sherwood number (equation 11). With this empirical model, one can use equations (1) and (2) as genuine predictive models for pollutant emissions from still aqueous solutions in indoor environments.

## APPENDIX. AN EXAMPLE OF USING THE PROPOSED EMPIRICAL MODEL

*Problem*

Estimate the overall liquid phase mass transfer coefficient ($K_{OL}$) for 1-hexanal emissions from a water pool, given the following parameters: molecular formula, $C_6H_{12}O$; Henry's constant, 0.0105 (dimensionless); pool diameter, 0.20 m; air speed in room, 15 cm/s (540 m/h); air and liquid temperature, 25°C. Additional parameters needed for the calculation are summarized in Table A1. All the values are at 25°C.

Step 1: Calculate Schmidt number using equation (13)

$$S_c = \mu/(\rho D_a) = 66.8/(1180 \times 0.0270) = 2.097$$

Step 2: Calculate Reynolds number using equation (14)

$$R_e = (Lu\rho)/\mu = (0.447 \times 540 \times 1180)/66.8 = 4264$$

Step 3: Calculate Sherwood number using equation (12)

$$S_h = 0.664 S_c^{1/3} R_e^{1/2} = 0.664 \times 2.097^{1/3} \times 4262^{1/2} = 55.5$$

Step 4: Calculate $k_G$ using equation (11)

$$k_G = (S_h D_a)/L = (55.5 \times 0.0270)/0.447 = 3.35 \text{ (m/h)}$$

Step 5: Calculate $k_L$ using equation (16)

$$k_L(Hx) = 2.99\sqrt{D_L(Hx)}$$

$$k_L(Hx) = 2.99\sqrt{2.96 \times 10^{-6}} = 5.14 \times 10^{-3} \text{ m/h}$$

Step 6: Calculate $K_{OL}$

Rearranging equation (3) yields

Table A1. Additional parameters needed to calculate $K_{OL}$ for 1-hexanal

| Parameter | Symbol | Value | Data source or method |
|---|---|---|---|
| Density of air | ρ | 1180 g/m$^3$ | Literature |
| Viscosity of air | μ | 66.8 g/h/m | Literature |
| Characteristic length of the pool | $L$ | 0.447 m | Square root of source area |
| Diffusivity in air for 1-hexanal | $D_a(Hx)$ | $2.70 \times 10^{-2}$ m$^2$/h | FSG method[a] |
| Diffusivity in water for 1-hexanal | $D_L(Hx)$ | $2.78 \times 10^{-6}$ m$^2$/h | Hayduk & Laudie method[b] |

[a]Fuller *et al.* (1966).
[b]Hayduk and Laudie (1974).

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$$K_{OL} = (k_L k_G H)/(k_L + k_G H)$$

$$K_{OL} = \frac{5.14 \times 10^{-3} \times 3.35 \times 0.0105}{5.14 \times 10^{-3} + 3.35 \times 0.0105} = 4.48 \times 10^{-3}\ \text{m/h}$$

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# Attachment 4
# Laboratory Analytical report for Tank T-103 Sample

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



# ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-34856-1
Client Project/Site: Model City Landfill: ATINF LEACH
Sampling Event: ATFINF LEACH, every 4 yrs(next 2013)

For:
CWM Chemical Services Inc
1550 Balmer Road
Model City, New York 14107

Attn: Jonathan Rizzo

Candace L. Fox

*Authorized for release by:*
*4/12/2013 3:38:36 PM*

Candace Fox
Project Manager II
candace.fox@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

*The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Sample Summary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 480-34856-1 | T103 | Water | 03/21/13 11:30 | 03/22/13 09:00 |
| 480-34856-2 | TB | Water | 03/21/13 00:00 | 03/22/13 09:00 |

## Qualifiers

### GC/MS VOA

| Qualifier | Qualifier Description |
|---|---|
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |
| * | LCS or LCSD exceeds the control limits |

### GC/MS VOA TICs

| Qualifier | Qualifier Description |
|---|---|
| J | Indicates an Estimated Value for TICs |
| N | Presumptive evidence of material. |
| T | Result is  a tentatively identified compound (TIC) and an estimated value. |

### GC/MS Semi VOA

| Qualifier | Qualifier Description |
|---|---|
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |
| * | LCS or LCSD exceeds the control limits |
| X | Surrogate is outside control limits |

### GC/MS Semi VOA TICs

| Qualifier | Qualifier Description |
|---|---|
| J | Indicates an Estimated Value for TICs |
| N | Presumptive evidence of material. |
| T | Result is  a tentatively identified compound (TIC) and an estimated value. |
| E | Result exceeded calibration range. |

### GC VOA

| Qualifier | Qualifier Description |
|---|---|
| X | Surrogate is outside control limits |

### GC Semi VOA

| Qualifier | Qualifier Description |
|---|---|
| X | Surrogate is outside control limits |
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

### Dioxin

| Qualifier | Qualifier Description |
|---|---|
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

### Metals

| Qualifier | Qualifier Description |
|---|---|
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |

## Glossary (Continued)

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

## Job ID: 480-34856-1

### Laboratory: TestAmerica Buffalo

**Narrative**

**Job Narrative**
**480-34856-1**

**Comments**
No additional comments.

**Receipt**
The samples were received on 3/22/2013 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.3º C and 4.2º C.

Except:
Client Id is T103 and the bottle lables say T101.

**GC/MS VOA**
Method(s) 8260B: The following samples were diluted to bring the concentration of target analytes within the calibration range: T103 (480-34856-1). Elevated reporting limits (RLs) are provided.

Method(s) 8260B: The continuing calibration verification (CCV) for Cyclohexanone associated with batch 109392 recovered above the upper control limit. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported.

Method(s) 8260B: The following sample(s) was diluted to bring the concentration of target analytes within the calibration range: T103 (480-34856-1). Elevated reporting limits (RLs) are provided.

Method(s) 8260B: The laboratory control sample (LCS) for batch 109805 exceeded control limits for the following analytes: methacrylonitrile. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

No other analytical or quality issues were noted.

**GC/MS Semi VOA**
Method(s) 8270C: The following sample was diluted due to abundance of target analytes: T103 (480-34856-1). As such, surrogate recoveries were reduced to a level in which they do not provide useful information. Elevated reporting limits (RLs) are provided.

Method(s) 8270C: The laboratory control sample (LCS) for batch 108882 exceeded control limits for the multiple analytes. These analytes have been identified as a poor performing analyte when analyzed using this method or the analyts were high in the LCS and not detected in the sample; therefore, re-extraction/re-analysis was not performed. These results have been reported and qualified.

Method(s) 8270C: The following sample was diluted due to abundance of target analytes: T103 (480-34856-1). As such, surrogate recoveries were reduced to a level in which they do not provied useful information. Elevated reporting limits (RLs) are provided.

Method(s) 8270C: Internal standard responses for the following CCVs exceeded the upper control limit: (CCV 480-110650/6), (CCV 480-110650/7). The assocated sample does not contain any analytes reported from these CCVs, therefore the data has been qualified and reported.

No other analytical or quality issues were noted.

**GC VOA**
Method(s) 8015B: The following sample was diluted due to the abundance of target analytes: T103 (480-34856-1). As such, surrogate recoveries are not reported or not representative, and elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

**GC Semi VOA**
Method(s) 608: The following samples were diluted due to the nature of the sample matrix: T103 (480-34856-1). As such, surrogate

## Job ID: 480-34856-1 (Continued)

### Laboratory: TestAmerica Buffalo (Continued)

recoveries are not representative, and elevated reporting limits (RLs) are provided.

Method(s) 608: The following sample was diluted due to the nature of the sample matrix : T103 (480-34856-1). As such, surrogate recoveries are not reported, and elevated reporting limits (RLs) are provided.

Method(s) 8151A: Due to the level of dilution required for the following sample, surrogate recoveries are not reported: T103 (480-34856-1).

No other analytical or quality issues were noted.

**Metals**

Method(s) 200.8: Sample T103 (480-34856-1) for ICP/MS metals analyzed by EPA Method 6020 required a dilution due to high concentrations of dissolved solids known to cause failure of routine method quality control (QC), such as internal standards outside of control limits. Samples that contain high levels of dissolved solids can cause significant signal suppression or enhancement. The analytical method recommends applying a dilution to correct for physical interferences of samples that contain greater than 2000 mg/L of total solids, as determined by performing a screening procedure.

Method(s) 200.8: Sample T103 (480-34856-1) had a negative instrument reading with an absolute value that was greater than the reporting limit for the analyte total selenium. Matrix interference is suspected. The sample was analyzed at a 500-fold dilution, to reduce the interference.

No other analytical or quality issues were noted.

**General Chemistry**

Method(s) SM 4500 S2 F: Due to the matrix, the initial volume(s) used for the following sample(s) deviated from the standard procedure: T103 (480-34856-1). The reporting limits (RLs) have been adjusted proportionately.

No other analytical or quality issues were noted.

**Organic Prep**

Method(s) 3510C: Due to the matrix, the following samples could not be concentrated to the final method required volume: T103 (480-34856-1). The reporting limits (RLs) are elevated proportionately.

Method(s) 3510C: During pH adjustment, the following sample required 20 mL of base to reach the desired pH: T103 (480-34856-1). Most samples take less than 10 mL to reach the desired range.

Method(s) 3510C: After hex-exchanging the sample, it would not concentrate down to the required volume. The sample concentrated to about 1.5mL's then was brought up to 10mL's with hexane.

Method(s) 3510C: The following samples required a Florisil clean-up, via EPA Method3620C, to reduce matrix interferences: T103 (480-34856-1).

Method(s) 8151A: During pH adjustment, the following sample required 20mL of base and 15 mL of acid to reach the desired pH: T103 (480-34856-1).

Method(s) 8151A: The following sample formed emulsions during the extraction procedure: T103 (480-34856-1). The emulsions were broken up using the centrifuge.

No other analytical or quality issues were noted.

**Dioxin Prep**

480-34856-A-1 had emulsions issues, removed by mechanical means.

No other analytical or quality issues were noted.

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

**Client Sample ID: T103**
**Date Collected: 03/21/13 11:30**
**Date Received: 03/22/13 09:00**

**Lab Sample ID: 480-34856-1**
**Matrix: Water**

## Method: 8260B - Volatile Organic Compounds (GC/MS)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 100 | 35 | ug/L | | | 03/29/13 00:02 | 100 |
| **1,1,1-Trichloroethane** | **3900** | | 100 | 82 | ug/L | | | 03/29/13 00:02 | 100 |
| **1,1,2-Trichloro-1,2,2-trichfluoroethane** | **39** | **J** | 100 | 31 | ug/L | | | 03/29/13 00:02 | 100 |
| **1,1,2-Trichloroethane** | **4800** | | 100 | 23 | ug/L | | | 03/29/13 00:02 | 100 |
| **1,1-Dichloroethane** | **2700** | | 100 | 38 | ug/L | | | 03/29/13 00:02 | 100 |
| **1,1-Dichloroethene** | **410** | | 100 | 29 | ug/L | | | 03/29/13 00:02 | 100 |
| 1,2,3-Trichloropropane | ND | | 100 | 89 | ug/L | | | 03/29/13 00:02 | 100 |
| 1,2-Dibromo-3-Chloropropane | ND | | 100 | 39 | ug/L | | | 03/29/13 00:02 | 100 |
| **1,2-Dibromoethane (EDB)** | **560** | | 100 | 73 | ug/L | | | 03/29/13 00:02 | 100 |
| **1,2-Dichloroethane** | **6900** | | 100 | 21 | ug/L | | | 03/29/13 00:02 | 100 |
| 1,2-Dichloropropane | ND | | 100 | 72 | ug/L | | | 03/29/13 00:02 | 100 |
| **1,4-Dioxane** | **95000** | | 4000 | 930 | ug/L | | | 03/29/13 00:02 | 100 |
| **Acetonitrile** | **6400** | | 4000 | 2600 | ug/L | | | 03/29/13 00:02 | 100 |
| Acrolein | ND | | 2000 | 1800 | ug/L | | | 03/29/13 00:02 | 100 |
| **Acrylonitrile** | **160** | **J** | 500 | 83 | ug/L | | | 03/29/13 00:02 | 100 |
| Allyl chloride | ND | | 100 | 44 | ug/L | | | 03/29/13 00:02 | 100 |
| **Benzene** | **920** | | 100 | 41 | ug/L | | | 03/29/13 00:02 | 100 |
| Bromodichloromethane | ND | | 100 | 39 | ug/L | | | 03/29/13 00:02 | 100 |
| Bromoform | ND | | 100 | 26 | ug/L | | | 03/29/13 00:02 | 100 |
| Bromomethane | ND | | 100 | 69 | ug/L | | | 03/29/13 00:02 | 100 |
| **Carbon disulfide** | **27** | **J** | 100 | 19 | ug/L | | | 03/29/13 00:02 | 100 |
| Carbon tetrachloride | ND | | 100 | 27 | ug/L | | | 03/29/13 00:02 | 100 |
| **Chlorobenzene** | **1000** | | 100 | 75 | ug/L | | | 03/29/13 00:02 | 100 |
| **Chloroethane** | **110** | | 100 | 32 | ug/L | | | 03/29/13 00:02 | 100 |
| **Chloroform** | **7800** | | 100 | 34 | ug/L | | | 03/29/13 00:02 | 100 |
| **Chloromethane** | **84** | **J** | 100 | 35 | ug/L | | | 03/29/13 00:02 | 100 |
| 1,3-Butadiene, 2-chloro- | ND | | 100 | 49 | ug/L | | | 03/29/13 00:02 | 100 |
| cis-1,3-Dichloropropene | ND | | 100 | 36 | ug/L | | | 03/29/13 00:02 | 100 |
| Dibromochloromethane | ND | | 100 | 32 | ug/L | | | 03/29/13 00:02 | 100 |
| **Dibromomethane** | **3500** | | 100 | 41 | ug/L | | | 03/29/13 00:02 | 100 |
| Dichlorodifluoromethane | ND | | 100 | 68 | ug/L | | | 03/29/13 00:02 | 100 |
| Ethyl acetate | ND | | 100 | 66 | ug/L | | | 03/29/13 00:02 | 100 |
| **Ethyl ether** | **9400** | | 500 | 72 | ug/L | | | 03/29/13 00:02 | 100 |
| Ethyl methacrylate | ND | | 100 | 59 | ug/L | | | 03/29/13 00:02 | 100 |
| **Ethylbenzene** | **170** | | 100 | 74 | ug/L | | | 03/29/13 00:02 | 100 |
| Iodomethane | ND | | 100 | 30 | ug/L | | | 03/29/13 00:02 | 100 |
| **Isobutanol** | **37000** | | 4000 | 2000 | ug/L | | | 03/29/13 00:02 | 100 |
| Methacrylonitrile | ND | * | 500 | 69 | ug/L | | | 03/29/13 00:02 | 100 |
| Methyl methacrylate | ND | | 100 | 61 | ug/L | | | 03/29/13 00:02 | 100 |
| Propionitrile | ND | | 1000 | 580 | ug/L | | | 03/29/13 00:02 | 100 |
| **Tetrachloroethene** | **500** | | 100 | 36 | ug/L | | | 03/29/13 00:02 | 100 |
| **Toluene** | **4800** | | 100 | 51 | ug/L | | | 03/29/13 00:02 | 100 |
| **trans-1,2-Dichloroethene** | **300** | | 100 | 90 | ug/L | | | 03/29/13 00:02 | 100 |
| trans-1,3-Dichloropropene | ND | | 100 | 37 | ug/L | | | 03/29/13 00:02 | 100 |
| Trichlorofluoromethane | ND | | 100 | 88 | ug/L | | | 03/29/13 00:02 | 100 |
| Vinyl chloride | ND | | 100 | 90 | ug/L | | | 03/29/13 00:02 | 100 |
| **Xylenes, Total** | **820** | | 200 | 66 | ug/L | | | 03/29/13 00:02 | 100 |
| **Cyclohexanone** | **2100** | | 1000 | 520 | ug/L | | | 03/29/13 00:02 | 100 |

**Client Sample ID: T103**
**Date Collected: 03/21/13 11:30**
**Date Received: 03/22/13 09:00**

**Lab Sample ID: 480-34856-1**
**Matrix: Water**

| Tentatively Identified Compound | Est. Result | Qualifier | Unit | D | RT | CAS No. | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2-Pentanol, 4-methyl- | 1000 | T J N | ug/L | | 5.86 | 108-11-2 | | 03/29/13 00:02 | 100 |
| Acetic acid, butyl ester | 1500 | T J N | ug/L | | 6.26 | 123-86-4 | | 03/29/13 00:02 | 100 |

| Surrogate | %Recovery | Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 86 | | 66 - 137 | | 03/29/13 00:02 | 100 |
| 4-Bromofluorobenzene (Surr) | 104 | | 73 - 120 | | 03/29/13 00:02 | 100 |
| Toluene-d8 (Surr) | 94 | | 71 - 126 | | 03/29/13 00:02 | 100 |

## Method: 8260B - Volatile Organic Compounds (GC/MS) - DL

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **1,1,2,2-Tetrachloroethane** | **12000** | | 5000 | 1100 | ug/L | | | 03/27/13 12:49 | 5000 |
| **2-Butanone (MEK)** | **550000** | | 50000 | 6600 | ug/L | | | 03/27/13 12:49 | 5000 |
| **4-Methyl-2-pentanone (MIBK)** | **79000** | | 25000 | 11000 | ug/L | | | 03/27/13 12:49 | 5000 |
| **Acetone** | **740000** | | 50000 | 15000 | ug/L | | | 03/27/13 12:49 | 5000 |
| **Methylene Chloride** | **220000** | | 5000 | 2200 | ug/L | | | 03/27/13 12:49 | 5000 |
| **Trichloroethene** | **13000** | | 5000 | 2300 | ug/L | | | 03/27/13 12:49 | 5000 |

| Tentatively Identified Compound | Est. Result | Qualifier | Unit | D | RT | CAS No. | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Methylene Chloride | 17000 | T J N | ug/L | | 2.80 | 75-9-2 | | 03/27/13 12:49 | 5000 |

| Surrogate | %Recovery | Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 97 | | 66 - 137 | | 03/27/13 12:49 | 5000 |
| 4-Bromofluorobenzene (Surr) | 113 | | 73 - 120 | | 03/27/13 12:49 | 5000 |
| Toluene-d8 (Surr) | 120 | | 71 - 126 | | 03/27/13 12:49 | 5000 |

## Method: 8270C - Semivolatile Organic Compounds (GC/MS)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **1,2,4,5-Tetrachlorobenzene** | **210** | **J** | 1300 | 150 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 1,2,4-Trichlorobenzene | ND | | 2500 | 110 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 1,2-Dichlorobenzene | ND | | 2500 | 100 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 1,2-Diphenylhydrazine | ND | | 2500 | 88 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 1,3-Dichlorobenzene | ND | | 2500 | 120 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 1,4-Dichlorobenzene | ND | | 2500 | 120 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 1,4-Dinitrobenzene | ND | * | 2500 | 180 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2,2'-Oxybis(1-chloropropane) | ND | | 1300 | 130 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2,3,4,6-Tetrachlorophenol | ND | * | 1300 | 80 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2,4,5-Trichlorophenol | ND | | 1300 | 120 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2,4,6-Trichlorophenol | ND | * | 1300 | 150 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **2,4-Dichlorophenol** | **1300** | ***** | 1300 | 130 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **2,4-Dimethylphenol** | **2600** | | 1300 | 130 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2,4-Dinitrophenol | ND | | 2500 | 560 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2,4-Dinitrotoluene | ND | | 1300 | 110 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2,6-Dichlorophenol | ND | | 2500 | 120 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2,6-Dinitrotoluene | ND | * | 1300 | 100 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2-Acetylaminofluorene | ND | | 2500 | 580 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2-Chloronaphthalene | ND | | 1300 | 120 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **2-Chlorophenol** | **230** | **J** | 1300 | 130 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **2-Methylphenol** | **2200** | | 1300 | 100 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 2-Naphthylamine | ND | | 2500 | 630 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 3-Methylcholanthrene | ND | | 2500 | 630 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **3-Methylphenol** | **17000** | | 2500 | 100 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |

**Client Sample ID: T103**
**Date Collected: 03/21/13 11:30**
**Date Received: 03/22/13 09:00**

**Lab Sample ID: 480-34856-1**
**Matrix: Water**

**Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 4,6-Dinitro-2-methylphenol | ND | | 2500 | 550 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 4-Aminobiphenyl | ND | | 2500 | 200 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 4-Bromophenyl phenyl ether | ND | | 1300 | 110 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 4-Chloro-3-methylphenol | ND | * | 1300 | 110 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **4-Chloroaniline** | **3000** | | 1300 | 150 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **4-Methylphenol** | **17000** | | 2500 | 90 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 4-Nitroaniline | ND | * | 2500 | 63 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 4-Nitrophenol | ND | | 2500 | 380 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| 5-Nitro-o-toluidine | ND | | 2500 | 160 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Acenaphthene | ND | | 1300 | 100 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Acenaphthylene | ND | | 1300 | 95 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **Acetophenone** | **3400** | | 1300 | 140 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **Aniline** | **2200** | **J** | 2500 | 150 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Anthracene | ND | | 1300 | 70 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Aramite | ND | | 5000 | 400 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Benzo[a]anthracene | ND | | 1300 | 90 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Benzo[a]pyrene | ND | | 1300 | 120 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Benzo[b]fluoranthene | ND | * | 1300 | 85 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Benzo[g,h,i]perylene | ND | | 1300 | 88 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Benzo[k]fluoranthene | ND | | 1300 | 180 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Bis(2-chloroethoxy)methane | ND | | 1300 | 88 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Bis(2-chloroethyl)ether | ND | | 1300 | 100 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Bis(2-ethylhexyl) phthalate | ND | | 1300 | 450 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Butyl benzyl phthalate | ND | | 1300 | 110 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Chlorobenzilate | ND | | 5000 | 170 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Chrysene | ND | * | 1300 | 83 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Dibenz[a,h]anthracene | ND | | 1300 | 110 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Dibenzo[a,e]pyrene | ND | | 2500 | 380 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **Diethyl phthalate** | **270** | **J** | 1300 | 55 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **Dimethyl phthalate** | **280** | **J** | 1300 | 90 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Di-n-butyl phthalate | ND | | 1300 | 78 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Di-n-octyl phthalate | ND | | 1300 | 120 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Dinoseb | ND | | 2500 | 740 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Diphenylamine | ND | | 2500 | 210 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Disulfoton | ND | | 2500 | 110 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Famphur | ND | | 10000 | 480 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Fluoranthene | ND | | 1300 | 100 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Fluorene | ND | | 1300 | 90 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Hexachlorobenzene | ND | * | 1300 | 130 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Hexachlorobutadiene | ND | | 1300 | 170 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Hexachlorocyclopentadiene | ND | | 1300 | 150 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Hexachloroethane | ND | | 1300 | 150 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Hexachloropropene | ND | | 2500 | 630 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Indeno[1,2,3-cd]pyrene | ND | | 1300 | 120 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Isodrin | ND | | 2500 | 45 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Isosafrole | ND | | 2500 | 150 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Kepone | ND | | 13000 | 450 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Methapyrilene | ND | | 13000 | 450 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Methyl methanesulfonate | ND | | 2500 | 630 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |

**Client Sample ID: T103**
**Date Collected: 03/21/13 11:30**
**Date Received: 03/22/13 09:00**

**Lab Sample ID: 480-34856-1**
**Matrix: Water**

## Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Methyl parathion | ND | | 2500 | 93 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Naphthalene | ND | | 1300 | 190 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Nitrobenzene | ND | | 1300 | 73 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| N-Nitrosodiethylamine | ND | | 2500 | 90 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| N-Nitrosodimethylamine | ND | | 2500 | 550 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| N-Nitrosodi-n-butylamine | ND | | 2500 | 150 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| N-Nitrosodi-n-propylamine | ND | * | 1300 | 140 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| N-Nitrosodiphenylamine | ND | * | 1300 | 130 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| N-Nitrosomethylethylamine | ND | | 2500 | 630 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| N-Nitrosomorpholine | ND | | 2500 | 630 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| N-Nitrosopiperidine | ND | | 2500 | 630 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| N-Nitrosopyrrolidine | ND | | 2500 | 630 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Parathion | ND | | 2500 | 160 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **Pentachlorobenzene** | **300** | **J** | 2500 | 130 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Pentachloronitrobenzene | ND | | 2500 | 630 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Pentachlorophenol | ND | | 2500 | 550 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Phenacetin | ND | | 2500 | 150 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Phenanthrene | ND | | 1300 | 110 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Phorate | ND | | 2500 | 130 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Phthalic anhydride | ND | | 130000 | 14000 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Pronamide | ND | | 2500 | 630 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Pyrene | ND | | 1300 | 85 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| **Pyridine** | **4600** | **J** | 6300 | 100 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |
| Safrole | ND | | 2500 | 120 | ug/L | | 03/23/13 07:29 | 04/02/13 16:35 | 50 |

| *Tentatively Identified Compound* | *Est. Result* | *Qualifier* | *Unit* | *D* | *RT* | *CAS No.* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|---|---|---|
| *1,4-Dioxane* | *23000* | | *ug/L* | | *2.48* | *123-91-1* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Acetamide, N,N-dimethyl-* | *62000* | *T J N* | *ug/L* | | *2.98* | *127-19-5* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Ethanol, 2-butoxy-* | *97000* | *T J N* | *ug/L* | | *3.11* | *111-76-2* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Benzyl alcohol* | *13000* | | *ug/L* | | *3.68* | *100-51-6* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Benzoic Acid* | *32000* | *T J N* | *ug/L* | | *4.17* | *65-85-0* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Benzoic acid* | *290000* | *E* | *ug/L* | | *4.25* | *65-85-0* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Phenol, 3-(1-methylethyl)-* | *13000* | *T J N* | *ug/L* | | *4.41* | *618-45-1* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Triacetin* | *9300* | *T J N* | *ug/L* | | *4.76* | *102-76-1* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Benzoic acid, 4-chloro-* | *8900* | *T J N* | *ug/L* | | *4.82* | *74-11-3* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Benzoic acid, 2-chloro-* | *13000* | *T J N* | *ug/L* | | *4.96* | *118-91-2* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *2,4,6-Tribromophenol* | *2127* | *X* | *52 - 132* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Nitrobenzene-d5* | *5849* | *X* | *46 - 120* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *Phenol-d5* | *0* | *X* | *16 - 120* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *p-Terphenyl-d14* | *0* | *X* | *67 - 150* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *2-Fluorobiphenyl* | *89* | | *48 - 120* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |
| *2-Fluorophenol* | *0* | *X* | *20 - 120* | *03/23/13 07:29* | *04/02/13 16:35* | *50* |

## Method: 8270C - Semivolatile Organic Compounds (GC/MS) - DL

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Phenol** | **140000** | | 13000 | 980 | ug/L | | 03/23/13 07:29 | 04/03/13 13:19 | 500 |

**Client Sample ID: T103**
**Date Collected: 03/21/13 11:30**
**Date Received: 03/22/13 09:00**

**Lab Sample ID: 480-34856-1**
**Matrix: Water**

| Tentatively Identified Compound | Est. Result | Qualifier | Unit | D | RT | CAS No. | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Acetamide, N,N-dimethyl- | 58000 | T J N | ug/L | | 2.98 | 127-19-5 | 03/23/13 07:29 | 04/03/13 13:19 | 500 |
| Ethanol, 2-butoxy- | 100000 | T J N | ug/L | | 3.12 | 111-76-2 | 03/23/13 07:29 | 04/03/13 13:19 | 500 |

| Surrogate | %Recovery | Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | 0 | X | 52 - 132 | 03/23/13 07:29 | 04/03/13 13:19 | 500 |
| Nitrobenzene-d5 | 0 | X | 46 - 120 | 03/23/13 07:29 | 04/03/13 13:19 | 500 |
| Phenol-d5 | 0 | X | 16 - 120 | 03/23/13 07:29 | 04/03/13 13:19 | 500 |
| p-Terphenyl-d14 | 0 | X | 67 - 150 | 03/23/13 07:29 | 04/03/13 13:19 | 500 |
| 2-Fluorobiphenyl | 0 | X | 48 - 120 | 03/23/13 07:29 | 04/03/13 13:19 | 500 |
| 2-Fluorophenol | 0 | X | 20 - 120 | 03/23/13 07:29 | 04/03/13 13:19 | 500 |

## Method: 8015B - Nonhalogenated Organic Compounds - Direct Injection (GC)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Methanol** | **970000** | | 100000 | 41000 | ug/L | | | 03/27/13 09:14 | 100 |
| **Butyl alcohol, n-** | **290000** | | 100000 | 40000 | ug/L | | | 03/27/13 09:14 | 100 |

| Surrogate | %Recovery | Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 2-Hexanone | 0 | X | 63 - 124 | | 03/27/13 09:14 | 100 |

## Method: 608 - Organochlorine Pesticides in Water

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2,4'-DDD | ND | | 4.6 | 0.58 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| 2,4'-DDE | ND | | 4.6 | 2.5 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| 2,4'-DDT | ND | | 4.6 | 0.84 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| **4,4'-DDD** | **2.6** | **J** | 4.6 | 0.85 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| 4,4'-DDE | ND | | 4.6 | 1.1 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| **4,4'-DDT** | **2.5** | **J** | 4.6 | 1.0 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Aldrin | ND | | 4.6 | 0.61 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| **alpha-BHC** | **6.2** | | 4.6 | 0.61 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| **beta-BHC** | **13** | | 4.6 | 2.3 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Chlordane | ND | | 46 | 27 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| **delta-BHC** | **14** | | 4.6 | 0.93 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Dieldrin | ND | | 4.6 | 0.91 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Endosulfan I | ND | | 4.6 | 1.0 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Endosulfan II | ND | | 4.6 | 1.1 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Endosulfan sulfate | ND | | 4.6 | 1.5 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| **Endrin** | **1.4** | **J** | 4.6 | 1.3 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Endrin aldehyde | ND | | 4.6 | 1.5 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| **gamma-BHC (Lindane)** | **14** | | 4.6 | 0.56 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Heptachlor | ND | | 4.6 | 0.79 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Heptachlor epoxide | ND | | 4.6 | 0.49 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Methoxychlor | ND | | 4.6 | 1.3 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Toxaphene | ND | | 46 | 11 | ug/L | | 03/25/13 19:30 | 03/26/13 14:24 | 100 |

| Surrogate | %Recovery | Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| DCB Decachlorobiphenyl | 0 | X | 15 - 125 | 03/25/13 19:30 | 03/26/13 14:24 | 100 |
| Tetrachloro-m-xylene | 0 | X | 36 - 121 | 03/25/13 19:30 | 03/26/13 14:24 | 100 |

## Method: 608 - Polychlorinated Biphenyls (PCBs) (GC)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Aroclor 1016 | ND | | 28 | 18 | ug/L | | 03/23/13 07:40 | 03/26/13 03:14 | 500 |

**Client Sample ID: T103**
**Date Collected: 03/21/13 11:30**
**Date Received: 03/22/13 09:00**

**Lab Sample ID: 480-34856-1**
**Matrix: Water**

## Method: 608 - Polychlorinated Biphenyls (PCBs) (GC) (Continued)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Aroclor 1221 | ND | | 28 | 18 | ug/L | | 03/23/13 07:40 | 03/26/13 03:14 | 500 |
| Aroclor 1232 | ND | | 28 | 18 | ug/L | | 03/23/13 07:40 | 03/26/13 03:14 | 500 |
| Aroclor 1242 | ND | | 28 | 18 | ug/L | | 03/23/13 07:40 | 03/26/13 03:14 | 500 |
| Aroclor 1248 | ND | | 28 | 18 | ug/L | | 03/23/13 07:40 | 03/26/13 03:14 | 500 |
| Aroclor 1254 | ND | | 28 | 14 | ug/L | | 03/23/13 07:40 | 03/26/13 03:14 | 500 |
| Aroclor 1260 | ND | | 28 | 14 | ug/L | | 03/23/13 07:40 | 03/26/13 03:14 | 500 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *DCB Decachlorobiphenyl* | *0* | *X* | *10 - 158* | *03/23/13 07:40* | *03/26/13 03:14* | *500* |
| *Tetrachloro-m-xylene* | *0* | *X* | *18 - 146* | *03/23/13 07:40* | *03/26/13 03:14* | *500* |

## Method: 8151A - Herbicides (GC)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2,4,5-T | ND | | 93 | 28 | ug/L | | 03/25/13 14:24 | 03/28/13 17:02 | 200 |
| Silvex (2,4,5-TP) | ND | | 93 | 67 | ug/L | | 03/25/13 14:24 | 03/28/13 17:02 | 200 |
| **2,4-D** | **1300** | | 93 | 74 | ug/L | | 03/25/13 14:24 | 03/28/13 17:02 | 200 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *2,4-Dichlorophenylacetic acid* | *0* | *X* | *32 - 132* | *03/25/13 14:24* | *03/28/13 17:02* | *200* |

## Method: 8280A - Dioxins and Furans (HRGC/LRMS)

| Analyte | Result | Qualifier | RL | EDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin** | **2.4** | **J** | 24 | 0.14 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | ND | | 24 | 0.12 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran | ND | | 24 | 0.14 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| 2,3,7,8-TCDD | ND | | 9.5 | 0.19 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| 2,3,7,8-TCDF | ND | | 9.5 | 0.12 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| **OCDD** | **1.5** | **J** | 47 | 0.19 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| **OCDF** | **1.3** | **J** | 47 | 0.17 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| Total HxCDD | ND | | 24 | 0.0095 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| Total HxCDF | ND | | 24 | 0.0095 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| Total PeCDD | ND | | 24 | 0.0095 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| Total PeCDF | ND | | 24 | 0.0095 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| Total TCDD | ND | | 9.5 | 0.19 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |
| Total TCDF | ND | | 9.5 | 0.12 | ng/L | | 04/04/13 11:18 | 04/05/13 21:52 | 1 |

| *Isotope Dilution* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C-1,2,3,6,7,8-HxCDD* | *58* | | *25 - 150* | *04/04/13 11:18* | *04/05/13 21:52* | *1* |
| *13C-2,3,7,8-TCDD* | *60* | | *25 - 150* | *04/04/13 11:18* | *04/05/13 21:52* | *1* |
| *13C-1,2,3,4,6,7,8-HpCDF* | *58* | | *25 - 150* | *04/04/13 11:18* | *04/05/13 21:52* | *1* |
| *13C-2,3,7,8-TCDF* | *60* | | *25 - 150* | *04/04/13 11:18* | *04/05/13 21:52* | *1* |
| *13C-OCDD* | *56* | | *25 - 150* | *04/04/13 11:18* | *04/05/13 21:52* | *1* |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *37Cl4-2,3,7,8-TCDD* | *92* | | *25 - 150* | *04/04/13 11:18* | *04/05/13 21:52* | *1* |

## Method: 200.7 Rev 4.4 - Metals (ICP)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Antimony** | **0.13** | **J** | 0.30 | 0.0068 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

**Client Sample ID: T103**
**Date Collected: 03/21/13 11:30**
**Date Received: 03/22/13 09:00**

**Lab Sample ID: 480-34856-1**
**Matrix: Water**

### Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 0.36 | | 0.010 | 0.0056 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |
| Barium | 0.14 | J | 0.20 | 0.00070 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |
| Beryllium | ND | | 0.0050 | 0.00030 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |
| Cadmium | 0.021 | | 0.0050 | 0.00050 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |
| Chromium | 0.099 | | 0.010 | 0.0010 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |
| Lead | 0.047 | | 0.0050 | 0.0030 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |
| Nickel | 4.1 | | 0.040 | 0.0013 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |
| Selenium | 1.0 | | 0.015 | 0.0087 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |
| Silver | 0.023 | J | 0.025 | 0.0017 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |
| Vanadium | 0.0096 | J | 0.050 | 0.0015 | mg/L | | 03/23/13 10:15 | 03/25/13 16:03 | 1 |

### Method: 200.8 - Metals (ICP/MS)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | ND | | 2.5 | 0.22 | mg/L | | 03/23/13 11:40 | 04/03/13 04:00 | 500 |
| Thallium | ND | | 0.010 | 0.000080 | mg/L | | 03/23/13 11:40 | 03/31/13 03:09 | 10 |

### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Volatile Residue | 10100 | | 10.0 | 4.0 | mg/L | | | 03/22/13 23:29 | 1 |
| Total Cyanide | 0.090 | | 0.020 | 0.0050 | mg/L | | 03/26/13 12:50 | 03/27/13 00:24 | 1 |
| Cyanide, Weak Acid Dissociable | 0.096 | | 0.010 | 0.0060 | mg/L | | 03/26/13 12:50 | 03/27/13 00:23 | 1 |
| Fluoride | 6.4 | | 0.50 | 0.085 | mg/L | | | 03/28/13 04:37 | 5 |
| Sulfide | 5.6 | | 2.0 | 1.3 | mg/L | | | 03/23/13 12:33 | 1 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

**Client Sample ID: TB**
**Date Collected: 03/21/13 00:00**
**Date Received: 03/22/13 09:00**

**Lab Sample ID: 480-34856-2**
**Matrix: Water**

**Method: 8260B - Volatile Organic Compounds (GC/MS)**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 1.0 | 0.35 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,1,1-Trichloroethane | ND | | 1.0 | 0.82 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | 1.0 | 0.21 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,1,2-Trichloro-1,2,2-trichfluoroethane | ND | | 1.0 | 0.31 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,1,2-Trichloroethane | ND | | 1.0 | 0.23 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,1-Dichloroethane | ND | | 1.0 | 0.38 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,1-Dichloroethene | ND | | 1.0 | 0.29 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,2,3-Trichloropropane | ND | | 1.0 | 0.89 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,2-Dibromo-3-Chloropropane | ND | | 1.0 | 0.39 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,2-Dibromoethane (EDB) | ND | | 1.0 | 0.73 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,2-Dichloroethane | ND | | 1.0 | 0.21 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,2-Dichloropropane | ND | | 1.0 | 0.72 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,4-Dioxane | ND | | 40 | 9.3 | ug/L | | | 03/27/13 13:11 | 1 |
| 2-Butanone (MEK) | ND | | 10 | 1.3 | ug/L | | | 03/27/13 13:11 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 5.0 | 2.1 | ug/L | | | 03/27/13 13:11 | 1 |
| Acetone | ND | | 10 | 3.0 | ug/L | | | 03/27/13 13:11 | 1 |
| Acetonitrile | ND | | 40 | 26 | ug/L | | | 03/27/13 13:11 | 1 |
| Acrolein | ND | | 20 | 18 | ug/L | | | 03/27/13 13:11 | 1 |
| Acrylonitrile | ND | | 5.0 | 0.83 | ug/L | | | 03/27/13 13:11 | 1 |
| Allyl chloride | ND | | 1.0 | 0.44 | ug/L | | | 03/27/13 13:11 | 1 |
| Benzene | ND | | 1.0 | 0.41 | ug/L | | | 03/27/13 13:11 | 1 |
| Bromodichloromethane | ND | | 1.0 | 0.39 | ug/L | | | 03/27/13 13:11 | 1 |
| Bromoform | ND | | 1.0 | 0.26 | ug/L | | | 03/27/13 13:11 | 1 |
| Bromomethane | ND | | 1.0 | 0.69 | ug/L | | | 03/27/13 13:11 | 1 |
| Carbon disulfide | ND | | 1.0 | 0.19 | ug/L | | | 03/27/13 13:11 | 1 |
| Carbon tetrachloride | ND | | 1.0 | 0.27 | ug/L | | | 03/27/13 13:11 | 1 |
| Chlorobenzene | ND | | 1.0 | 0.75 | ug/L | | | 03/27/13 13:11 | 1 |
| Chloroethane | ND | | 1.0 | 0.32 | ug/L | | | 03/27/13 13:11 | 1 |
| Chloroform | ND | | 1.0 | 0.34 | ug/L | | | 03/27/13 13:11 | 1 |
| Chloromethane | ND | | 1.0 | 0.35 | ug/L | | | 03/27/13 13:11 | 1 |
| 1,3-Butadiene, 2-chloro- | ND | | 1.0 | 0.49 | ug/L | | | 03/27/13 13:11 | 1 |
| cis-1,3-Dichloropropene | ND | | 1.0 | 0.36 | ug/L | | | 03/27/13 13:11 | 1 |
| Dibromochloromethane | ND | | 1.0 | 0.32 | ug/L | | | 03/27/13 13:11 | 1 |
| Dibromomethane | ND | | 1.0 | 0.41 | ug/L | | | 03/27/13 13:11 | 1 |
| Dichlorodifluoromethane | ND | | 1.0 | 0.68 | ug/L | | | 03/27/13 13:11 | 1 |
| Ethyl acetate | ND | | 1.0 | 0.66 | ug/L | | | 03/27/13 13:11 | 1 |
| Ethyl ether | ND | | 5.0 | 0.72 | ug/L | | | 03/27/13 13:11 | 1 |
| Ethyl methacrylate | ND | | 1.0 | 0.59 | ug/L | | | 03/27/13 13:11 | 1 |
| Ethylbenzene | ND | | 1.0 | 0.74 | ug/L | | | 03/27/13 13:11 | 1 |
| Iodomethane | ND | | 1.0 | 0.30 | ug/L | | | 03/27/13 13:11 | 1 |
| Isobutanol | ND | | 40 | 20 | ug/L | | | 03/27/13 13:11 | 1 |
| Methacrylonitrile | ND | | 5.0 | 0.69 | ug/L | | | 03/27/13 13:11 | 1 |
| Methyl methacrylate | ND | | 1.0 | 0.61 | ug/L | | | 03/27/13 13:11 | 1 |
| Methylene Chloride | ND | | 1.0 | 0.44 | ug/L | | | 03/27/13 13:11 | 1 |
| Propionitrile | ND | | 10 | 5.8 | ug/L | | | 03/27/13 13:11 | 1 |
| Tetrachloroethene | ND | | 1.0 | 0.36 | ug/L | | | 03/27/13 13:11 | 1 |
| Toluene | ND | | 1.0 | 0.51 | ug/L | | | 03/27/13 13:11 | 1 |
| trans-1,2-Dichloroethene | ND | | 1.0 | 0.90 | ug/L | | | 03/27/13 13:11 | 1 |
| trans-1,3-Dichloropropene | ND | | 1.0 | 0.37 | ug/L | | | 03/27/13 13:11 | 1 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

**Client Sample ID: TB**
**Date Collected: 03/21/13 00:00**
**Date Received: 03/22/13 09:00**

**Lab Sample ID: 480-34856-2**
**Matrix: Water**

**Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Trichloroethene | ND | | 1.0 | 0.46 | ug/L | | | 03/27/13 13:11 | 1 |
| Trichlorofluoromethane | ND | | 1.0 | 0.88 | ug/L | | | 03/27/13 13:11 | 1 |
| Vinyl chloride | ND | | 1.0 | 0.90 | ug/L | | | 03/27/13 13:11 | 1 |
| Xylenes, Total | ND | | 2.0 | 0.66 | ug/L | | | 03/27/13 13:11 | 1 |
| Cyclohexanone | ND | | 10 | 5.2 | ug/L | | | 03/27/13 13:11 | 1 |

| *Tentatively Identified Compound* | *Est. Result* | *Qualifier* | *Unit* | *D* | *RT* | *CAS No.* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|---|---|---|
| *Tentatively Identified Compound* | *None* | | *ug/L* | | | | | *03/27/13 13:11* | *1* |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *96* | | *66 - 137* | | *03/27/13 13:11* | *1* |
| *4-Bromofluorobenzene (Surr)* | *111* | | *73 - 120* | | *03/27/13 13:11* | *1* |
| *Toluene-d8 (Surr)* | *118* | | *71 - 126* | | *03/27/13 13:11* | *1* |

## Method: 8260B - Volatile Organic Compounds (GC/MS)

**Lab Sample ID: MB 480-109392/5**
**Matrix: Water**
**Analysis Batch: 109392**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 1.0 | 0.35 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,1,1-Trichloroethane | ND | | 1.0 | 0.82 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | 1.0 | 0.21 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,1,2-Trichloro-1,2,2-trichfluoroethane | ND | | 1.0 | 0.31 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,1,2-Trichloroethane | ND | | 1.0 | 0.23 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,1-Dichloroethane | ND | | 1.0 | 0.38 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,1-Dichloroethene | ND | | 1.0 | 0.29 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,2,3-Trichloropropane | ND | | 1.0 | 0.89 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,2-Dibromo-3-Chloropropane | ND | | 1.0 | 0.39 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,2-Dibromoethane (EDB) | ND | | 1.0 | 0.73 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,2-Dichloroethane | ND | | 1.0 | 0.21 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,2-Dichloropropane | ND | | 1.0 | 0.72 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,4-Dioxane | ND | | 40 | 9.3 | ug/L | | | 03/27/13 11:19 | 1 |
| 2-Butanone (MEK) | ND | | 10 | 1.3 | ug/L | | | 03/27/13 11:19 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 5.0 | 2.1 | ug/L | | | 03/27/13 11:19 | 1 |
| Acetone | ND | | 10 | 3.0 | ug/L | | | 03/27/13 11:19 | 1 |
| Acetonitrile | ND | | 40 | 26 | ug/L | | | 03/27/13 11:19 | 1 |
| Acrolein | ND | | 20 | 18 | ug/L | | | 03/27/13 11:19 | 1 |
| Acrylonitrile | ND | | 5.0 | 0.83 | ug/L | | | 03/27/13 11:19 | 1 |
| Allyl chloride | ND | | 1.0 | 0.44 | ug/L | | | 03/27/13 11:19 | 1 |
| Benzene | ND | | 1.0 | 0.41 | ug/L | | | 03/27/13 11:19 | 1 |
| Bromodichloromethane | ND | | 1.0 | 0.39 | ug/L | | | 03/27/13 11:19 | 1 |
| Bromoform | ND | | 1.0 | 0.26 | ug/L | | | 03/27/13 11:19 | 1 |
| Bromomethane | ND | | 1.0 | 0.69 | ug/L | | | 03/27/13 11:19 | 1 |
| Carbon disulfide | ND | | 1.0 | 0.19 | ug/L | | | 03/27/13 11:19 | 1 |
| Carbon tetrachloride | ND | | 1.0 | 0.27 | ug/L | | | 03/27/13 11:19 | 1 |
| Chlorobenzene | ND | | 1.0 | 0.75 | ug/L | | | 03/27/13 11:19 | 1 |
| Chloroethane | ND | | 1.0 | 0.32 | ug/L | | | 03/27/13 11:19 | 1 |
| Chloroform | ND | | 1.0 | 0.34 | ug/L | | | 03/27/13 11:19 | 1 |
| Chloromethane | ND | | 1.0 | 0.35 | ug/L | | | 03/27/13 11:19 | 1 |
| 1,3-Butadiene, 2-chloro- | ND | | 1.0 | 0.49 | ug/L | | | 03/27/13 11:19 | 1 |
| cis-1,3-Dichloropropene | ND | | 1.0 | 0.36 | ug/L | | | 03/27/13 11:19 | 1 |
| Dibromochloromethane | ND | | 1.0 | 0.32 | ug/L | | | 03/27/13 11:19 | 1 |
| Dibromomethane | ND | | 1.0 | 0.41 | ug/L | | | 03/27/13 11:19 | 1 |
| Dichlorodifluoromethane | ND | | 1.0 | 0.68 | ug/L | | | 03/27/13 11:19 | 1 |
| Ethyl acetate | ND | | 1.0 | 0.66 | ug/L | | | 03/27/13 11:19 | 1 |
| Ethyl ether | ND | | 5.0 | 0.72 | ug/L | | | 03/27/13 11:19 | 1 |
| Ethyl methacrylate | ND | | 1.0 | 0.59 | ug/L | | | 03/27/13 11:19 | 1 |
| Ethylbenzene | ND | | 1.0 | 0.74 | ug/L | | | 03/27/13 11:19 | 1 |
| Iodomethane | ND | | 1.0 | 0.30 | ug/L | | | 03/27/13 11:19 | 1 |
| Isobutanol | ND | | 40 | 20 | ug/L | | | 03/27/13 11:19 | 1 |
| Methacrylonitrile | ND | | 5.0 | 0.69 | ug/L | | | 03/27/13 11:19 | 1 |
| Methyl methacrylate | ND | | 1.0 | 0.61 | ug/L | | | 03/27/13 11:19 | 1 |
| Methylene Chloride | ND | | 1.0 | 0.44 | ug/L | | | 03/27/13 11:19 | 1 |
| Propionitrile | ND | | 10 | 5.8 | ug/L | | | 03/27/13 11:19 | 1 |
| Tetrachloroethene | ND | | 1.0 | 0.36 | ug/L | | | 03/27/13 11:19 | 1 |
| Toluene | ND | | 1.0 | 0.51 | ug/L | | | 03/27/13 11:19 | 1 |
| trans-1,2-Dichloroethene | ND | | 1.0 | 0.90 | ug/L | | | 03/27/13 11:19 | 1 |

## Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

**Lab Sample ID: MB 480-109392/5**
**Matrix: Water**
**Analysis Batch: 109392**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| trans-1,3-Dichloropropene | ND | | 1.0 | 0.37 | ug/L | | | 03/27/13 11:19 | 1 |
| Trichloroethene | ND | | 1.0 | 0.46 | ug/L | | | 03/27/13 11:19 | 1 |
| Trichlorofluoromethane | ND | | 1.0 | 0.88 | ug/L | | | 03/27/13 11:19 | 1 |
| Vinyl chloride | ND | | 1.0 | 0.90 | ug/L | | | 03/27/13 11:19 | 1 |
| Xylenes, Total | ND | | 2.0 | 0.66 | ug/L | | | 03/27/13 11:19 | 1 |
| Cyclohexanone | ND | | 10 | 5.2 | ug/L | | | 03/27/13 11:19 | 1 |

| *Tentatively Identified Compound* | *MB Est. Result* | *MB Qualifier* | *Unit* | *D* | *RT* | *CAS No.* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|---|---|---|
| *Tentatively Identified Compound* | *None* | | *ug/L* | | | | | *03/27/13 11:19* | *1* |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *94* | | *66 - 137* | | *03/27/13 11:19* | *1* |
| *4-Bromofluorobenzene (Surr)* | *110* | | *73 - 120* | | *03/27/13 11:19* | *1* |
| *Toluene-d8 (Surr)* | *116* | | *71 - 126* | | *03/27/13 11:19* | *1* |

**Lab Sample ID: LCS 480-109392/4**
**Matrix: Water**
**Analysis Batch: 109392**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | 25.0 | 22.3 | | ug/L | | 89 | 71 - 129 |
| 1,1-Dichloroethene | 25.0 | 19.8 | | ug/L | | 79 | 58 - 121 |
| 1,2-Dichloroethane | 25.0 | 22.4 | | ug/L | | 89 | 75 - 127 |
| Benzene | 25.0 | 23.7 | | ug/L | | 95 | 71 - 124 |
| Chlorobenzene | 25.0 | 26.3 | | ug/L | | 105 | 72 - 120 |
| Ethylbenzene | 25.0 | 25.3 | | ug/L | | 101 | 77 - 123 |
| Tetrachloroethene | 25.0 | 26.5 | | ug/L | | 106 | 74 - 122 |
| Toluene | 25.0 | 25.3 | | ug/L | | 101 | 80 - 122 |
| trans-1,2-Dichloroethene | 25.0 | 18.6 | | ug/L | | 75 | 73 - 127 |
| Trichloroethene | 25.0 | 23.4 | | ug/L | | 94 | 74 - 123 |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *98* | | *66 - 137* |
| *4-Bromofluorobenzene (Surr)* | *113* | | *73 - 120* |
| *Toluene-d8 (Surr)* | *120* | | *71 - 126* |

**Lab Sample ID: MB 480-109805/7**
**Matrix: Water**
**Analysis Batch: 109805**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 1.0 | 0.35 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,1,1-Trichloroethane | ND | | 1.0 | 0.82 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | 1.0 | 0.21 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,1,2-Trichloro-1,2,2-trichfluoroethane | ND | | 1.0 | 0.31 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,1,2-Trichloroethane | ND | | 1.0 | 0.23 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,1-Dichloroethane | ND | | 1.0 | 0.38 | ug/L | | | 03/28/13 23:17 | 1 |

## Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

**Lab Sample ID: MB 480-109805/7**
**Matrix: Water**
**Analysis Batch: 109805**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethene | ND | | 1.0 | 0.29 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,2,3-Trichloropropane | ND | | 1.0 | 0.89 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,2-Dibromo-3-Chloropropane | ND | | 1.0 | 0.39 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,2-Dibromoethane (EDB) | ND | | 1.0 | 0.73 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,2-Dichloroethane | ND | | 1.0 | 0.21 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,2-Dichloropropane | ND | | 1.0 | 0.72 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,4-Dioxane | ND | | 40 | 9.3 | ug/L | | | 03/28/13 23:17 | 1 |
| 2-Butanone (MEK) | ND | | 10 | 1.3 | ug/L | | | 03/28/13 23:17 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 5.0 | 2.1 | ug/L | | | 03/28/13 23:17 | 1 |
| Acetone | ND | | 10 | 3.0 | ug/L | | | 03/28/13 23:17 | 1 |
| Acetonitrile | ND | | 40 | 26 | ug/L | | | 03/28/13 23:17 | 1 |
| Acrolein | ND | | 20 | 18 | ug/L | | | 03/28/13 23:17 | 1 |
| Acrylonitrile | ND | | 5.0 | 0.83 | ug/L | | | 03/28/13 23:17 | 1 |
| Allyl chloride | ND | | 1.0 | 0.44 | ug/L | | | 03/28/13 23:17 | 1 |
| Benzene | ND | | 1.0 | 0.41 | ug/L | | | 03/28/13 23:17 | 1 |
| Bromodichloromethane | ND | | 1.0 | 0.39 | ug/L | | | 03/28/13 23:17 | 1 |
| Bromoform | ND | | 1.0 | 0.26 | ug/L | | | 03/28/13 23:17 | 1 |
| Bromomethane | ND | | 1.0 | 0.69 | ug/L | | | 03/28/13 23:17 | 1 |
| Carbon disulfide | ND | | 1.0 | 0.19 | ug/L | | | 03/28/13 23:17 | 1 |
| Carbon tetrachloride | ND | | 1.0 | 0.27 | ug/L | | | 03/28/13 23:17 | 1 |
| Chlorobenzene | ND | | 1.0 | 0.75 | ug/L | | | 03/28/13 23:17 | 1 |
| Chloroethane | ND | | 1.0 | 0.32 | ug/L | | | 03/28/13 23:17 | 1 |
| Chloroform | ND | | 1.0 | 0.34 | ug/L | | | 03/28/13 23:17 | 1 |
| Chloromethane | ND | | 1.0 | 0.35 | ug/L | | | 03/28/13 23:17 | 1 |
| 1,3-Butadiene, 2-chloro- | ND | | 1.0 | 0.49 | ug/L | | | 03/28/13 23:17 | 1 |
| cis-1,3-Dichloropropene | ND | | 1.0 | 0.36 | ug/L | | | 03/28/13 23:17 | 1 |
| Dibromochloromethane | ND | | 1.0 | 0.32 | ug/L | | | 03/28/13 23:17 | 1 |
| Dibromomethane | ND | | 1.0 | 0.41 | ug/L | | | 03/28/13 23:17 | 1 |
| Dichlorodifluoromethane | ND | | 1.0 | 0.68 | ug/L | | | 03/28/13 23:17 | 1 |
| Ethyl acetate | ND | | 1.0 | 0.66 | ug/L | | | 03/28/13 23:17 | 1 |
| Ethyl ether | ND | | 5.0 | 0.72 | ug/L | | | 03/28/13 23:17 | 1 |
| Ethyl methacrylate | ND | | 1.0 | 0.59 | ug/L | | | 03/28/13 23:17 | 1 |
| Ethylbenzene | ND | | 1.0 | 0.74 | ug/L | | | 03/28/13 23:17 | 1 |
| Iodomethane | ND | | 1.0 | 0.30 | ug/L | | | 03/28/13 23:17 | 1 |
| Isobutanol | ND | | 40 | 20 | ug/L | | | 03/28/13 23:17 | 1 |
| Methacrylonitrile | ND | | 5.0 | 0.69 | ug/L | | | 03/28/13 23:17 | 1 |
| Methyl methacrylate | ND | | 1.0 | 0.61 | ug/L | | | 03/28/13 23:17 | 1 |
| Methylene Chloride | ND | | 1.0 | 0.44 | ug/L | | | 03/28/13 23:17 | 1 |
| Propionitrile | ND | | 10 | 5.8 | ug/L | | | 03/28/13 23:17 | 1 |
| Tetrachloroethene | ND | | 1.0 | 0.36 | ug/L | | | 03/28/13 23:17 | 1 |
| Toluene | ND | | 1.0 | 0.51 | ug/L | | | 03/28/13 23:17 | 1 |
| trans-1,2-Dichloroethene | ND | | 1.0 | 0.90 | ug/L | | | 03/28/13 23:17 | 1 |
| trans-1,3-Dichloropropene | ND | | 1.0 | 0.37 | ug/L | | | 03/28/13 23:17 | 1 |
| Trichloroethene | ND | | 1.0 | 0.46 | ug/L | | | 03/28/13 23:17 | 1 |
| Trichlorofluoromethane | ND | | 1.0 | 0.88 | ug/L | | | 03/28/13 23:17 | 1 |
| Vinyl chloride | ND | | 1.0 | 0.90 | ug/L | | | 03/28/13 23:17 | 1 |
| Xylenes, Total | ND | | 2.0 | 0.66 | ug/L | | | 03/28/13 23:17 | 1 |
| Cyclohexanone | ND | | 10 | 5.2 | ug/L | | | 03/28/13 23:17 | 1 |

## Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

**Lab Sample ID: MB 480-109805/7**
**Matrix: Water**
**Analysis Batch: 109805**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Tentatively Identified Compound | MB Est. Result | MB Qualifier | Unit | D | RT | CAS No. | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Tentatively Identified Compound | None | | ug/L | | | | | 03/28/13 23:17 | 1 |

| Surrogate | MB %Recovery | MB Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 91 | | 66 - 137 | | 03/28/13 23:17 | 1 |
| 4-Bromofluorobenzene (Surr) | 101 | | 73 - 120 | | 03/28/13 23:17 | 1 |
| Toluene-d8 (Surr) | 95 | | 71 - 126 | | 03/28/13 23:17 | 1 |

**Lab Sample ID: LCS 480-109805/4**
**Matrix: Water**
**Analysis Batch: 109805**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | 25.0 | 23.2 | | ug/L | | 93 | 71 - 129 |
| 1,1-Dichloroethene | 25.0 | 23.2 | | ug/L | | 93 | 58 - 121 |
| 1,2-Dichloroethane | 25.0 | 21.4 | | ug/L | | 86 | 75 - 127 |
| Benzene | 25.0 | 23.4 | | ug/L | | 93 | 71 - 124 |
| Chlorobenzene | 25.0 | 24.0 | | ug/L | | 96 | 72 - 120 |
| Ethylbenzene | 25.0 | 23.1 | | ug/L | | 92 | 77 - 123 |
| Tetrachloroethene | 25.0 | 26.7 | | ug/L | | 107 | 74 - 122 |
| Toluene | 25.0 | 23.2 | | ug/L | | 93 | 80 - 122 |
| trans-1,2-Dichloroethene | 25.0 | 24.1 | | ug/L | | 96 | 73 - 127 |
| Trichloroethene | 25.0 | 24.0 | | ug/L | | 96 | 74 - 123 |

| Surrogate | LCS %Recovery | LCS Qualifier | Limits |
|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 87 | | 66 - 137 |
| 4-Bromofluorobenzene (Surr) | 102 | | 73 - 120 |
| Toluene-d8 (Surr) | 96 | | 71 - 126 |

## Method: 8270C - Semivolatile Organic Compounds (GC/MS)

**Lab Sample ID: MB 480-108882/1-A**
**Matrix: Water**
**Analysis Batch: 110446**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 108882**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,2,4,5-Tetrachlorobenzene | ND | | 5.0 | 0.58 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 1,2,4-Trichlorobenzene | ND | | 10 | 0.44 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 1,2-Dichlorobenzene | ND | | 10 | 0.40 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 1,2-Diphenylhydrazine | ND | | 10 | 0.35 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 1,3-Dichlorobenzene | ND | | 10 | 0.48 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 1,4-Dichlorobenzene | ND | | 10 | 0.46 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 1,4-Dinitrobenzene | ND | | 10 | 0.71 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2,2'-Oxybis(1-chloropropane) | ND | | 5.0 | 0.52 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2,3,4,6-Tetrachlorophenol | ND | | 5.0 | 0.32 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2,4,5-Trichlorophenol | ND | | 5.0 | 0.48 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2,4,6-Trichlorophenol | ND | | 5.0 | 0.61 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2,4-Dichlorophenol | ND | | 5.0 | 0.51 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |

## Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

**Lab Sample ID: MB 480-108882/1-A**
**Matrix: Water**
**Analysis Batch: 110446**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 108882**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2,4-Dimethylphenol | ND | | 5.0 | 0.50 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2,4-Dinitrophenol | ND | | 10 | 2.2 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2,4-Dinitrotoluene | ND | | 5.0 | 0.45 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2,6-Dichlorophenol | ND | | 10 | 0.46 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2,6-Dinitrotoluene | ND | | 5.0 | 0.40 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2-Acetylaminofluorene | ND | | 10 | 2.3 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2-Chloronaphthalene | ND | | 5.0 | 0.46 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2-Chlorophenol | ND | | 5.0 | 0.53 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2-Methylphenol | ND | | 5.0 | 0.40 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2-Naphthylamine | ND | | 10 | 2.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 3-Methylcholanthrene | ND | | 10 | 2.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 3-Methylphenol | ND | | 10 | 0.40 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 4,6-Dinitro-2-methylphenol | ND | | 10 | 2.2 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 4-Aminobiphenyl | ND | | 10 | 0.81 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 4-Bromophenyl phenyl ether | ND | | 5.0 | 0.45 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 4-Chloro-3-methylphenol | ND | | 5.0 | 0.45 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 4-Chloroaniline | ND | | 5.0 | 0.59 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 4-Methylphenol | ND | | 10 | 0.36 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 4-Nitroaniline | ND | | 10 | 0.25 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 4-Nitrophenol | ND | | 10 | 1.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 5-Nitro-o-toluidine | ND | | 10 | 0.66 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Acenaphthene | ND | | 5.0 | 0.41 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Acenaphthylene | ND | | 5.0 | 0.38 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Acetophenone | ND | | 5.0 | 0.54 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Aniline | ND | | 10 | 0.61 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Anthracene | ND | | 5.0 | 0.28 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Aramite | ND | | 20 | 1.6 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Benzo[a]anthracene | ND | | 5.0 | 0.36 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Benzo[a]pyrene | ND | | 5.0 | 0.47 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Benzo[b]fluoranthene | ND | | 5.0 | 0.34 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Benzo[g,h,i]perylene | ND | | 5.0 | 0.35 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Benzo[k]fluoranthene | ND | | 5.0 | 0.73 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Bis(2-chloroethoxy)methane | ND | | 5.0 | 0.35 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Bis(2-chloroethyl)ether | ND | | 5.0 | 0.40 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Bis(2-ethylhexyl) phthalate | ND | | 5.0 | 1.8 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Butyl benzyl phthalate | ND | | 5.0 | 0.42 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Chlorobenzilate | ND | | 20 | 0.67 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Chrysene | ND | | 5.0 | 0.33 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Dibenz[a,h]anthracene | ND | | 5.0 | 0.42 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Dibenzo[a,e]pyrene | ND | | 10 | 1.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Diethyl phthalate | ND | | 5.0 | 0.22 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Dimethyl phthalate | ND | | 5.0 | 0.36 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Di-n-butyl phthalate | ND | | 5.0 | 0.31 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Di-n-octyl phthalate | ND | | 5.0 | 0.47 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Dinoseb | ND | | 10 | 2.9 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Diphenylamine | ND | | 10 | 0.82 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Disulfoton | ND | | 10 | 0.42 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Famphur | ND | | 40 | 1.9 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |

## Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

**Lab Sample ID: MB 480-108882/1-A**
**Matrix: Water**
**Analysis Batch: 110446**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 108882**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Fluoranthene | ND | | 5.0 | 0.40 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Fluorene | ND | | 5.0 | 0.36 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Hexachlorobenzene | ND | | 5.0 | 0.51 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Hexachlorobutadiene | ND | | 5.0 | 0.68 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Hexachlorocyclopentadiene | ND | | 5.0 | 0.59 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Hexachloroethane | ND | | 5.0 | 0.59 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Hexachloropropene | ND | | 10 | 2.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Indeno[1,2,3-cd]pyrene | ND | | 5.0 | 0.47 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Isodrin | ND | | 10 | 0.18 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Isosafrole | ND | | 10 | 0.58 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Kepone | ND | | 50 | 1.8 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Methapyrilene | ND | | 50 | 1.8 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Methyl methanesulfonate | ND | | 10 | 2.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Methyl parathion | ND | | 10 | 0.37 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Naphthalene | ND | | 5.0 | 0.76 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Nitrobenzene | ND | | 5.0 | 0.29 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| N-Nitrosodiethylamine | ND | | 10 | 0.36 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| N-Nitrosodimethylamine | ND | | 10 | 2.2 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| N-Nitrosodi-n-butylamine | ND | | 10 | 0.60 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| N-Nitrosodi-n-propylamine | ND | | 5.0 | 0.54 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| N-Nitrosodiphenylamine | ND | | 5.0 | 0.51 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| N-Nitrosomethylethylamine | ND | | 10 | 2.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| N-Nitrosomorpholine | ND | | 10 | 2.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| N-Nitrosopiperidine | ND | | 10 | 2.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| N-Nitrosopyrrolidine | ND | | 10 | 2.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Parathion | ND | | 10 | 0.64 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Pentachlorobenzene | ND | | 10 | 0.53 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Pentachloronitrobenzene | ND | | 10 | 2.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Pentachlorophenol | ND | | 10 | 2.2 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Phenacetin | ND | | 10 | 0.61 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Phenanthrene | ND | | 5.0 | 0.44 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Phenol | ND | | 5.0 | 0.39 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Phorate | ND | | 10 | 0.50 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Phthalic anhydride | ND | | 500 | 56 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Pronamide | ND | | 10 | 2.5 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Pyrene | ND | | 5.0 | 0.34 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Pyridine | ND | | 25 | 0.41 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Safrole | ND | | 10 | 0.46 | ug/L | | 03/23/13 06:29 | 04/02/13 15:39 | 1 |

| *Tentatively Identified Compound* | *MB Est. Result* | *MB Qualifier* | *Unit* | *D* | *RT* | *CAS No.* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|---|---|---|
| *Ethanol, 2,2'-oxybis-* | *10.4* | *T J N* | *ug/L* | | *3.32* | *111-46-6* | *03/23/13 06:29* | *04/02/13 15:39* | *1* |
| *2-Propanol, 1-[1-methyl-2-(2-propenyloxy* | *10.8* | *T J N* | *ug/L* | | *7.66* | *55956-25-7* | *03/23/13 06:29* | *04/02/13 15:39* | *1* |
| *2-Propanol, 1-[1-methyl-2-(2-propenyloxy* | *7.58* | *T J N* | *ug/L* | | *8.49* | *55956-25-7* | *03/23/13 06:29* | *04/02/13 15:39* | *1* |
| *Ethane, 1,2-diethoxy-* | *7.56* | *T J N* | *ug/L* | | *9.11* | *629-14-1* | *03/23/13 06:29* | *04/02/13 15:39* | *1* |
| *1-Propanol, 2-(2-methoxy-1-methylethoxy)* | *9.49* | *T J N* | *ug/L* | | *10.30* | *55956-21-3* | *03/23/13 06:29* | *04/02/13 15:39* | *1* |

## Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

**Lab Sample ID: MB 480-108882/1-A**
**Matrix: Water**
**Analysis Batch: 110446**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 108882**

| Tentatively Identified Compound | MB Est. Result | MB Qualifier | Unit | D | RT | CAS No. | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Butanoic acid, 3-methoxy- | 7.36 | T J N | ug/L | | 12.36 | 10024-70-1 | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Hexaethylene glycol dimethyl ether | 7.55 | T J N | ug/L | | 14.00 | 1072-40-8 | 03/23/13 06:29 | 04/02/13 15:39 | 1 |

| Surrogate | MB %Recovery | MB Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 2,4,6-Tribromophenol | 88 | | 52 - 132 | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Nitrobenzene-d5 | 80 | | 46 - 120 | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| Phenol-d5 | 32 | | 16 - 120 | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| p-Terphenyl-d14 | 108 | | 67 - 150 | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2-Fluorobiphenyl | 86 | | 48 - 120 | 03/23/13 06:29 | 04/02/13 15:39 | 1 |
| 2-Fluorophenol | 42 | | 20 - 120 | 03/23/13 06:29 | 04/02/13 15:39 | 1 |

**Lab Sample ID: LCS 480-108882/2-A**
**Matrix: Water**
**Analysis Batch: 110446**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 108882**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 1,2,4-Trichlorobenzene | 91.0 | 78.9 | | ug/L | | 87 | 40 - 120 |
| 1,4-Dichlorobenzene | 92.0 | 79.6 | | ug/L | | 86 | 32 - 120 |
| 2,4-Dinitrotoluene | 88.0 | 135 | | ug/L | | 154 | 65 - 154 |
| 2-Chlorophenol | 92.0 | 97.8 | | ug/L | | 106 | 48 - 120 |
| 4-Chloro-3-methylphenol | 90.0 | 116 | * | ug/L | | 128 | 64 - 120 |
| 4-Nitrophenol | 89.0 | 60.6 | | ug/L | | 68 | 16 - 120 |
| Acenaphthene | 94.0 | 103 | | ug/L | | 109 | 60 - 120 |
| Bis(2-ethylhexyl) phthalate | 84.0 | 123 | | ug/L | | 146 | 53 - 158 |
| Fluorene | 93.0 | 110 | | ug/L | | 118 | 55 - 143 |
| Hexachloroethane | 92.0 | 67.9 | | ug/L | | 74 | 14 - 101 |
| N-Nitrosodi-n-propylamine | 93.0 | 116 | * | ug/L | | 125 | 56 - 120 |
| Pentachlorophenol | 97.0 | 105 | | ug/L | | 109 | 39 - 136 |
| Phenol | 91.0 | 47.2 | | ug/L | | 52 | 17 - 120 |
| Pyrene | 92.0 | 114 | | ug/L | | 124 | 58 - 136 |

| Surrogate | LCS %Recovery | LCS Qualifier | Limits |
|---|---|---|---|
| 2,4,6-Tribromophenol | 110 | | 52 - 132 |
| Nitrobenzene-d5 | 93 | | 46 - 120 |
| Phenol-d5 | 42 | | 16 - 120 |
| p-Terphenyl-d14 | 106 | | 67 - 150 |
| 2-Fluorobiphenyl | 96 | | 48 - 120 |
| 2-Fluorophenol | 56 | | 20 - 120 |

## Method: 8015B - Nonhalogenated Organic Compounds - Direct Injection (GC)

**Lab Sample ID: MB 480-109374/3**
**Matrix: Water**
**Analysis Batch: 109374**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Methanol | ND | | 1000 | 410 | ug/L | | | 03/27/13 08:12 | 1 |

## Method: 8015B - Nonhalogenated Organic Compounds - Direct Injection (GC) (Continued)

**Lab Sample ID: MB 480-109374/3**
**Matrix: Water**
**Analysis Batch: 109374**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Butyl alcohol, n- | ND | | 1000 | 400 | ug/L | | | 03/27/13 08:12 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *2-Hexanone* | *92* | | *63 - 124* | | *03/27/13 08:12* | *1* |

**Lab Sample ID: LCS 480-109374/4**
**Matrix: Water**
**Analysis Batch: 109374**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | | | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Methanol | | | 20000 | 18400 | | ug/L | | 92 | 76 - 122 | | |
| Butyl alcohol, n- | | | 20000 | 16400 | | ug/L | | 82 | 75 - 120 | | |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *2-Hexanone* | *93* | | *63 - 124* |

**Lab Sample ID: LCSD 480-109374/5**
**Matrix: Water**
**Analysis Batch: 109374**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**

| Analyte | | | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Methanol | | | 20000 | 19200 | | ug/L | | 96 | 76 - 122 | 4 | 30 |
| Butyl alcohol, n- | | | 20000 | 17200 | | ug/L | | 86 | 75 - 120 | 5 | 30 |

| *Surrogate* | *LCSD %Recovery* | *LCSD Qualifier* | *Limits* |
|---|---|---|---|
| *2-Hexanone* | *100* | | *63 - 124* |

## Method: 608 - Organochlorine Pesticides in Water

**Lab Sample ID: MB 480-109118/1-A**
**Matrix: Water**
**Analysis Batch: 109186**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 109118**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2,4'-DDD | ND | | 0.050 | 0.0063 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| 2,4'-DDE | ND | | 0.050 | 0.027 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| 2,4'-DDT | ND | | 0.050 | 0.0091 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| 4,4'-DDD | ND | | 0.050 | 0.0092 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| 4,4'-DDE | ND | | 0.050 | 0.012 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| 4,4'-DDT | ND | | 0.050 | 0.011 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Aldrin | ND | | 0.050 | 0.0066 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| alpha-BHC | ND | | 0.050 | 0.0066 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| beta-BHC | ND | | 0.050 | 0.025 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Chlordane | ND | | 0.50 | 0.29 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| delta-BHC | ND | | 0.050 | 0.010 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Dieldrin | ND | | 0.050 | 0.0098 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Endosulfan I | ND | | 0.050 | 0.011 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |

## Method: 608 - Organochlorine Pesticides in Water (Continued)

**Lab Sample ID: MB 480-109118/1-A**
**Matrix: Water**
**Analysis Batch: 109186**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 109118**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Endosulfan II | ND | | 0.050 | 0.012 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Endosulfan sulfate | ND | | 0.050 | 0.016 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Endrin | ND | | 0.050 | 0.014 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Endrin aldehyde | ND | | 0.050 | 0.016 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| gamma-BHC (Lindane) | ND | | 0.050 | 0.0060 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Heptachlor | ND | | 0.050 | 0.0085 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Heptachlor epoxide | ND | | 0.050 | 0.0053 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Methoxychlor | ND | | 0.050 | 0.014 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |
| Toxaphene | ND | | 0.50 | 0.12 | ug/L | | 03/25/13 19:30 | 03/26/13 08:51 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *DCB Decachlorobiphenyl* | *66* | | *15 - 125* | *03/25/13 19:30* | *03/26/13 08:51* | *1* |
| *Tetrachloro-m-xylene* | *62* | | *36 - 121* | *03/25/13 19:30* | *03/26/13 08:51* | *1* |

**Lab Sample ID: LCS 480-109118/2-A**
**Matrix: Water**
**Analysis Batch: 109186**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 109118**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 4,4'-DDD | 0.500 | 0.452 | | ug/L | | 90 | 54 - 142 |
| 4,4'-DDE | 0.500 | 0.427 | | ug/L | | 85 | 48 - 128 |
| 4,4'-DDT | 0.500 | 0.401 | | ug/L | | 80 | 53 - 136 |
| Aldrin | 0.500 | 0.358 | | ug/L | | 72 | 35 - 120 |
| alpha-BHC | 0.500 | 0.395 | | ug/L | | 79 | 39 - 121 |
| beta-BHC | 0.500 | 0.431 | | ug/L | | 86 | 39 - 138 |
| delta-BHC | 0.500 | 0.424 | | ug/L | | 85 | 40 - 121 |
| Dieldrin | 0.500 | 0.476 | | ug/L | | 95 | 52 - 132 |
| Endosulfan I | 0.500 | 0.461 | | ug/L | | 92 | 47 - 126 |
| Endosulfan II | 0.500 | 0.467 | | ug/L | | 93 | 48 - 134 |
| Endosulfan sulfate | 0.500 | 0.461 | | ug/L | | 92 | 57 - 140 |
| Endrin | 0.500 | 0.495 | | ug/L | | 99 | 54 - 135 |
| Endrin aldehyde | 0.500 | 0.445 | | ug/L | | 89 | 55 - 132 |
| gamma-BHC (Lindane) | 0.500 | 0.406 | | ug/L | | 81 | 54 - 134 |
| Heptachlor | 0.500 | 0.430 | | ug/L | | 86 | 42 - 126 |
| Heptachlor epoxide | 0.500 | 0.466 | | ug/L | | 93 | 53 - 134 |
| Methoxychlor | 0.500 | 0.429 | | ug/L | | 86 | 47 - 166 |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *DCB Decachlorobiphenyl* | *69* | | *15 - 125* |
| *Tetrachloro-m-xylene* | *65* | | *36 - 121* |

## Method: 608 - Polychlorinated Biphenyls (PCBs) (GC)

**Lab Sample ID: MB 480-108884/1-A**
**Matrix: Water**
**Analysis Batch: 108979**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 108884**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Aroclor 1016 | ND | | 0.060 | 0.038 | ug/L | | 03/23/13 06:40 | 03/25/13 11:29 | 1 |
| Aroclor 1221 | ND | | 0.060 | 0.038 | ug/L | | 03/23/13 06:40 | 03/25/13 11:29 | 1 |
| Aroclor 1232 | ND | | 0.060 | 0.038 | ug/L | | 03/23/13 06:40 | 03/25/13 11:29 | 1 |
| Aroclor 1242 | ND | | 0.060 | 0.038 | ug/L | | 03/23/13 06:40 | 03/25/13 11:29 | 1 |
| Aroclor 1248 | ND | | 0.060 | 0.038 | ug/L | | 03/23/13 06:40 | 03/25/13 11:29 | 1 |
| Aroclor 1254 | ND | | 0.060 | 0.031 | ug/L | | 03/23/13 06:40 | 03/25/13 11:29 | 1 |
| Aroclor 1260 | ND | | 0.060 | 0.031 | ug/L | | 03/23/13 06:40 | 03/25/13 11:29 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *DCB Decachlorobiphenyl* | *62* | | *10 - 158* | *03/23/13 06:40* | *03/25/13 11:29* | *1* |
| *Tetrachloro-m-xylene* | *77* | | *18 - 146* | *03/23/13 06:40* | *03/25/13 11:29* | *1* |

**Lab Sample ID: LCS 480-108884/2-A**
**Matrix: Water**
**Analysis Batch: 108979**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 108884**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Aroclor 1016 | 1.00 | 0.971 | | ug/L | | 97 | 44 - 154 |
| Aroclor 1260 | 1.00 | 0.803 | | ug/L | | 80 | 34 - 150 |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *DCB Decachlorobiphenyl* | *54* | | *10 - 158* |
| *Tetrachloro-m-xylene* | *78* | | *18 - 146* |

## Method: 8151A - Herbicides (GC)

**Lab Sample ID: MB 480-109072/1-A**
**Matrix: Water**
**Analysis Batch: 109480**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 109072**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2,4,5-T | ND | | 0.50 | 0.15 | ug/L | | 03/25/13 14:24 | 03/27/13 16:59 | 1 |
| Silvex (2,4,5-TP) | ND | | 0.50 | 0.36 | ug/L | | 03/25/13 14:24 | 03/27/13 16:59 | 1 |
| 2,4-D | ND | | 0.50 | 0.40 | ug/L | | 03/25/13 14:24 | 03/27/13 16:59 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *2,4-Dichlorophenylacetic acid* | *112* | | *32 - 132* | *03/25/13 14:24* | *03/27/13 16:59* | *1* |

**Lab Sample ID: LCS 480-109072/2-A**
**Matrix: Water**
**Analysis Batch: 109480**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 109072**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 2,4,5-T | 2.00 | 1.97 | | ug/L | | 99 | 46 - 143 |
| Silvex (2,4,5-TP) | 2.00 | 1.87 | | ug/L | | 94 | 44 - 147 |
| 2,4-D | 2.00 | 1.97 | | ug/L | | 99 | 45 - 149 |

## Method: 8151A - Herbicides (GC) (Continued)

**Lab Sample ID: LCS 480-109072/2-A**
**Matrix: Water**
**Analysis Batch: 109480**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 109072**

| Surrogate | LCS %Recovery | LCS Qualifier | Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 121 | | 32 - 132 |

**Lab Sample ID: LCSD 480-109072/3-A**
**Matrix: Water**
**Analysis Batch: 109480**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**
**Prep Batch: 109072**

| Analyte | | | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,5-T | | | 2.00 | 1.93 | | ug/L | | 97 | 46 - 143 | NaN | 50 |
| Silvex (2,4,5-TP) | | | 2.00 | 1.83 | | ug/L | | 92 | 44 - 147 | NaN | 50 |
| 2,4-D | | | 2.00 | 1.85 | | ug/L | | 93 | 45 - 149 | NaN | 50 |

| Surrogate | LCSD %Recovery | LCSD Qualifier | Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 117 | | 32 - 132 |

## Method: 8280A - Dioxins and Furans (HRGC/LRMS)

**Lab Sample ID: MB 320-13628/1-A**
**Matrix: Water**
**Analysis Batch: 13783**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 13628**

| Analyte | MB Result | MB Qualifier | RL | EDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | ND | | 13 | 0.053 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | ND | | 13 | 0.056 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran | ND | | 13 | 0.062 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| 2,3,7,8-TCDD | ND | | 5.0 | 0.060 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| 2,3,7,8-TCDF | ND | | 5.0 | 0.032 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| OCDD | ND | | 25 | 0.093 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| OCDF | ND | | 25 | 0.068 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| Total HxCDD | ND | | 13 | 0.053 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| Total HxCDF | ND | | 13 | 0.053 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| Total PeCDD | ND | | 13 | 0.069 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| Total PeCDF | ND | | 13 | 0.043 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| Total TCDD | ND | | 5.0 | 0.060 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| Total TCDF | ND | | 5.0 | 0.032 | ng/L | | 04/04/13 11:18 | 04/05/13 17:53 | 1 |

| Isotope Dilution | MB %Recovery | MB Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 13C-1,2,3,6,7,8-HxCDD | 59 | | 25 - 150 | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| 13C-2,3,7,8-TCDD | 66 | | 25 - 150 | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| 13C-1,2,3,4,6,7,8-HpCDF | 54 | | 25 - 150 | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| 13C-2,3,7,8-TCDF | 65 | | 25 - 150 | 04/04/13 11:18 | 04/05/13 17:53 | 1 |
| 13C-OCDD | 48 | | 25 - 150 | 04/04/13 11:18 | 04/05/13 17:53 | 1 |

| Surrogate | MB %Recovery | MB Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 37Cl4-2,3,7,8-TCDD | 91 | | 25 - 150 | 04/04/13 11:18 | 04/05/13 17:53 | 1 |

## Method: 8280A - Dioxins and Furans (HRGC/LRMS) (Continued)

**Lab Sample ID: LCS 320-13628/2-A**
**Matrix: Water**
**Analysis Batch: 13783**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 13628**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 62.5 | 61.0 | | ng/L | | 98 | 63 - 124 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 62.5 | 64.9 | | ng/L | | 104 | 65 - 127 |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran | 62.5 | 65.5 | | ng/L | | 105 | 51 - 148 |
| 2,3,7,8-TCDD | 25.0 | 25.7 | | ng/L | | 103 | 66 - 126 |
| 2,3,7,8-TCDF | 25.0 | 26.7 | | ng/L | | 107 | 65 - 125 |
| OCDD | 125 | 129 | | ng/L | | 103 | 64 - 124 |
| OCDF | 125 | 135 | | ng/L | | 108 | 64 - 124 |

| *Isotope Dilution* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *13C-1,2,3,6,7,8-HxCDD* | *61* | | *25 - 150* |
| *13C-2,3,7,8-TCDD* | *61* | | *25 - 150* |
| *13C-1,2,3,4,6,7,8-HpCDF* | *61* | | *25 - 150* |
| *13C-2,3,7,8-TCDF* | *58* | | *25 - 150* |
| *13C-OCDD* | *51* | | *25 - 150* |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *37Cl4-2,3,7,8-TCDD* | *90* | | *25 - 150* |

## Method: 200.7 Rev 4.4 - Metals (ICP)

**Lab Sample ID: MB 480-108837/1-A**
**Matrix: Water**
**Analysis Batch: 109198**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 108837**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | | 0.30 | 0.0068 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |
| Arsenic | ND | | 0.010 | 0.0056 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |
| Barium | ND | | 0.20 | 0.00070 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |
| Beryllium | ND | | 0.0050 | 0.00030 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |
| Cadmium | ND | | 0.0050 | 0.00050 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |
| Chromium | ND | | 0.010 | 0.0010 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |
| Lead | ND | | 0.0050 | 0.0030 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |
| Nickel | ND | | 0.040 | 0.0013 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |
| Selenium | ND | | 0.015 | 0.0087 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |
| Silver | ND | | 0.025 | 0.0017 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |
| Vanadium | ND | | 0.050 | 0.0015 | mg/L | | 03/23/13 10:15 | 03/25/13 15:26 | 1 |

**Lab Sample ID: LCS 480-108837/2-A**
**Matrix: Water**
**Analysis Batch: 109198**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 108837**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Antimony | 0.200 | 0.198 | J | mg/L | | 99 | 85 - 115 |
| Arsenic | 0.200 | 0.199 | | mg/L | | 100 | 85 - 115 |
| Barium | 0.200 | 0.213 | | mg/L | | 106 | 85 - 115 |

## Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

**Lab Sample ID: LCS 480-108837/2-A**
**Matrix: Water**
**Analysis Batch: 109198**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 108837**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Beryllium | 0.200 | 0.207 | | mg/L | | 103 | 85 - 115 |
| Cadmium | 0.200 | 0.204 | | mg/L | | 102 | 85 - 115 |
| Chromium | 0.200 | 0.204 | | mg/L | | 102 | 85 - 115 |
| Lead | 0.200 | 0.197 | | mg/L | | 99 | 85 - 115 |
| Nickel | 0.200 | 0.198 | | mg/L | | 99 | 85 - 115 |
| Selenium | 0.200 | 0.200 | | mg/L | | 100 | 85 - 115 |
| Silver | 0.0500 | 0.0526 | | mg/L | | 105 | 85 - 115 |
| Vanadium | 0.200 | 0.211 | | mg/L | | 106 | 85 - 115 |

## Method: 200.8 - Metals (ICP/MS)

**Lab Sample ID: MB 480-108840/1-A**
**Matrix: Water**
**Analysis Batch: 110259**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 108840**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | ND | | 0.0050 | 0.00044 | mg/L | | 03/23/13 11:40 | 03/31/13 00:33 | 1 |
| Thallium | ND | | 0.0010 | 0.0000080 | mg/L | | 03/23/13 11:40 | 03/31/13 00:33 | 1 |

**Lab Sample ID: LCS 480-108840/2-A**
**Matrix: Water**
**Analysis Batch: 110259**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 108840**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Selenium | 0.0200 | 0.0188 | | mg/L | | 94 | 85 - 115 |
| Thallium | 0.0200 | 0.0207 | | mg/L | | 104 | 85 - 115 |

**Lab Sample ID: LCSD 480-108840/3-A**
**Matrix: Water**
**Analysis Batch: 110259**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**
**Prep Batch: 108840**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 0.0200 | 0.0198 | | mg/L | | 99 | 85 - 115 | 5 | 20 |
| Thallium | 0.0200 | 0.0202 | | mg/L | | 101 | 85 - 115 | 3 | 20 |

## Method: 160.4 - Solids, Total Volatile (TVS)

**Lab Sample ID: MB 480-108871/1**
**Matrix: Water**
**Analysis Batch: 108871**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Volatile Residue | ND | | 10.0 | 4.0 | mg/L | | | 03/22/13 23:27 | 1 |

## Method: 160.4 - Solids, Total Volatile (TVS) (Continued)

**Lab Sample ID: 480-34856-1 DU** — **Client Sample ID: T103**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 108871**

| Analyte | Sample Result | Sample Qualifier | DU Result | DU Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Volatile Residue | 10100 | | 9924 | | mg/L | | 2 | 20 |

## Method: SM 4500 CN I - Cyanide, Weak Acid Dissociable

**Lab Sample ID: MB 480-109302/1-A** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 109346** — **Prep Batch: 109302**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Cyanide, Weak Acid Dissociable | ND | | 0.010 | 0.0060 | mg/L | | 03/26/13 12:50 | 03/27/13 00:05 | 1 |

**Lab Sample ID: LCS 480-109302/2-A** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 109346** — **Prep Batch: 109302**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Cyanide, Weak Acid Dissociable | 0.400 | 0.421 | | mg/L | | 105 | 90 - 110 |

## Method: SM 4500 F C - Fluoride

**Lab Sample ID: MB 480-109589/27** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 109589**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Fluoride | ND | | 0.10 | 0.017 | mg/L | | | 03/28/13 03:05 | 1 |

**Lab Sample ID: LCS 480-109589/28** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 109589**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Fluoride | 1.00 | 1.01 | | mg/L | | 101 | 90 - 110 |

## Method: SM 4500 S2 F - Sulfide, Total

**Lab Sample ID: MB 480-108922/3** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 108922**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Sulfide | ND | | 1.0 | 0.67 | mg/L | | | 03/23/13 12:23 | 1 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

## Method: SM 4500 S2 F - Sulfide, Total (Continued)

**Lab Sample ID: LCS 480-108922/4**
**Matrix: Water**
**Analysis Batch: 108922**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Sulfide | 10.0 | 9.60 | | mg/L | | 96 | 90 - 110 |

# Lab Chronicle

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

## Client Sample ID: T103

**Lab Sample ID: 480-34856-1**

**Date Collected: 03/21/13 11:30**

**Matrix: Water**

**Date Received: 03/22/13 09:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 8260B | DL | 5000 | 109392 | 03/27/13 12:49 | RL | TAL BUF |
| Total/NA | Analysis | 8260B | | 100 | 109805 | 03/29/13 00:02 | LH | TAL BUF |
| Total/NA | Prep | 3510C | | | 108882 | 03/23/13 07:29 | DE | TAL BUF |
| Total/NA | Analysis | 8270C | | 50 | 110446 | 04/02/13 16:35 | RMM | TAL BUF |
| Total/NA | Prep | 3510C | DL | | 108882 | 03/23/13 07:29 | DE | TAL BUF |
| Total/NA | Analysis | 8270C | DL | 500 | 110650 | 04/03/13 13:19 | RMM | TAL BUF |
| Total/NA | Analysis | 8015B | | 100 | 109374 | 03/27/13 09:14 | CD | TAL BUF |
| Total/NA | Prep | 3510C | | | 108884 | 03/23/13 07:40 | DE | TAL BUF |
| Total/NA | Analysis | 608 | | 500 | 108979 | 03/26/13 03:14 | JM | TAL BUF |
| Total/NA | Prep | 3510C | | | 109118 | 03/25/13 19:30 | TG | TAL BUF |
| Total/NA | Analysis | 608 | | 100 | 109186 | 03/26/13 14:24 | LW | TAL BUF |
| Total/NA | Prep | 3510C | | | 109118 | 03/25/13 19:30 | TG | TAL BUF |
| Total/NA | Analysis | 608 | | 100 | 109186 | 03/26/13 14:24 | LW | TAL BUF |
| Total/NA | Prep | 8151A | | | 109072 | 03/25/13 14:24 | TG | TAL BUF |
| Total/NA | Analysis | 8151A | | 200 | 109715 | 03/28/13 17:02 | JAD | TAL BUF |
| Total/NA | Prep | 8280A | | | 13628 | 04/04/13 11:18 | NM | TAL SAC |
| Total/NA | Analysis | 8280A | | 1 | 13783 | 04/05/13 21:52 | MO | TAL SAC |
| Total/NA | Prep | 200.7 | | | 108837 | 03/23/13 10:15 | SS | TAL BUF |
| Total/NA | Analysis | 200.7 Rev 4.4 | | 1 | 109198 | 03/25/13 16:03 | LH | TAL BUF |
| Total/NA | Prep | 200.8 | | | 108840 | 03/23/13 11:40 | SS | TAL BUF |
| Total/NA | Analysis | 200.8 | | 10 | 110259 | 03/31/13 03:09 | MM | TAL BUF |
| Total/NA | Prep | 200.8 | | | 108840 | 03/23/13 11:40 | SS | TAL BUF |
| Total/NA | Analysis | 200.8 | | 500 | 110691 | 04/03/13 04:00 | MM | TAL BUF |
| Total/NA | Analysis | 160.4 | | 1 | 108871 | 03/22/13 23:29 | KS | TAL BUF |
| Total/NA | Analysis | SM 4500 S2 F | | 1 | 108922 | 03/23/13 12:33 | KS | TAL BUF |
| Total/NA | Prep | SM 4500 CN I | | | 109302 | 03/26/13 12:50 | EGN | TAL BUF |
| Total/NA | Analysis | SM 4500 CN I | | 1 | 109346 | 03/27/13 00:23 | PJQ | TAL BUF |
| Total/NA | Prep | Distill/CN | | | 109302 | 03/26/13 12:50 | EGN | TAL BUF |
| Total/NA | Analysis | 335.4 | | 1 | 109346 | 03/27/13 00:24 | PJQ | TAL BUF |
| Total/NA | Analysis | SM 4500 F C | | 5 | 109589 | 03/28/13 04:37 | LK | TAL BUF |

## Client Sample ID: TB

**Lab Sample ID: 480-34856-2**

**Date Collected: 03/21/13 00:00**

**Matrix: Water**

**Date Received: 03/22/13 09:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 8260B | | 1 | 109392 | 03/27/13 13:11 | RL | TAL BUF |

**Laboratory References:**

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

# Certification Summary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

## Laboratory: TestAmerica Buffalo

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Arkansas DEQ | State Program | 6 | 88-0686 | 07-06-13 |
| California | NELAP | 9 | 1169CA | 09-30-13 |
| Connecticut | State Program | 1 | PH-0568 | 09-30-14 |
| Florida | NELAP | 4 | E87672 | 06-30-13 |
| Georgia | State Program | 4 | N/A | 03-31-14 |
| Georgia | State Program | 4 | 956 | 06-30-13 |
| Georgia | State Program | 4 | 956 | 06-30-13 |
| Illinois | NELAP | 5 | 200003 | 09-30-13 |
| Iowa | State Program | 7 | 374 | 03-01-13 * |
| Kansas | NELAP | 7 | E-10187 | 01-31-14 |
| Kentucky | State Program | 4 | 90029 | 12-31-13 |
| Kentucky (UST) | State Program | 4 | 30 | 04-01-14 |
| Louisiana | NELAP | 6 | 02031 | 06-30-13 |
| Maine | State Program | 1 | NY00044 | 12-04-13 |
| Maryland | State Program | 3 | 294 | 03-31-13 * |
| Massachusetts | State Program | 1 | M-NY044 | 06-30-13 |
| Michigan | State Program | 5 | 9937 | 04-01-13 * |
| Minnesota | NELAP | 5 | 036-999-337 | 12-31-13 |
| New Hampshire | NELAP | 1 | 2973 | 09-11-13 |
| New Hampshire | NELAP | 1 | 2337 | 11-17-13 |
| New Jersey | NELAP | 2 | NY455 | 06-30-13 |
| New York | NELAP | 2 | 10026 | 04-01-14 |
| North Dakota | State Program | 8 | R-176 | 03-31-13 * |
| Oklahoma | State Program | 6 | 9421 | 08-31-13 |
| Oregon | NELAP | 10 | NY200003 | 06-09-13 |
| Pennsylvania | NELAP | 3 | 68-00281 | 07-31-13 |
| Rhode Island | State Program | 1 | LAO00328 | 12-31-13 |
| Tennessee | State Program | 4 | TN02970 | 04-01-14 |
| Texas | NELAP | 6 | T104704412-11-2 | 07-31-13 |
| USDA | Federal | | P330-11-00386 | 11-22-14 |
| Virginia | NELAP | 3 | 460185 | 09-14-13 |
| Washington | State Program | 10 | C784 | 02-10-14 |
| West Virginia DEP | State Program | 3 | 252 | 09-30-13 |
| Wisconsin | State Program | 5 | 998310390 | 08-31-13 |

## Laboratory: TestAmerica Sacramento

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| A2LA | DoD ELAP | | 2928-01 | 01-31-14 |
| Alaska (UST) | State Program | 10 | UST-055 | 12-18-13 |
| Arizona | State Program | 9 | AZ0708 | 08-11-13 * |
| Arkansas DEQ | State Program | 6 | 88-0691 | 06-17-13 |
| California | NELAP | 9 | 1119CA | 01-31-14 |
| Colorado | State Program | 8 | N/A | 08-31-13 |
| Connecticut | State Program | 1 | PH-0691 | 06-30-13 |
| Florida | NELAP | 4 | E87570 | 06-30-13 |
| Guam | State Program | 9 | N/A | 08-31-13 |
| Hawaii | State Program | 9 | N/A | 01-31-14 |
| Illinois | NELAP | 5 | 200060 | 03-17-14 |

* Expired certification is currently pending renewal and is considered valid.

# Certification Summary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

## Laboratory: TestAmerica Sacramento (Continued)

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Kansas | NELAP | 7 | E-10375 | 10-31-13 |
| Louisiana | NELAP | 6 | 30612 | 06-30-13 |
| Michigan | State Program | 5 | 9947 | 01-31-14 |
| Nevada | State Program | 9 | CA44 | 07-31-13 |
| New Jersey | NELAP | 2 | CA005 | 06-30-13 |
| New York | NELAP | 2 | 11666 | 04-01-14 |
| Northern Mariana Islands | State Program | 9 | MP0007 | 02-01-14 |
| Oregon | NELAP | 10 | CA200005 | 03-28-14 |
| Pennsylvania | NELAP | 3 | 68-01272 | 03-31-14 |
| South Carolina | State Program | 4 | 87014 | 06-30-13 |
| Texas | NELAP | 6 | T104704399-08-TX | 05-31-13 |
| US Fish & Wildlife | Federal | | LE148388-0 | 12-31-13 |
| USDA | Federal | | P330-11-00436 | 12-30-14 |
| USEPA UCMR | Federal | 1 | CA00044 | 11-06-14 |
| Utah | NELAP | 8 | QUAN1 | 01-31-14 |
| Washington | State Program | 10 | C581 | 05-05-13 |
| West Virginia | State Program | 3 | 9930C | 12-31-13 |
| West Virginia DEP | State Program | 3 | 334 | 07-31-13 |
| Wyoming | State Program | 8 | 8TMS-Q | 01-31-14 |

# Method Summary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 8260B | Volatile Organic Compounds (GC/MS) | SW846 | TAL BUF |
| 8270C | Semivolatile Organic Compounds (GC/MS) | SW846 | TAL BUF |
| 8015B | Nonhalogenated Organic Compounds - Direct Injection (GC) | SW846 | TAL BUF |
| 608 | Polychlorinated Biphenyls (PCBs) (GC) | 40CFR136A | TAL BUF |
| 608 | Organochlorine Pesticides in Water | 40CFR136A | TAL BUF |
| 8151A | Herbicides (GC) | SW846 | TAL BUF |
| 8280A | Dioxins and Furans (HRGC/LRMS) | SW846 | TAL SAC |
| 200.7 Rev 4.4 | Metals (ICP) | EPA | TAL BUF |
| 200.8 | Metals (ICP/MS) | EPA | TAL BUF |
| 160.4 | Solids, Total Volatile (TVS) | MCAWW | TAL BUF |
| 335.4 | Cyanide, Total | MCAWW | TAL BUF |
| SM 4500 CN I | Cyanide, Weak Acid Dissociable | SM | TAL BUF |
| SM 4500 F C | Fluoride | SM | TAL BUF |
| SM 4500 S2 F | Sulfide, Total | SM | TAL BUF |

**Protocol References:**

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# WASTE MANAGEMENT CHAIN OF CUSTODY

480-34856 Chain of Custody

| Sampler Name (Print) | Signature: |
|---|---|
| J. Hardy | Jessica Hardy |
| **Site Name:** | **Spec Request:** |
| AWM | AC |
| **Site Location:** | **Event Name:** |
| Model City, NY | ATF/NF Leachate |

| Sample Identification | Sample Date | Sample Time | MATRIX | COMP / GRAB | 8260VOA | T-METALS | ~~D-METALS~~ 6010.3-DAI | CHLORIDE/SULFATE/NITRATE PH, TSS, TDS | ALK / CARB / BICARB | ~~SM4500-S2-F-Sulfide~~ ~~HARDNESS~~ | ~~4500 FCC-Fluoride~~ ~~$NH_3$/COD~~ | ~~TOC~~ ~~TCN 335.4~~ ~~4500 CN-I Cyanide~~ | 8260.4 | PCB | Pest | herbicide | SVOC 8270C | 160.4 residue | Additional Analysis/Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | INDICATE FIELD FILTERED AND PRESERVATION TYPE IN SAMPLE CONTAINER BELOW | | | | | | | | | | | | | | | | |
| T103 | 3/21/13 | 1130 | WW | G | 2/1 | 1/3 | 2/6 | | | 1/5 | 1/6 | 1/4 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 1/6 | ID on bottles says T101 → Should be T103 |
| TB | ↓ | — | ↓ | ↓ | ↓ | | | | | | | | | | | | | | |

| RELINQUISHED BY | COMPANY | DATE | TIME | RECEIVED BY | COMPANY | DATE | TIME |
|---|---|---|---|---|---|---|---|
| Jessica Hardy | AWM | 3/21/13 | 1205 | Chuck Kahr | TA | 3/22/13 | 0900 |
| RELINQUISHED BY | COMPANY | DATE | TIME | RECEIVED BY | COMPANY | DATE | TIME |
| RELINQUISHED BY | COMPANY | DATE | TIME | RECEIVED BY | COMPANY | DATE | TIME |

| Matrix Key | | Container Key | | Preservation Key | |
|---|---|---|---|---|---|
| WW | Wastewater | 1. | Plastic | 1. | HCl, Cool to 4° |
| ~~W~~ | ~~Water/Groundwater~~ | 2. | VOA Vial | 2 | $H_2SO_4$, Cool to 4° |
| S | Solid | 3 | Sterile Plastic | 3 | $HNO_3$, Cool to 4° |
| Sl | Sludge | 4. | Amber Glass | 4. | NaOH, Cool to 4° |
| MS | Miscellaneous Solids | 5. | Widemouth Glass | 5 | NaOH/Zn Acetate, Cool to 4° |
| Ol | Oil | 6 | Other | 6. | Cool to 4° |
| A | Air | | | 7 | None |
| O | _____ | | | | |

| COMMENTS | Courier: |
|---|---|
| Temp 1.3 4.2 Ice #2 | Bill of Lading: |

TAL-8219 (1108)

# Isotope Dilution Summary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: ATINF LEACH

TestAmerica Job ID: 480-34856-1

## Method: 8280A - Dioxins and Furans (HRGC/LRMS)

**Matrix: Water** **Prep Type: Total/NA**

| | | Percent Isotope Dilution Recovery (Acceptance Limits) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | HxCDD2 | TCDD | HpCDF1 | TCDF | OCDD | | | |
| Lab Sample ID | Client Sample ID | (25-150) | (25-150) | (25-150) | (25-150) | (25-150) | | | |
| 480-34856-1 | T103 | 58 | 60 | 58 | 60 | 56 | | | |
| LCS 320-13628/2-A | Lab Control Sample | 61 | 61 | 61 | 58 | 51 | | | |
| MB 320-13628/1-A | Method Blank | 59 | 66 | 54 | 65 | 48 | | | |

**Surrogate Legend**

HxCDD2 = 13C-1,2,3,6,7,8-HxCDD
TCDD = 13C-2,3,7,8-TCDD
HpCDF1 = 13C-1,2,3,4,6,7,8-HpCDF
TCDF = 13C-2,3,7,8-TCDF
OCDD = 13C-OCDD

# Attachment 5
# 1994 Study of SLF 1-6 Leachate

SLF 1-6
LEACHATE DATA

| ORGANIC CONSTITUENT | AQUEOUS 3/15/94 | AQUEOUS 10/5/94 | AQUEOUS AVERAGE | LIGHT OIL 3/15/94 | LIGHT OIL 12/28/94 | LIGHT OIL AVERAGE | HEAVY OIL 3/23/94 | HEAVY OIL 10/5/94 | HEAVY OIL AVERAGE | OVERALL AVERAGE |
|---|---|---|---|---|---|---|---|---|---|---|
| Acenaphthene | | | ND | | | ND | | | ND | ND |
| Acenaphthylene | | | ND | | | ND | | | ND | ND |
| Acetone | 1300000 | 790000 | 1045000 | | 340000 | 340000 | | 390000 | 390000 | 969665.28 |
| Anthracene | | | ND | | 38000 | 38000 | | 25000 | 25000 | 2878.43 |
| Benzene | | | ND | | 86000 | 86000 | 590000 | 460000 | 525000 | 60250.49 |
| ~~Benzo (A) Anthracene~~ | | | ~~ND~~ | | | ~~ND~~ | 41000 | 5700 | ~~23350~~ | 2678.66 |
| Benzo (B) Fluoranthene | | | ND | | | ND | | | ND | ND |
| ~~Benzo (K) Fluoranthene~~ | | | ND | | | ND | | | ND | ND |
| ~~Benzo (A) Pyrene~~ | | | ND | | | ND | | | ND | ND |
| ~~Benzoic acid~~ | 260000 | 28000 | ~~144000~~ | | | ~~ND~~ | 4800000 | | ~~4800000~~ | 678085.36 |
| Benzyl alcohol | 8000 | 830 | 4415 | | | ND | | 76000 | 76000 | 12625.84 |
| BHC, Gamma | | | ND | | | ND | | | ND | ND |
| Bis(2-Chloroethyl)ether | | | ND | | | ND | | | ND | ND |
| ~~Bis(2-Ethylhexyl)phthalate~~ | | | ND | | 730000 | ~~730000~~ | 2800000 | 3400000 | ~~3100000~~ | 355826.15 |
| Bromodichloromethane | | | ND | | | ND | | | ND | ND |
| Bromoform | | | ND | | | ND | | | ND | ND |
| 2-Butanone (MEK) | 760000 | 720000 | 740000 | | 980000 | 980000 | 1800000 | 1400000 | 1600000 | 838723.41 |
| Butyl Benzyl Phthalate | | | ND | | 35000 | 35000 | 62000 | 56000 | 59000 | 6778.00 |
| Carbon Disulfide | | | ND | | | ND | | 220000 | 220000 | 25237.87 |
| Carbon Tetrachloride | | | ND | | 250000 | 250000 | 690000 | 560000 | 625000 | 71767.54 |
| 4-Chloroaniline | | | ND | | | ND | | | ND | ND |
| Chlorobenzene | 6000 | | 6000 | | 2200000 | 2200000 | 5400000 | 4200000 | 4800000 | 556562.07 |
| Chloroform | 15000 | 12000 | 13500 | | 570000 | 570000 | 2300000 | 1400000 | 1850000 | 224332.55 |
| Chloromethane | | | ND | | | ND | | | ND | ND |
| 2-Chlorophenol | | | ND | | | ND | | | ND | ND |
| ~~4-Chloro-3-Methylphenol~~ | | | ND | | | ND | | | ND | ND |
| ~~Chrysene~~ | | | ND | | | ND | | | ND | ND |
| DDT, 2,4- | | | ND | | | ND | | | ND | ND |
| 3,3'-Dichlorobenzidine | | | ND | | | ND | | | ND | ND |
| Dibenzofuran | | | ND | | | ND | | | ND | ND |
| 1,1-Dichloroethane | | | ND | | 88000 | 88000 | 360000 | 240000 | 300000 | 34439.58 |
| 1,2-Dichloroethane | | | ND | | 200000 | 200000 | 450000 | 240000 | 345000 | 39632.80 |
| 1,1-Dichloroethene | | | ND | | | ND | | 67000 | 67000 | 7686.08 |
| 1,2-Dichloroethene (Total) | | | ND | | | ND | 130000 | 180000 | 155000 | 17781.23 |
| 1,2-Dichlorobenzene | | | ND | | | ND | 4600000 | 3100000 | 3850000 | 441662.75 |
| 1,3-Dichlorobenzene | | | ND | | | ND | 150000 | 96000 | 123000 | 14110.26 |
| 1,4-Dichlorobenzene | | | ND | | | ND | 1400000 | 830000 | 1115000 | 127910.12 |
| trans-1,2-Dichloroethene | | | ND | | | ND | | | ND | ND |
| trans-1,3-Dichloropropene | | | ND | | | ND | | | ND | ND |
| Diethyl Ether | | | ND | | | ND | | | ND | ND |
| Diethylphthalate | 190 | | 190 | | 90000 | 90000 | 45000 | 110000 | 77500 | 9083.62 |
| ~~Dimethylphthalate~~ | | | ND | | | ND | 46000 | | ~~46000~~ | 5277.01 |
| 2,4-Dimethylphenol | | | ND | | | ND | | 150000 | 150000 | 17207.64 |
| ~~Di-n-Butylphthalate~~ | | | ND | | 340000 | ~~340000~~ | 300000 | 380000 | ~~340000~~ | 39097.88 |
| Di-n-Octyl phthalate | | | ND | | | ND | | | ND | ND |
| Endosulfan I | | | ND | | | ND | | | ND | ND |
| Ethylbenzene | | | ND | | 1600000 | 1600000 | 3700000 | 3900000 | 3800000 | 436368.74 |
| 2-Ethylnaphthalene (a) | | | ND | | | ND | | | ND | ND |
| Fluoranthene | | | ND | | | ND | | 8300 | 8300 | 952.16 |
| Fluorene | | | ND | | | ND | | | ND | ND |
| Hexachlorobenzene | | | ND | | | ND | 750000 | 850000 | 800000 | 91774.08 |
| Hexachlorobutadiene | | | ND | | | ND | 680000 | 260000 | 470000 | 53917.27 |
| Hexachloroethane | | | ND | | | ND | 130000 | | 130000 | 14913.29 |
| 2-Hexanone | | | ND | | | ND | 260000 | | 260000 | 29826.58 |
| Isophorone | 2400 | | 2400 | | | ND | | | ND | 2124.01 |
| Methanol | | | ND | | | ND | | | ND | ND |
| Methylene Chloride | 380000 | 400000 | 390000 | | 5400000 | 5400000 | 15000000 | 13000000 | 14000000 | 1952690.09 |
| 2-Methylnaphthalene | | | ND | | | ND | 360000 | 190000 | 275000 | 31547.34 |
| 2-Methylphenol | | 2000 | 2000 | | | ND | | 27000 | 27000 | 4867.39 |
| 4-Methyl-2-pentanone | 120000 | 73000 | 96500 | | 1700000 | 1700000 | 3200000 | 1700000 | 2450000 | 366930.70 |
| ~~4-Methylphenol~~ | 13000 | 3700 | 8350 | | | ND | | 160000 | ~~160000~~ | 25744.62 |
| Naphthalene | | | ND | | 1100000 | 1100000 | 320000 | 210000 | 265000 | 30703.95 |
| n-Nitrosodiphenylamine | | | ND | | | ND | | | ND | ND |
| PCB 1016 | | | ND | | | ND | | | ND | ND |
| PCB-1242 | 220 | 1600 | 910 | | 4100000 | 4100000 | 61000000 | 16000000 | ~~38500000~~ | 4418565.12 |
| PCB-1248 | | | ND | | | ND | | | ND | ND |
| PCB-1254 | | | ND | | 1400000 | 1400000 | | | ND | 386.64 |
| PCB-1260 | | 140 | 140 | | | ND | | 1700000 | 1700000 | 195143.82 |
| Pentachlorophenol | | | ND | | | ND | | 29000 | 29000 | 3326.81 |
| ~~Phenol~~ | 430000 | 240000 | 335000 | | 490000 | 490000 | 3600000 | 1400000 | ~~2500000~~ | 583406.40 |
| Phenanthrene | | | ND | | 98000 | 98000 | 46000 | 96000 | 71000 | 8172.01 |
| ~~Pyrene~~ | | | ND | | | ~~ND~~ | | 10000 | ~~10000~~ | 1147.18 |
| 1,1,2,2-Tetrachloroethane | 30000 | 22000 | 26000 | | 6800000 | 6800000 | 11000000 | 11000000 | 11000000 | 1286781.67 |
| Tetrachloroethene | 3600 | 3400 | 3500 | | 4100000 | 4100000 | 14000000 | 15000000 | 14500000 | 1667634.96 |
| Toluene | 20000 | 17000 | 18500 | | 6500000 | 6500000 | 20000000 | 21000000 | 20500000 | 2369878.44 |
| 1,2,4-Trichlorobenzene | 480 | | 480 | | 4800000 | 4800000 | 16000000 | 5900000 | 10950000 | 1257908.09 |
| 1,1,1-Trichloroethane | 28000 | 20000 | 24000 | | 6300000 | 6300000 | 19000000 | 25000000 | 22000000 | 2546767.13 |
| 1,1,2-Trichloroethane | 3800 | | 3800 | | 290000 | 290000 | 1000000 | 510000 | 755000 | 90054.90 |
| Trichloroethene | 51000 | 47000 | 49000 | | 12000000 | 12000000 | 37000000 | 41000000 | 39000000 | 4520665.59 |
| 2,4,5-Trichlorophenol | | | ND | | | ND | | 140000 | 140000 | 16060.46 |
| 2,4,6-Trichlorophenol | | | ND | | | ND | | 70000 | 70000 | 8030.23 |
| Vinyl Chloride | | | ND | | | ND | | 17000 | 17000 | 1950.20 |
| Xylenes (Total) | 3300 | 3400 | 3350 | | 8900000 | 8900000 | 20000000 | 17000000 | 18500000 | 2127698.20 |

All concentrations expressed in ug/l

FLOW BASIS — 1994 Leachate Flow Data

| | Gallons | % of Flow |
|---|---|---|
| AQUEOUS | 205094 | 0.89 |
| LIGHT OILS | 64 | 0.00 |
| HEAVY OILS | 26585 | 0.11 |
| TOTAL | 231743 | 1.00 |

# Attachment 6
# Maximum Detected Values for Select Tanks

Attachment 6

History

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1304019-01 | 304019-01RE1 | update | | | SLF7 | SLF10 | SLF11 | SLF12 |
| | | 04/03/13 | 04/03/13 | 4/24/15 | | | | | | |
| | | TK 103 | TK 103 | T-8009 | T-8001 | T-8001 | T-107 | T-109/ T-110 | T-108 | T-150 |
| | | | | 3/5/13 | ~~4/7/13~~ | 4/19 | | | | |
| Analyte | Units | 4/4/2013 6:4 | 4/4/2013 6:40:00 AM | | 4/9/15 | | (max) | (max) | (max) | (max) |
| Chloromethane | ug/L | <100000 | <50000 | ~~<1000~~ | ~~<2500~~ | | ~~<5000~~ | ~~<5000~~ | ~~<1000~~ | ~~<20~~ |
| Vinyl chloride | ug/L | <100000 | <50000 | | | | | | | |
| Bromomethane | ug/L | <100000 | <50000 | | | | | | | |
| Chloroethane | ug/L | <100000 | <50000 | | | | | | | |
| Trichlorofluoromethane | ug/L | <100000 | <50000 | | | | | | | |
| Diethyl ether | ug/L | <100000 | <50000 | | 5460 | | | | | |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <100000 | <50000 | 1050 | ~~3830~~ | | | | | |
| Acetone | ug/L | 763000 | 916000 | <1000 | | | ✓180000 | ✓236000 | ✓32000 | 362 |
| 1,1-Dichloroethene | ug/L | <100000 | <50000 | | | <1000 — | | | | |
| Methylene chloride | ug/L | 219000 | 252000 | 3680 ~~3760~~ | 3470 | 3450 | ✓167000 | ✓24900 | ~~<1000~~ ~~14100~~ | 2280 |
| Carbon disulfide | ug/L | <100000 | <50000 | | | | | | | |
| trans-1,2-Dichloroethene | ug/L | <100000 | <50000 | | | | | | | |
| 1,1-Dichloroethane | ug/L | <100000 | <50000 | | | | | | | |
| Vinyl acetate | ug/L | <100000 | <50000 | | | | | 120,000 | | |
| 2-Butanone | ug/L | 449000 | 563000 | | | | ✓179000 | ~~✓50300~~ | ✓14100 | <20 |
| Ethyl acetate | ug/L | <100000 | <50000 | | | | | | | |
| Chloroform | ug/L | <100000 | <50000 | ~~3950~~ 2170 | 4820 | | | | | |
| 1,1,1-Trichloroethane | ug/L | <100000 | <50000 | | ~~2890~~ 8670 | | | | | |
| Carbon tetrachloride | ug/L | <100000 | <50000 | 7500 | 3870 | | | | | |
| 1,2-Dichloroethane-d4 | [surr] | 109% | 110% | | | | | | | |
| 1,2-Dichloroethane | ug/L | <100000 | <50000 | | 4740 | | | | | |
| Benzene | ug/L | <100000 | <50000 | | | 1400 — | | | | |
| Trichloroethene | ug/L | <100000 | <50000 | 6580 | ~~16400~~ 9640 | 6770 | | | | |
| 1,2-Dichloropropane | ug/L | <100000 | <50000 | | | | | | | |
| Bromodichloromethane | ug/L | <100000 | <50000 | | | | | | | |
| 2-Chloroethylvinyl ether | ug/L | <100000 | <50000 | | | | | | | |
| 4-Methyl-2-pentanone | ug/L | <100000 | 69100 | | | | <5000 | ✓11900 | ✓2580 | <20 |
| cis-1,3-Dichloropropene | ug/L | <100000 | <50000 | | | | | | | |
| Toluene-d8 | [surr] | 102% | 102% | | | | | | | |
| Toluene | ug/L | <100000 | <50000 | 1130 | 3900 | | ✓5990 | | | |
| trans-1,3-Dichloropropene | ug/L | <100000 | <50000 | | | | | | | |
| 1,1,2-Trichloroethane | ug/L | <100000 | <50000 | ~~1640~~ 1120 | 2390 | | | | | |

Table 32 — T-8001 tank calcs. — first week — after first week just these two — Tables 5,22 — Tables 6,23 — Tables 7,24 — Tables 8,25

all NDs

already updated

History

| | | | | T-8009 | T-8001 | T-8001 | SF-7 | | |
|---|---|---|---|---|---|---|---|---|---|
| 4-Bromofluorobenzene | [surr] | 102% | 101% | | | | | | |
| 2-Hexanone | ug/L | <100000 | <50000 | | | | | | |
| Tetrachloroethene | ug/L | <100000 | <50000 | | 2010 | | | | |
| Dibromochloromethane | ug/L | <100000 | <50000 | | | | | | |
| Chlorobenzene | ug/L | <100000 | <50000 | 2090 | 2960 | | | | |
| Ethylbenzene | ug/L | <100000 | <50000 | | | | | | |
| Xylenes, total | ug/L | <300000 | <150000 | | | | ✓ 17600 | | |
| Styrene | ug/L | <100000 | <50000 | | | | | | |
| Bromoform | ug/L | <100000 | <50000 | | | | | | |
| 1,1,2,2-Tetrachloroethane | ug/L | <100000 | <50000 | | 1290 | | | | |
| 1,3-Dichlorobenzene | ug/L | <100000 | <50000 | | | | | | |
| 1,4-Dichlorobenzene | ug/L | <100000 | <50000 | | | | | | |
| 1,2-Dichlorobenzene | ug/L | <100000 | <50000 | 3030 | 2990 | | | | |

**CWM Chemical Services, LLC.** **Reported: 04/14/15 06:48**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Aqueous Treatment | Project: | T-8000's | Sampled: | 04/09/15 00:15 |
| Work Order: | 1504040 | Project #: | CWM | Received: | 04/09/15 06:50 |
| Lab Sample ID: | 1504040-01 | Client Sample ID: | T-8001 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **pH by Meter** *Prep Method: NONE* | | | | | | | |
| **pH** | **6.85** | | | pH Units | 04/09/15 11:02 | CJN | SM 4500 H+B** |
| **Volatiles - Aqueous** *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 1000 | ug/L | 04/09/15 14:14 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LAD | " |
| Bromomethane | ND | | 1000 | " | " | LAD | " |
| Chloroethane | ND | | 1000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LAD | " |
| Diethyl ether | ND | | 1000 | " | " | LAD | " |
| **1,1,2-Trichloro-1,2,2-trifluoroethane** | **5660** | | 1000 | " | " | LAD | " |
| Acetone | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | REC+, RPD | 1000 | " | " | LAD | " |
| **Methylene chloride** | **3470** | | 1000 | " | " | LAD | " |
| Carbon disulfide | ND | | 1000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Vinyl acetate | ND | | 1000 | " | " | LAD | " |
| 2-Butanone | ND | | 1000 | " | " | LAD | " |
| Ethyl acetate | ND | | 1000 | " | " | LAD | " |
| **Chloroform** | **4820** | | 1000 | " | " | LAD | " |
| **1,1,1-Trichloroethane** | **8670** | | 1000 | " | " | LAD | " |
| **Carbon tetrachloride** | **3870** | | 1000 | " | " | LAD | " |
| **1,2-Dichloroethane** | **4740** | | 1000 | " | " | LAD | " |
| Benzene | ND | | 1000 | " | " | LAD | " |
| **Trichloroethene** | **29000** | E | 1000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| **Toluene** | **3900** | | 1000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| **1,1,2-Trichloroethane** | **2390** | | 1000 | " | " | LAD | " |
| 2-Hexanone | ND | | 1000 | " | " | LAD | " |
| **Tetrachloroethene** | **2010** | | 1000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LAD | " |
| **Chlorobenzene** | **2960** | | 1000 | " | " | LAD | " |
| Ethylbenzene | ND | | 1000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 3000 | " | " | LAD | " |
| Styrene | ND | | 1000 | " | " | LAD | " |
| Bromoform | ND | | 1000 | " | " | LAD | " |
| **1,1,2,2-Tetrachloroethane** | **1290** | | 1000 | " | " | LAD | " |

**:WM Chemical Services, LLC.** **Reported: 04/14/15 06:48**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Aqueous Treatment | Project: | T-8000's | Sampled: | 04/09/15 00:15 |
| Work Order: | 1504040 | Project #: | CWM | Received: | 04/09/15 06:50 |
| Lab Sample ID: | 1504040-01 | Client Sample ID: | T-8001 | | Aqueous |

| ,nalyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| ,3-Dichlorobenzene | ND | | 1000 | ug/L | 04/09/15 14:14 | LAD | EPA 8260C |
| ,4-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |
| **,2-Dichlorobenzene** | **2990** | | 1000 | " | " | LAD | " |
| *urrogate: 1,2-Dichloroethane-d4* | *92.2 %* | | *85-115* | | " | LAD | " |
| *urrogate: Toluene-d8* | *101 %* | | *85-115* | | " | LAD | " |
| *urrogate: 4-Bromofluorobenzene* | *96.6 %* | | *85-115* | | " | LAD | " |

**Metals Soluble 200.7**

*Prep Method: EPA 200.7*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ilver | ND | | 0.0200 | ug/mL | 04/10/15 12:49 | AAC | EPA 200.7 Rev 4.4 |
| ,rsenic | ND | | 0.100 | " | " | AAC | " |
| arium | ND | | 0.100 | " | " | AAC | " |
| eryllium | ND | | 0.0400 | " | " | AAC | " |
| admium | ND | | 0.0200 | " | " | AAC | " |
| obalt | ND | | 0.100 | " | " | AAC | " |
| hromium | ND | | 0.100 | " | " | AAC | " |
| opper | ND | | 0.100 | " | " | AAC | " |
| **ron** | **9.07** | | 0.100 | " | " | AAC | " |
| **Manganese** | **2.21** | | 0.100 | " | " | AAC | " |
| Molybdenum | ND | | 0.100 | " | " | AAC | " |
| **lickel** | **0.197** | | 0.100 | " | " | AAC | " |
| ,ead | ND | | 0.100 | " | " | AAC | " |
| ,ntimony | ND | | 0.100 | " | " | AAC | " |
| elenium | ND | | 0.100 | " | " | AAC | " |
| in | ND | | 0.0400 | " | " | AAC | " |
| itanium | ND | | 0.0400 | " | " | AAC | " |
| hallium | ND | | 0.100 | " | " | AAC | " |
| anadium | ND | | 0.100 | " | " | AAC | " |
| inc | ND | | 0.100 | " | " | AAC | " |

**CWM Chemical Services, LLC.** **Reported: 04/17/15 09:21**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Aqueous Treatment | Project: | T-8000's | Sampled: | 04/15/15 08:00 |
| Work Order: | 1504073 | Project #: | CWM | Received: | 04/15/15 09:00 |
| Lab Sample ID: | 1504073-01 | Client Sample ID: | T-8001 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **pH by Meter** *Prep Method: NONE* | | | | | | | |
| **pH** | **6.93** | | | pH Units | 04/15/15 09:52 | CJN | SM 4500 H+B** |
| **Volatiles - Aqueous** *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 1000 | ug/L | 04/15/15 12:39 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LAD | " |
| Bromomethane | ND | | 1000 | " | " | LAD | " |
| Chloroethane | ND | | 1000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LAD | " |
| Diethyl ether | ND | | 1000 | " | " | LAD | " |
| **1,1,2-Trichloro-1,2,2-trifluoroethane** | **2650** | | 1000 | " | " | LAD | " |
| Acetone | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| **Methylene chloride** | **1900** | | 1000 | " | " | LAD | " |
| Carbon disulfide | ND | | 1000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Vinyl acetate | ND | | 1000 | " | " | LAD | " |
| 2-Butanone | ND | | 1000 | " | " | LAD | " |
| Ethyl acetate | ND | | 1000 | " | " | LAD | " |
| **Chloroform** | **3540** | | 1000 | " | " | LAD | " |
| **1,1,1-Trichloroethane** | **5050** | | 1000 | " | " | LAD | " |
| **Carbon tetrachloride** | **2200** | | 1000 | " | " | LAD | " |
| **1,2-Dichloroethane** | **3700** | | 1000 | " | " | LAD | " |
| Benzene | ND | | 1000 | " | " | LAD | " |
| **Trichloroethene** | **16400** | | 1000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| Toluene | ND | | 1000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| **1,1,2-Trichloroethane** | **1780** | | 1000 | " | " | LAD | " |
| 2-Hexanone | ND | | 1000 | " | " | LAD | " |
| **Tetrachloroethene** | **1200** | | 1000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LAD | " |
| **Chlorobenzene** | **1540** | | 1000 | " | " | LAD | " |
| Ethylbenzene | ND | | 1000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 3000 | " | " | LAD | " |
| Styrene | ND | | 1000 | " | " | LAD | " |
| Bromoform | ND | | 1000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 04/17/15 09:21**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Aqueous Treatment | Project: | T-8000's | Sampled: | 04/15/15 08:00 |
| Work Order: | 1504073 | Project #: | CWM | Received: | 04/15/15 09:00 |
| Lab Sample ID: | 1504073-01 | Client Sample ID: | T-8001 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,3-Dichlorobenzene | ND | | 1000 | ug/L | 04/15/15 12:39 | LAD | EPA 8260C |
| 1,4-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |
| **1,2-Dichlorobenzene** | **1240** | | 1000 | " | " | LAD | " |
| *Surrogate: 1,2-Dichloroethane-d4* | *94.9 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *103 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *98.1 %* | | *85-115* | | " | LAD | " |
| **Metals Soluble 200.7** | | | | | | | |
| *Prep Method: EPA 200.7* | | | | | | | |
| Silver | ND | | 0.0200 | ug/mL | 04/16/15 11:17 | AAC | EPA 200.7 Rev 4.4 |
| Arsenic | ND | | 0.100 | " | " | AAC | " |
| Barium | ND | | 0.100 | " | " | AAC | " |
| Beryllium | ND | | 0.0400 | " | " | AAC | " |
| Cadmium | ND | | 0.0200 | " | " | AAC | " |
| Cobalt | ND | | 0.100 | " | " | AAC | " |
| Chromium | ND | | 0.100 | " | " | AAC | " |
| Copper | ND | | 0.100 | " | " | AAC | " |
| **Iron** | **0.345** | | 0.100 | " | " | AAC | " |
| **Manganese** | **6.10** | | 0.100 | " | " | AAC | " |
| Molybdenum | ND | | 0.100 | " | " | AAC | " |
| **Nickel** | **0.169** | | 0.100 | " | " | AAC | " |
| Lead | ND | | 0.100 | " | " | AAC | " |
| Antimony | ND | | 0.100 | " | " | AAC | " |
| Selenium | ND | | 0.100 | " | " | AAC | " |
| Tin | ND | | 0.0400 | " | " | AAC | " |
| Titanium | ND | | 0.0400 | " | " | AAC | " |
| Thallium | ND | | 0.100 | " | " | AAC | " |
| Vanadium | ND | | 0.100 | " | " | AAC | " |
| Zinc | ND | | 0.100 | " | " | AAC | " |

| Parameter | Units | Analytical Method | SLF-7 T-107 10/18/2011 | SLF-7 T-107 2/1/2012 | SLF-7 T-107 7/23/2012 |
|---|---|---|---|---|---|
| **Volatile Organic Compounds - Purgeables (10)** | | | | | |
| Chloromethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| Vinyl Chloride | µg/L | 8260C | <10000 | <5000 | <50000 |
| Bromomethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| Chloroethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| Trichlorofluoromethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| Diethyl ether | µg/L | 8260C | <10000 | <5000 | <50000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| Acetone | µg/L | 8260C | 180000 | 56600 | 177000 |
| 1,1-Dichloroethene | µg/L | 8260C | <10000 | <5000 | <50000 |
| Methylene chloride | µg/L | 8260C | 48000 | 64000 | 167000 |
| Carbon disulfide | µg/L | 8260C | <10000 | <5000 | <50000 |
| trans-1,2-Dichlorethene | µg/L | 8260C | <10000 | <5000 | <50000 |
| 1,1-Dichloroethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| Vinyl acetate | µg/L | 8260C | <10000 | <5000 | <50000 |
| 2-Butanone | µg/L | 8260C | 99000 | 49500 | 179000 |
| Ethyl acetate | µg/L | 8260C | <10000 | <5000 | <50000 |
| Chloroform | µg/L | 8260C | <10000 | <5000 | <50000 |
| 1,1,1-Trichloroethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| Carbon tetrachloride | µg/L | 8260C | <10000 | <5000 | <50000 |
| 1,2-Dichloroethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| Benzene | µg/L | 8260C | <10000 | <5000 | <50000 |
| Trichloroethene | µg/L | 8260C | <10000 | <5000 | <50000 |
| 1,2-Dichlropropane | µg/L | 8260C | <10000 | <5000 | <50000 |
| Bromodichloromethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| 2-Chloroethylvinyl ether | µg/L | 8260C | <10000 | <5000 | <50000 |
| 4-Methyl-2-pentanone | µg/L | 8260C | <10000 | <5000 | <50000 |
| cis-1,3-Dichloropropene | µg/L | 8260C | <10000 | <5000 | <50000 |
| Toluene | µg/L | 8260C | <10000 | 5990 | <50000 |
| trans-1,3-Dichloropropene | µg/L | 8260C | <10000 | <5000 | <50000 |
| 1,1,2-Trichloroethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| 2-Hexanone | µg/L | 8260C | <10000 | <5000 | <50000 |
| Tetrachloroethene | µg/L | 8260C | <10000 | <5000 | <50000 |
| Dibromochloromethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| Chlorobenzene | µg/L | 8260C | <10000 | <5000 | <50000 |

| | | | | | |
|---|---|---|---|---|---|
| Ethylbenezene | µg/L | 8260C | <10000 | <5000 | <50000 |
| Xylenes, total | µg/L | 8260C | <30000 | 17600 | <150000 |
| Styrene | µg/L | 8260C | <10000 | <5000 | <50000 |
| Bromoform | µg/L | 8260C | <10000 | <5000 | <50000 |
| 1,1,2,2-Tetrachloroethane | µg/L | 8260C | <10000 | <5000 | <50000 |
| 1,3-Dichlorobenzene | µg/L | 8260C | <10000 | <5000 | <50000 |
| 1,4-Dichlorobenzene | µg/L | 8260C | <10000 | <5000 | <50000 |
| 1,2-Dichlorobenzene | µg/L | 8260C | <10000 | <5000 | <50000 |
| **Semi-Volatile Organic Compounds - Base Acid/Neutrals** | | | | | |
| 1,2,4-Trichlorobenzene | µg/L | 625 | <5000 | | <5000 |
| 1,2-Dichlorobenzene | µg/L | 625 | <5000 | | <5000 |
| 1,3-Dichlorobenzene | µg/L | 625 | <5000 | | <5000 |
| 1,4-Dichlorobenzene | µg/L | 625 | <5000 | | <5000 |
| 2,4,5-Trichlorophenol | µg/L | 625 | <5000 | | <5000 |
| 2,4,6-Trichlorophenol | µg/L | 625 | <5000 | | <5000 |
| 2,4-Dichlorophenol | µg/L | 625 | <5000 | | <5000 |
| 2,4-Dimethylphenol | µg/L | 625 | <5000 | | <5000 |
| 2,4-Dinitrophenol | µg/L | 625 | <25000 | | <25000 |
| 2,4-Dinitrotoluene | µg/L | 625 | <5000 | | <5000 |
| 2,6-Dinitrotoluene | µg/L | 625 | <5000 | | <5000 |
| 2-Chloronaphthalene | µg/L | 625 | <5000 | | <5000 |
| 2-Chlorophenol | µg/L | 625 | <5000 | | <5000 |
| 2-Methylnaphthalene | µg/L | 625 | | | |
| 2-Methylphenol | µg/L | 625 | | | |
| 2-Nitrophenol | µg/L | 625 | <5000 | | <5000 |
| 3,3´-Dichlorobenzidine | µg/L | 625 | <10000 | | <10000 |
| 4,6-Dinitro-2-methylphenol | µg/L | 625 | <25000 | | <25000 |
| 4-Bromophenyl phenyl ether | µg/L | 625 | <5000 | | <5000 |
| 4-Chloro-3-methylphenol | µg/L | 625 | <5000 | | <5000 |
| 4-Chlorophenyl phenyl ether | µg/L | 625 | <5000 | | <5000 |
| 4-Methylphenol | µg/L | 625 | | | |
| 4-Nitrophenol | µg/L | 625 | <25000 | | <25000 |
| Acenaphthene | µg/L | 625 | <5000 | | <5000 |
| Acenaphthylene | µg/L | 625 | <5000 | | <5000 |
| Anthracene | µg/L | 625 | <5000 | | <5000 |
| Azobenzene | µg/L | 625 | <5000 | | <5000 |
| Benz(a)anthracene | µg/L | 625 | <5000 | | <5000 |
| Benzidine | µg/L | 625 | <25000 | | <25000 |

| | | | | | |
|---|---|---|---|---|---|
| Benzo(a)pyrene | µg/L | 625 | <5000 | | <5000 |
| Benzo(b)fluoranthene | µg/L | 625 | <5000 | | <5000 |
| Benzo(g,h,i)perylene | µg/L | 625 | <5000 | | <5000 |
| Benzo(k)fluoranthene | µg/L | 625 | <5000 | | <5000 |
| Benzothiazole | µg/L | 625 | | | |
| Bis(2-chloroethoxy)methane | µg/L | 625 | <5000 | | <5000 |
| Bis(2-chloroethyl)ether | µg/L | 625 | <5000 | | <5000 |
| Bis(2-chloroisopropyl)ether | µg/L | 625 | <5000 | | <5000 |
| Bis(2-ethylhexyl)phthalate | µg/L | 625 | <5000 | | <5000 |
| Butyl benzyl phthalate | µg/L | 625 | <5000 | | <5000 |
| Carbazole | µg/L | 625 | <5000 | | <5000 |
| Chrysene | µg/L | 625 | <5000 | | <5000 |
| Dibenz(a,h)anthracene | µg/L | 625 | <5000 | | <5000 |
| Dibenzofuran | µg/L | 625 | <5000 | | <5000 |
| Diethyl phthalate | µg/L | 625 | <5000 | | <5000 |
| Dimethyl phthalate | µg/L | 625 | <5000 | | <5000 |
| Di-n-butyl phthalate | µg/L | 625 | <5000 | | <5000 |
| Di-n-octyl phthalate | µg/L | 625 | <5000 | | <5000 |
| Fluoranthene | µg/L | 625 | <5000 | | <5000 |
| Fluorene | µg/L | 625 | <5000 | | <5000 |
| Hexachlorobenzene | µg/L | 625 | <5000 | | <5000 |
| Hexachlorobutadiene | µg/L | 625 | <5000 | | <5000 |
| Hexachlorocyclopentadiene | µg/L | 625 | <5000 | | <5000 |
| Hexachloroethane | µg/L | 625 | <5000 | | <5000 |
| Hexamethylbenzene | µg/L | 625 | | | |
| Indeno(1,2,3-cd)pyrene | µg/L | 625 | <5000 | | <5000 |
| Isophorone | µg/L | 625 | <5000 | | <5000 |
| Naphthalene | µg/L | 625 | <5000 | | <5000 |
| n-decane | µg/L | 625 | | | |
| Nitrobenzene | µg/L | 625 | <5000 | | <5000 |
| N-Nitrosodimethylamine | µg/L | 625 | <5000 | | <5000 |
| N-Nitrosodi-n-propylamine | µg/L | 625 | <5000 | | <5000 |
| N-Nitrosodiphenylamine | µg/L | 625 | <5000 | | <5000 |
| n-Octadecane | µg/L | 625 | | | |
| Pentachlorophenol | µg/L | 625 | <25000 | | <25000 |
| Phenanthrene | µg/L | 625 | <5000 | | <5000 |
| Phenol | µg/L | 625 | 73000 | | 52000 |
| Pyrene | µg/L | 625 | <5000 | | <5000 |

| | | | | | |
|---|---|---|---|---|---|
| Pyridine | µg/L | 625 | | | |
| **PCB Aroclor** | | | | | |
| Aroclor 1016 | µg/L | 608 | <26.0 | | <26 |
| Aroclor 1221 | µg/L | 608 | <26.0 | | <26 |
| Aroclor 1232 | µg/L | 608 | <26.0 | | <26 |
| Aroclor 1242 | µg/L | 608 | 152 | | 480 |
| Aroclor 1248 | µg/L | 608 | <26.0 | | <26 |
| Aroclor 1254 | µg/L | 608 | <26.0 | | <26 |
| Aroclor 1260 | µg/L | 608 | <26.0 | | <26 |

| Parameter | Units | Analytical Method | T109 2/2/2012 | SLF-10 T-110 10/18/2011 | SLF-10 T-110 10/19/2011 | SLF-10 T-110 07/23/2012 |
|---|---|---|---|---|---|---|
| **Volatile Organic Compounds - Purgeables (10)** | | | | | | |
| Chloromethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Vinyl Chloride | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Bromomethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Chloroethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Trichlorofluoromethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Diethyl ether | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Acetone | µg/L | 8260C | 34700 | | 102000 | 236000 |
| 1,1-Dichloroethene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Methylene chloride | µg/L | 8260C | 24900 | | 21700 | <20000 |
| Carbon disulfide | µg/L | 8260C | <5000 | | <10000 | <20000 |
| trans-1,2-Dichlorethene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 1,1-Dichloroethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Vinyl acetate | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 2-Butanone | µg/L | 8260C | 21400 | | 50300 | 120000 |
| Ethyl acetate | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Chloroform | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 1,1,1-Trichloroethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Carbon tetrachloride | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 1,2-Dichloroethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Benzene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Trichloroethene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 1,2-Dichlropropane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Bromodichloromethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 2-Chloroethylvinyl ether | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 4-Methyl-2-pentanone | µg/L | 8260C | 7170 | | 11900 | <20000 |
| cis-1,3-Dichloropropene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Toluene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| trans-1,3-Dichloropropene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 1,1,2-Trichloroethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 2-Hexanone | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Tetrachloroethene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Dibromochloromethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Chlorobenzene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Ethylbenezene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Xylenes, total | µg/L | 8260C | <15000 | | <30000 | <60000 |
| Styrene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| Bromoform | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 1,1,2,2-Tetrachloroethane | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 1,3-Dichlorobenzene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| 1,4-Dichlorobenzene | µg/L | 8260C | <5000 | | <10000 | <20000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | µg/L | 8260C | <5000 | | <10000 | <20000 |
| **Semi-Volatile Organic Compounds - Base Acid/Neutrals** | | | | | | |
| 1,2,4-Trichlorobenzene | µg/L | 625 | <2500 | <1000 | | <2500 |
| 1,2-Dichlorobenzene | µg/L | 625 | <2500 | <1000 | | <2500 |
| 1,3-Dichlorobenzene | µg/L | 625 | <2500 | <1000 | | <2500 |
| 1,4-Dichlorobenzene | µg/L | 625 | <2500 | <1000 | | <2500 |
| 2,4,5-Trichlorophenol | µg/L | 625 | <2500 | <1000 | | <2500 |
| 2,4,6-Trichlorophenol | µg/L | 625 | <2500 | <1000 | | <2500 |
| 2,4-Dichlorophenol | µg/L | 625 | <2500 | <1000 | | <2500 |
| 2,4-Dimethylphenol | µg/L | 625 | <2500 | 1200 | | <2500 |
| 2,4-Dinitrophenol | µg/L | 625 | <12000 | <5000 | | <12000 |
| 2,4-Dinitrotoluene | µg/L | 625 | <2500 | <1000 | | <2500 |
| 2,6-Dinitrotoluene | µg/L | 625 | <2500 | <1000 | | <2500 |
| 2-Chloronaphthalene | µg/L | 625 | <2500 | <1000 | | <2500 |
| 2-Chlorophenol | µg/L | 625 | <2500 | <1000 | | <2500 |
| 2-Methylnaphthalene | µg/L | 625 | | | | |
| 2-Methylphenol | µg/L | 625 | | | | |
| 2-Nitrophenol | µg/L | 625 | <2500 | <1000 | | <2500 |
| 3,3'-Dichlorobenzidine | µg/L | 625 | <5000 | <2000 | | <5000 |
| 4,6-Dinitro-2-methylphenol | µg/L | 625 | <12000 | <5000 | | <12000 |
| 4-Bromophenyl phenyl ether | µg/L | 625 | <2500 | <1000 | | <2500 |
| 4-Chloro-3-methylphenol | µg/L | 625 | <2500 | <1000 | | <2500 |
| 4-Chlorophenyl phenyl ether | µg/L | 625 | <2500 | <1000 | | <2500 |
| 4-Methylphenol | µg/L | 625 | | | | |
| 4-Nitrophenol | µg/L | 625 | <12000 | <5000 | | <12000 |
| Acenaphthene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Acenaphthylene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Anthracene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Azobenzene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Benz(a)anthracene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Benzidine | µg/L | 625 | <12000 | <5000 | | <12000 |
| Benzo(a)pyrene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Benzo(b)fluoranthene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Benzo(g,h,i)perylene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Benzo(k)fluoranthene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Benzothiazole | µg/L | 625 | | | | |
| Bis(2-chloroethoxy)methane | µg/L | 625 | <2500 | <1000 | | <2500 |
| Bis(2-chloroethyl)ether | µg/L | 625 | <2500 | <1000 | | <2500 |
| Bis(2-chloroisopropyl)ether | µg/L | 625 | <2500 | <1000 | | <2500 |
| Bis(2-ethylhexyl)phthalate | µg/L | 625 | <2500 | <1000 | | <2500 |
| Butyl benzyl phthalate | µg/L | 625 | <2500 | <1000 | | <2500 |
| Carbazole | µg/L | 625 | <2500 | <1000 | | <2500 |
| Chrysene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Dibenz(a,h)anthracene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Dibenzofuran | µg/L | 625 | <2500 | <1000 | | <2500 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Diethyl phthalate | µg/L | 625 | <2500 | <1000 | | <2500 |
| Dimethyl phthalate | µg/L | 625 | <2500 | <1000 | | <2500 |
| Di-n-butyl phthalate | µg/L | 625 | <2500 | <1000 | | <2500 |
| Di-n-octyl phthalate | µg/L | 625 | <2500 | <1000 | | <2500 |
| Fluoranthene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Fluorene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Hexachlorobenzene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Hexachlorobutadiene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Hexachlorocyclopentadiene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Hexachloroethane | µg/L | 625 | <2500 | <1000 | | <2500 |
| Hexamethylbenzene | µg/L | 625 | | | | |
| Indeno(1,2,3-cd)pyrene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Isophorone | µg/L | 625 | <2500 | <1000 | | <2500 |
| Naphthalene | µg/L | 625 | <2500 | <1000 | | <2500 |
| n-decane | µg/L | 625 | | | | |
| Nitrobenzene | µg/L | 625 | <2500 | <1000 | | <2500 |
| N-Nitrosodimethylamine | µg/L | 625 | <2500 | <1000 | | <2500 |
| N-Nitrosodi-n-propylamine | µg/L | 625 | <2500 | <1000 | | <2500 |
| N-Nitrosodiphenylamine | µg/L | 625 | <2500 | <1000 | | <2500 |
| n-Octadecane | µg/L | 625 | | | | |
| Pentachlorophenol | µg/L | 625 | <12000 | <5000 | | <12000 |
| Phenanthrene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Phenol | µg/L | 625 | 22000 | 14000 | | 28000 |
| Pyrene | µg/L | 625 | <2500 | <1000 | | <2500 |
| Pyridine | µg/L | 625 | | | | |
| **PCB Aroclor** | | | | | | |
| Aroclor 1016 | µg/L | 608 | <1.3 | <1.30 | | <1.3 |
| Aroclor 1221 | µg/L | 608 | <1.3 | <1.30 | | <1.3 |
| Aroclor 1232 | µg/L | 608 | <1.3 | <1.30 | | <1.3 |
| Aroclor 1242 | µg/L | 608 | 12.6 | 15.3 | | 3.04 |
| Aroclor 1248 | µg/L | 608 | <1.3 | <1.30 | | <1.3 |
| Aroclor 1254 | µg/L | 608 | <1.3 | <1.30 | | 2.95 |
| Aroclor 1260 | µg/L | 608 | 5.25 | <1.30 | | <1.3 |

| Parameter | Units | Analytical Method | T-108 10/18/2011 | T-108 2/7/2012 | T-108 07/23/2012 | T-108 08/06/2012 |
|---|---|---|---|---|---|---|
| **Volatile Organic Compounds - Purgeables (10)** | | | | | | |
| Chloromethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Vinyl Chloride | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Bromomethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Chloroethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Trichlorofluoromethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Diethyl ether | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Acetone | µg/L | 8260C | 32000 | | 8880 | 5810 |
| 1,1-Dichloroethene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Methylene chloride | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Carbon disulfide | µg/L | 8260C | <2000 | | <1000 | <1000 |
| trans-1,2-Dichlorethene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 1,1-Dichloroethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Vinyl acetate | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 2-Butanone | µg/L | 8260C | 14100 | | 3650 | 3210 |
| Ethyl acetate | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Chloroform | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 1,1,1-Trichloroethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Carbon tetrachloride | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 1,2-Dichloroethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Benzene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Trichloroethene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 1,2-Dichlropropane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Bromodichloromethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 2-Chloroethylvinyl ether | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 4-Methyl-2-pentanone | µg/L | 8260C | 2580 | | 1230 | <1000 |
| cis-1,3-Dichloropropene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Toluene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| trans-1,3-Dichloropropene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 1,1,2-Trichloroethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 2-Hexanone | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Tetrachloroethene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Dibromochloromethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Chlorobenzene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Ethylbenezene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Xylenes, total | µg/L | 8260C | <6000 | | <3000 | <3000 |
| Styrene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| Bromoform | µg/L | 8260C | <2000 | | <1000 | <1000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1,1,2,2-Tetrachloroethane | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 1,3-Dichlorobenzene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 1,4-Dichlorobenzene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| 1,2-Dichlorobenzene | µg/L | 8260C | <2000 | | <1000 | <1000 |
| **Semi-Volatile Organic Compounds - Base Acid/Neutrals** | | | | | | |
| 1,2,4-Trichlorobenzene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 1,2-Dichlorobenzene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 1,3-Dichlorobenzene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 1,4-Dichlorobenzene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 2,4,5-Trichlorophenol | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 2,4,6-Trichlorophenol | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 2,4-Dichlorophenol | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 2,4-Dimethylphenol | µg/L | 625 | 280 | <25000 | 390 | <1000 |
| 2,4-Dinitrophenol | µg/L | 625 | <1200 | <120000 | <750 | <5000 |
| 2,4-Dinitrotoluene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 2,6-Dinitrotoluene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 2-Chloronaphthalene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 2-Chlorophenol | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 2-Methylnaphthalene | µg/L | 625 | | | | |
| 2-Methylphenol | µg/L | 625 | | | | |
| 2-Nitrophenol | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 3,3´-Dichlorobenzidine | µg/L | 625 | <500 | <50000 | <300 | <2000 |
| 4,6-Dinitro-2-methylphenol | µg/L | 625 | <1200 | <120000 | <750 | <5000 |
| 4-Bromophenyl phenyl ether | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 4-Chloro-3-methylphenol | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 4-Chlorophenyl phenyl ether | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| 4-Methylphenol | µg/L | 625 | | | | |
| 4-Nitrophenol | µg/L | 625 | <1200 | <120000 | <750 | <5000 |
| Acenaphthene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Acenaphthylene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Anthracene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Azobenzene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Benz(a)anthracene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Benzidine | µg/L | 625 | <1200 | <120000 | <750 | <5000 |
| Benzo(a)pyrene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Benzo(b)fluoranthene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Benzo(g,h,i)perylene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Benzo(k)fluoranthene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Benzothiazole | µg/L | 625 | | | | |
| Bis(2-chloroethoxy)methane | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Bis(2-chloroethyl)ether | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Bis(2-chloroisopropyl)ether | µg/L | 625 | <250 | <25000 | <150 | <1000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Bis(2-ethylhexyl)phthalate | µg/L | 625 | 1000 | 200000 | 940 | 27000 |
| Butyl benzyl phthalate | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Carbazole | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Chrysene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Dibenz(a,h)anthracene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Dibenzofuran | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Diethyl phthalate | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Dimethyl phthalate | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Di-n-butyl phthalate | µg/L | 625 | 270 | <25000 | <150 | 1500 |
| Di-n-octyl phthalate | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Fluoranthene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Fluorene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Hexachlorobenzene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Hexachlorobutadiene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Hexachlorocyclopentadiene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Hexachloroethane | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Hexamethylbenzene | µg/L | 625 | | | | |
| Indeno(1,2,3-cd)pyrene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Isophorone | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Naphthalene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| n-decane | µg/L | 625 | | | | |
| Nitrobenzene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| N-Nitrosodimethylamine | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| N-Nitrosodi-n-propylamine | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| N-Nitrosodiphenylamine | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| n-Octadecane | µg/L | 625 | | | | |
| Pentachlorophenol | µg/L | 625 | <1200 | <120000 | <750 | <5000 |
| Phenanthrene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Phenol | µg/L | 625 | 1700 | <25000 | 990 | <1000 |
| Pyrene | µg/L | 625 | <250 | <25000 | <150 | <1000 |
| Pyridine | µg/L | 625 | | | | |
| **PCB Aroclor** | | | | | | |
| Aroclor 1016 | µg/L | 608 | <26.0 | <1300 | <13 | <52 |
| Aroclor 1221 | µg/L | 608 | <26.0 | <1300 | <13 | <52 |
| Aroclor 1232 | µg/L | 608 | <26.0 | <1300 | <13 | <52 |
| Aroclor 1242 | µg/L | 608 | <26.0 | <1300 | 51 | 457 |
| Aroclor 1248 | µg/L | 608 | <26.0 | <1300 | <13 | <52 |
| Aroclor 1254 | µg/L | 608 | 188 | 21500 | 171 | 1590 |
| Aroclor 1260 | µg/L | 608 | 133 | 10800 | 78.1 | 892 |

| Parameter | Units | Analytical Method | L-54 2/14/2012 | T-150 2/14/2012 | T-150 2/14/2012 | T-150 7/23/2012 |
|---|---|---|---|---|---|---|
| **Volatile Organic Compounds - Purgeables (10)** | | | | | | |
| Chloromethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Vinyl Chloride | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Bromomethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Chloroethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Trichlorofluoromethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Diethyl ether | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Acetone | µg/L | 8260C | <50.0 | 60.1 | 362 | |
| 1,1-Dichloroethene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Methylene chloride | µg/L | 8260C | <50.0 | <20.0 | 2280 | |
| Carbon disulfide | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| trans-1,2-Dichlorethene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 1,1-Dichloroethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Vinyl acetate | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 2-Butanone | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Ethyl acetate | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Chloroform | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 1,1,1-Trichloroethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Carbon tetrachloride | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 1,2-Dichloroethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Benzene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Trichloroethene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 1,2-Dichlropropane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Bromodichloromethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 2-Chloroethylvinyl ether | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 4-Methyl-2-pentanone | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| cis-1,3-Dichloropropene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Toluene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| trans-1,3-Dichloropropene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 1,1,2-Trichloroethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 2-Hexanone | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Tetrachloroethene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Dibromochloromethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Chlorobenzene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Ethylbenezene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Xylenes, total | µg/L | 8260C | <150 | <60.0 | <150 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Styrene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| Bromoform | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 1,1,2,2-Tetrachloroethane | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 1,3-Dichlorobenzene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 1,4-Dichlorobenzene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| 1,2-Dichlorobenzene | µg/L | 8260C | <50.0 | <20.0 | <50.0 | |
| **Semi-Volatile Organic Compounds - Base Acid/Neutrals** | | | | | | |
| 1,2,4-Trichlorobenzene | µg/L | 625 | <50 | <50 | | <5 |
| 1,2-Dichlorobenzene | µg/L | 625 | <50 | <50 | | <5 |
| 1,3-Dichlorobenzene | µg/L | 625 | <50 | <50 | | <5 |
| 1,4-Dichlorobenzene | µg/L | 625 | <50 | <50 | | <5 |
| 2,4,5-Trichlorophenol | µg/L | 625 | <50 | <50 | | <5 |
| 2,4,6-Trichlorophenol | µg/L | 625 | <50 | <50 | | <5 |
| 2,4-Dichlorophenol | µg/L | 625 | <50 | <50 | | <5 |
| 2,4-Dimethylphenol | µg/L | 625 | <50 | <50 | | <5 |
| 2,4-Dinitrophenol | µg/L | 625 | <250 | <250 | | <25 |
| 2,4-Dinitrotoluene | µg/L | 625 | <50 | <50 | | <5 |
| 2,6-Dinitrotoluene | µg/L | 625 | <50 | <50 | | <5 |
| 2-Chloronaphthalene | µg/L | 625 | <50 | <50 | | <5 |
| 2-Chlorophenol | µg/L | 625 | <50 | <50 | | <5 |
| 2-Methylnaphthalene | µg/L | 625 | | | | |
| 2-Methylphenol | µg/L | 625 | | | | |
| 2-Nitrophenol | µg/L | 625 | <50 | <50 | | <5 |
| 3,3´-Dichlorobenzidine | µg/L | 625 | <100 | <100 | | <10 |
| 4,6-Dinitro-2-methylphenol | µg/L | 625 | <250 | <250 | | <25 |
| 4-Bromophenyl phenyl ether | µg/L | 625 | <50 | <50 | | <5 |
| 4-Chloro-3-methylphenol | µg/L | 625 | <50 | <50 | | <5 |
| 4-Chlorophenyl phenyl ether | µg/L | 625 | <50 | <50 | | <5 |
| 4-Methylphenol | µg/L | 625 | | | | |
| 4-Nitrophenol | µg/L | 625 | <250 | <250 | | <25 |
| Acenaphthene | µg/L | 625 | <50 | <50 | | <5 |
| Acenaphthylene | µg/L | 625 | <50 | <50 | | <5 |
| Anthracene | µg/L | 625 | <50 | <50 | | <5 |
| Azobenzene | µg/L | 625 | <50 | <50 | | <5 |
| Benz(a)anthracene | µg/L | 625 | <50 | <50 | | <5 |
| Benzidine | µg/L | 625 | <250 | <250 | | <25 |
| Benzo(a)pyrene | µg/L | 625 | <50 | <50 | | <5 |
| Benzo(b)fluoranthene | µg/L | 625 | <50 | <50 | | <5 |
| Benzo(g,h,i)perylene | µg/L | 625 | <50 | <50 | | <5 |
| Benzo(k)fluoranthene | µg/L | 625 | <50 | <50 | | <5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Benzothiazole | µg/L | 625 | | | | |
| Bis(2-chloroethoxy)methane | µg/L | 625 | <50 | <50 | | <5 |
| Bis(2-chloroethyl)ether | µg/L | 625 | <50 | <50 | | <5 |
| Bis(2-chloroisopropyl)ether | µg/L | 625 | <50 | <50 | | <5 |
| Bis(2-ethylhexyl)phthalate | µg/L | 625 | <50 | 330 | | <5 |
| Butyl benzyl phthalate | µg/L | 625 | <50 | <50 | | <5 |
| Carbazole | µg/L | 625 | <50 | <50 | | <5 |
| Chrysene | µg/L | 625 | <50 | <50 | | <5 |
| Dibenz(a,h)anthracene | µg/L | 625 | <50 | <50 | | <5 |
| Dibenzofuran | µg/L | 625 | <50 | <50 | | <5 |
| Diethyl phthalate | µg/L | 625 | <50 | <50 | | <5 |
| Dimethyl phthalate | µg/L | 625 | <50 | <50 | | <5 |
| Di-n-butyl phthalate | µg/L | 625 | <50 | <50 | | <5 |
| Di-n-octyl phthalate | µg/L | 625 | <50 | <50 | | <5 |
| Fluoranthene | µg/L | 625 | <50 | <50 | | <5 |
| Fluorene | µg/L | 625 | <50 | <50 | | <5 |
| Hexachlorobenzene | µg/L | 625 | <50 | <50 | | <5 |
| Hexachlorobutadiene | µg/L | 625 | <50 | <50 | | <5 |
| Hexachlorocyclopentadiene | µg/L | 625 | <50 | <50 | | <5 |
| Hexachloroethane | µg/L | 625 | <50 | <50 | | <5 |
| Hexamethylbenzene | µg/L | 625 | | | | |
| Indeno(1,2,3-cd)pyrene | µg/L | 625 | <50 | <50 | | <5 |
| Isophorone | µg/L | 625 | <50 | <50 | | <5 |
| Naphthalene | µg/L | 625 | <50 | <50 | | <5 |
| n-decane | µg/L | 625 | | | | |
| Nitrobenzene | µg/L | 625 | <50 | <50 | | <5 |
| N-Nitrosodimethylamine | µg/L | 625 | <50 | <50 | | <5 |
| N-Nitrosodi-n-propylamine | µg/L | 625 | <50 | <50 | | <5 |
| N-Nitrosodiphenylamine | µg/L | 625 | <50 | <50 | | <5 |
| n-Octadecane | µg/L | 625 | | | | |
| Pentachlorophenol | µg/L | 625 | <250 | <250 | | <25 |
| Phenanthrene | µg/L | 625 | <50 | <50 | | <5 |
| Phenol | µg/L | 625 | <50 | <50 | | <5 |
| Pyrene | µg/L | 625 | <50 | <50 | | <5 |
| Pyridine | µg/L | 625 | | | | |
| **PCB Aroclor** | | | | | | |
| Aroclor 1016 | µg/L | 608 | <0.357 | <13.1 | | <16.8 |
| Aroclor 1221 | µg/L | 608 | <0.357 | <13.1 | | <16.8 |
| Aroclor 1232 | µg/L | 608 | <0.357 | <13.1 | | <16.8 |
| Aroclor 1242 | µg/L | 608 | <0.357 | 34.6 | | 226 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Aroclor 1248 | µg/L | 608 | <0.357 | <13.1 | | <16.8 |
| Aroclor 1254 | µg/L | 608 | <0.357 | 289 | | 92.5 |
| Aroclor 1260 | µg/L | 608 | <0.357 | 227 | | 69.7 |

# Attachment 7
# Historical Sampling Results for RMU-1 Leachate

| | | 1208078-01 | 1202062-01 | 1107076-01 | 1102051-01 | 1007059-01 | 1002080-01 | 0907120-01 | 0902088-01 | 0807173-01 | 0802071-01 | 0707061-01 | 0702073-01 | 0607077-01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 08/22/12 | 02/14/12 | 07/19/11 | 02/15/11 | 07/13/10 | 02/18/10 | 07/21/09 | 02/17/09 | 07/29/08 | 02/13/08 | 07/12/07 | 02/12/07 | 07/14/06 |
| Analyte | Units | L55 | L55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 |
| 1,1,1-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane-d4 | [surr] | 90.1% | 102% | 101% | 100% | 92.0% | 103% | 101% | 90.6% | 106% | 100% | 99.6% | 107% | 113% |
| 1,2-Dichloropropane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,3-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,4-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Butanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Chloroethylvinyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 [1] | <50.0 [1] | <50.0 |
| 2-Hexanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 4-Bromofluorobenzene | [surr] | 90.6% | 94.9% | 98.8% | 93.8% | 90.0% | 91.8% | 96.6% | 92.1% | 104% | 102% | 91.5% | 99.9% | 102% |
| 4-Methyl-2-pentanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Acetone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Benzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromodichloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromoform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromomethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon disulfide | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon tetrachloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| cis-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Dibromochloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Diethyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethylbenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Methylene chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Styrene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Tetrachloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene-d8 | [surr] | 101% | 101% | 102% | 96.2% | 93.1% | 97.0% | 100% | 95.3% | 107% | 101% | 96.5% | 109% | 104% |
| trans-1,2-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| trans-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichlorofluoromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Xylenes, total | ug/L | <150 | <150 | <150 | <150 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |

| | | 1208078-02 | 1202062-02 | 1107076-02 | 1102051-02 | 1007059-02 | 1002080-02 | 0907120-02 | 0902088-02 | 902088-02RE | 0807173-02 | 0802071-02 | 0707061-02 | 0702073-02 | 0607077-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 08/22/12 | 02/14/12 | 07/19/11 | 02/15/11 | 07/13/10 | 02/18/10 | 07/21/09 | 02/17/09 | 02/17/09 | 07/29/08 | 02/13/08 | 07/12/07 | 02/12/07 | 07/14/06 |
| Analyte | Units | L56 | L56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 |
| 1,1,1-Trichloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichlorobenzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane-d4 | [surr] | 93.1% | 102% | 104% | 102% | 91.5% | 106% | 99.6% | 90.7% | 98.6% | 104% | 99.7% | 97.4% | 109% | 111% |
| 1,2-Dichloropropane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,3-Dichlorobenzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,4-Dichlorobenzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Butanone | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | 53.3 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Chloroethylvinyl ether | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 [1] | <50.0 [1] | <50.0 [1] | <50.0 |
| 2-Hexanone | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 4-Bromofluorobenzene | [surr] | 95.5% | 93.5% | 100% | 96.1% | 91.9% | 96.2% | 97.0% | 90.9% | 99.2% | 104% | 99.8% | 91.8% | 102% | 100% |
| 4-Methyl-2-pentanone | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Acetone | ug/L | 849 | <50.0 | 877 | <50.0 | <50.0 | <50.0 | <50.0 | 1170 | 1070 | <50.0 | <50.0 | <50.0 | 86.7 | 126 |
| Benzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromodichloromethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromoform | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromomethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon disulfide | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon tetrachloride | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chlorobenzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroform | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloromethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| cis-1,3-Dichloropropene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Dibromochloromethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Diethyl ether | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethyl acetate | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethylbenzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Methylene chloride | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Styrene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Tetrachloroethene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene-d8 | [surr] | 106% | 98.3% | 104% | 98.9% | 93.8% | 101% | 98.7% | 96.4% | 103% | 103% | 99.3% | 94.4% | 109% | 102% |
| trans-1,2-Dichloroethene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| trans-1,3-Dichloropropene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichloroethene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichlorofluoromethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl acetate | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl chloride | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Xylenes, total | ug/L | <300 | <150 | <150 | <150 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |

| | | 1208078-03 | 1202062-03 | 1107076-03 | 1102051-03 | 1007059-03 | 1002080-03 | 0907120-03 | 0902088-03 | 0807173-03 | 0802071-03 | 0707061-03 | 0702073-03 | 0607077-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 08/22/12 | 02/14/12 | 07/19/11 | 02/15/11 | 07/13/10 | 02/18/10 | 07/21/09 | 02/17/09 | 07/29/08 | 02/13/08 | 07/12/07 | 02/12/07 | 07/14/06 |
| Analyte | Units | L57 | L57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 |
| 1,1,1-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane-d4 | [surr] | 91.7% | 101% | 96.2% | 99.8% | 90.7% | 105% | 97.6% | 93.1% | 103% | 99.8% | 95.7% | 105% | 113% |
| 1,2-Dichloropropane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,3-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,4-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Butanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Chloroethylvinyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 [1] | <50.0 [1] | <50.0 |
| 2-Hexanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 4-Bromofluorobenzene | [surr] | 91.8% | 95.2% | 93.9% | 94.4% | 90.0% | 94.6% | 94.0% | 94.8% | 102% | 102% | 91.0% | 101% | 103% |
| 4-Methyl-2-pentanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Acetone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Benzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromodichloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromoform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromomethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon disulfide | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon tetrachloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| cis-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Dibromochloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Diethyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethylbenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Methylene chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Styrene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Tetrachloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene-d8 | [surr] | 103% | 97.7% | 96.4% | 97.0% | 91.6% | 99.8% | 96.4% | 99.0% | 102% | 102% | 94.2% | 107% | 106% |
| trans-1,2-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| trans-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichlorofluoromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Xylenes, total | ug/L | <150 | <150 | <150 | <150 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |

| Analyte | Units | 1208078-04<br>08/22/12<br>L58 | 1202062-04<br>02/14/12<br>L58 | 1107076-04<br>07/19/11<br>L-58 | 1102051-04<br>02/15/11<br>L-58 | 1007059-04<br>07/13/10<br>L-58 | 1002080-04<br>02/18/10<br>L-58 | 0907120-04<br>07/21/09<br>L-58 | 0905095-01<br>05/18/09<br>L-58 | 0902088-04<br>02/17/09<br>L-58 | 0807173-04<br>07/29/08<br>L-58 | 0802071-04<br>02/13/08<br>L-58 | 0707061-04<br>07/12/07<br>L-58 | 0702073-04<br>02/12/07<br>L-58 | 0607077-04<br>07/14/06<br>L-58 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane-d4 | [surr] | 87.6% | 103% | 101% | 102% | 93.1% | 106% | 96.8% | 99.2% | 92.3% | 106% | 100% | 95.8% | 109% | 112% |
| 1,2-Dichloropropane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,3-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,4-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Butanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Chloroethylvinyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 [1] | <50.0 [1] | <50.0 |
| 2-Hexanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 4-Bromofluorobenzene | [surr] | 88.5% | 96.0% | 98.6% | 97.6% | 91.5% | 95.5% | 92.0% | 96.7% | 96.2% | 105% | 100% | 89.2% | 99.3% | 102% |
| 4-Methyl-2-pentanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Acetone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Benzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromodichloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromoform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromomethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon disulfide | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon tetrachloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| cis-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Dibromochloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Diethyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethylbenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Methylene chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Styrene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Tetrachloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene-d8 | [surr] | 98.8% | 102% | 101% | 100% | 94.0% | 101% | 96.6% | 99.1% | 101% | 105% | 99.1% | 93.9% | 110% | 103% |
| trans-1,2-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| trans-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichlorofluoromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Xylenes, total | ug/L | <150 | <150 | <150 | <150 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |

| | | 1208078-05 | 1202062-05 | 1107076-05 | 1102051-05 | 1007059-05 | 1002080-05 | 0907120-05 | 0902088-05 | 0807173-05 | 0802071-05 | 0707061-05 | 0702073-05 | 0607077-05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 08/22/12 | 02/14/12 | 07/19/11 | 02/15/11 | 07/13/10 | 02/18/10 | 07/21/09 | 02/17/09 | 07/29/08 | 02/13/08 | 07/12/07 | 02/12/07 | 07/14/06 |
| Analyte | Units | L59 | L59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 |
| 1,1,1-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,1,2-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,1-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,1-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,2-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,2-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,2-Dichloroethane-d4 | [surr] | 90.8% | 106% | 103% | 103% | 92.8% | 107% | 100% | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,2-Dichloropropane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 [1] | <200 [1] | <50.0 [1] | <50.0 |
| 1,3-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,4-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 2-Butanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 2-Chloroethylvinyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 2-Hexanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 4-Bromofluorobenzene | [surr] | 91.0% | 96.2% | 97.7% | 97.1% | 91.2% | 95.7% | 97.6% | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 4-Methyl-2-pentanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | 95.4% | 103% | 97.3% | 95.3% | 108% | 112% |
| Acetone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Benzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Bromodichloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Bromoform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Bromomethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Carbon disulfide | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Carbon tetrachloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Chlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 [1] | <200 | <50.0 | <50.0 |
| Chloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Chloroform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Chloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| cis-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Dibromochloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Diethyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Ethyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Ethylbenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Methylene chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Styrene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Tetrachloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | 102% | 102% | 97.0% | 92.8% | 109% | 102% |
| Toluene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Toluene-d8 | [surr] | 101% | 103% | 104% | 100% | 94.7% | 100% | 98.2% | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| trans-1,2-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| trans-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | 97.9% | 102% | 98.0% | 89.5% | 100% | 100% |
| Trichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Trichlorofluoromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Vinyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Vinyl chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <100 | <100 | <100 [1] | <200 | <50.0 | <50.0 |
| Xylenes, total | ug/L | <150 | <150 | <150 | <150 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |

| | | 1302105-01 | 1211120-01 | 1208112-01 | 1205142-01 | 1202076-01 | 1112105-01 | 1111006-01 | 1102051-06 | 1012072-01 | 1007059-06 | 1005079-01 | 1002080-06 | 0912112-01 | 0907120-06 | 0905095-02 | 0902088-06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/25/13 | 11/30/12 | 08/30/12 | 05/25/12 | 02/16/12 | 12/22/11 | 11/01/11 | 02/15/11 | 12/15/10 | 07/13/10 | 05/18/10 | 02/18/10 | 12/21/09 | 07/21/09 | 05/18/09 | 02/17/09 |
| Analyte | Units | L60 | L60 | L60 | L60 | L60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 |
| 1,1,1-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,1,2-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,1-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,1-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,2-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,2-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 104% | 107% | 98.2% | 92.7% | 103% | 104% | 99.6% | 102% | 110% | 92.0% | 89.9% | 104% | 95.8% | 97.6% | 99.1% | 93.1% |
| 1,2-Dichloropropane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,3-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,4-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 2-Butanone | ug/L | <200 | <200 | 270 | <200 | 349 | 242 | 122 | 137 | 152 | 201 | 189 | 212 | 140 | 271 | 385 | <100 |
| 2-Chloroethylvinyl ether | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 [4] | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 2-Hexanone | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 4-Bromofluorobenzene | [surr] | 101% | 100% | 93.6% | 89.3% | 97.0% | 93.6% | 96.1% | 95.0% | 102% | 92.3% | 94.8% | 93.2% | 98.1% | 96.1% | 97.0% | 94.3% |
| 4-Methyl-2-pentanone | ug/L | <200 | <200 | <200 | <200 | 105 | <100 | <100 | <100 | <100 | 130 | <100 | 105 | <100 | <200 | 175 | <100 |
| Acetone | ug/L | <200 | 318 | 640 | 516 | 924 | 764 | 448 | 593 | 558 | 645 | 619 | 805 | 646 | 1050 | 1340 | 338 |
| Benzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Bromodichloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Bromoform | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Bromomethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Carbon disulfide | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Carbon tetrachloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Chlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Chloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Chloroform | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Chloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| cis-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Dibromochloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Diethyl ether | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Ethyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Ethylbenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Methylene chloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Styrene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 [4] | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Tetrachloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Toluene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Toluene-d8 | [surr] | 107% | 105% | 98.7% | 94.0% | 99.1% | 99.6% | 101% | 98.5% | 103% | 92.6% | 96.4% | 100% | 99.9% | 96.8% | 98.1% | 98.1% |
| trans-1,2-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| trans-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Trichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Trichlorofluoromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Vinyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Vinyl chloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 [4] | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Xylenes, total | ug/L | <600 | <600 | <600 | <600 | <300 | <300 | <300 | <300 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |

| | | 0812030-01 | 0807173-06 | 0805043-01 | 0802071-06 | 0712071-01 | 0707061-06 | 0705127-01 | 0702073-06 | 702073-06RE | 0612057-01 | 0607077-06 | 0605021-01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 12/05/08 | 07/29/08 | 05/08/08 | 02/13/08 | 12/13/07 | 07/12/07 | 05/17/07 | 02/12/07 | 02/12/07 | 12/07/06 | 07/14/06 | 05/02/06 |
| Analyte | Units | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 |
| 1,1,1-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,1,2-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,1-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,1-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,2-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,2-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 93.6% | 106% | 102% | 99.1% | 106% | 98.4% | 115% | 113% | 78.3% | 117% | 110% | 106% |
| 1,2-Dichloropropane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,3-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,4-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 2-Butanone | ug/L | <200 | 205 | 255 | 222 | <100 | <200 | <200 | 482 | 295 | 239 | 124 | 240 |
| 2-Chloroethylvinyl ether | ug/L | <200 | <200 | <200 | <200 [1] | <100 [1] | <200 [1] | <200 [1] | <50.0 [1] | <200 [1] | <100 | <50.0 | <100 |
| 2-Hexanone | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 4-Bromofluorobenzene | [surr] | 96.2% | 104% | 104% | 102% | 104% | 91.6% | 99.1% | 104% | 93.6% | 107% | 101% | 96.7% |
| 4-Methyl-2-pentanone | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | 247 | <200 | <100 | 60.7 | 118 |
| Acetone | ug/L | 543 | 954 | 1270 | 955 | 153 | 728 | 716 | 2480 [2] | 1320 | 1190 | 385 | 1110 |
| Benzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Bromodichloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Bromoform | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Bromomethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Carbon disulfide | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Carbon tetrachloride | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Chlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Chloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Chloroform | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Chloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| cis-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Dibromochloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Diethyl ether | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Ethyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Ethylbenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Methylene chloride | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Styrene | ug/L | <200 | <200 | <200 | <200 [1] | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Tetrachloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Toluene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Toluene-d8 | [surr] | 101% | 107% | 106% | 99.9% | 104% | 97.0% | 95.4% | 114% | 100% | 108% | 101% | 103% |
| trans-1,2-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| trans-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Trichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Trichlorofluoromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Vinyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Vinyl chloride | ug/L | <200 | <200 | <200 | <200 [1] | <100 | <200 | <200 | 75.1 | <200 | <100 | <50.0 | <100 |
| Xylenes, total | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |

| | | 1302105-02 | 1211120-02 | 1208078-06 | 1205142-02 | 1202062-06 | 1112105-02 | 1107076-06 | 1105128-01 | 1102051-07 | 1012072-02 | 1007059-07 | 1005079-02 | 1002080-07 | 0912057-01 | 0907120-07 | 0905095-03 | 0902088-07 | 0812030-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/25/13 | 11/30/12 | 08/22/12 | 05/25/12 | 02/14/12 | 12/22/11 | 07/19/11 | 05/23/11 | 02/15/11 | 12/15/10 | 07/13/10 | 05/18/10 | 02/18/10 | 12/10/09 | 07/21/09 | 05/18/09 | 02/17/09 | 12/05/08 |
| Analyte | Units | L61 | L61 | L61 | L61 | L61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 |
| 1,1,1-Trichloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,1,2,2-Tetrachloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,1,2-Trichloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,1-Dichloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,1-Dichloroethene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,2-Dichlorobenzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,2-Dichloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,2-Dichloroethane-d4 | [surr] | 101% | 111% | 90.1% | 96.1% | 104% | 104% | 102% | 102% | 98.8% | 106% | 90.9% | 92.4% | 101% | 99.5% | 99.7% | 100% | 97.7% | 92.1% |
| 1,2-Dichloropropane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,3-Dichlorobenzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,4-Dichlorobenzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 2-Butanone | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 2-Chloroethylvinyl ether | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 [6] | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 2-Hexanone | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 4-Bromofluorobenzene | [surr] | 96.1% | 103% | 91.1% | 89.1% | 97.0% | 97.1% | 99.5% | 96.4% | 97.5% | 99.9% | 91.8% | 97.2% | 92.8% | 99.3% | 96.0% | 97.7% | 101% | 96.9% |
| 4-Methyl-2-pentanone | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Acetone | ug/L | <200 | <200 | <500 | 435 | <100 | 265 | <100 | <100 | 234 | 107 | 128 | 613 | <100 | <100 | <100 | <100 | <100 | 360 |
| Benzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Bromodichloromethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Bromoform | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Bromomethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Carbon disulfide | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Carbon tetrachloride | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Chlorobenzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Chloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Chloroform | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Chloromethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| cis-1,3-Dichloropropene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Dibromochloromethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Diethyl ether | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Ethyl acetate | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Ethylbenzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Methylene chloride | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Styrene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 [6] | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Tetrachloroethene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Toluene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Toluene-d8 | [surr] | 102% | 107% | 102% | 95.4% | 101% | 99.9% | 101% | 99.3% | 97.0% | 101% | 92.5% | 97.6% | 97.4% | 102% | 98.2% | 99.9% | 102% | 101% |
| trans-1,2-Dichloroethene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| trans-1,3-Dichloropropene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Trichloroethene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Trichlorofluoromethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Vinyl acetate | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Vinyl chloride | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 [6] | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Xylenes, total | ug/L | <600 | <600 | <1500 | <600 | <300 | <300 | <300 | <300 | <300 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |

| | | 0807173-07 | 0802071-07 | 0707061-07 | 0705127-02 | 0702073-07 | 702073-07RE | 0612057-02 | 612057-02RE | 0607077-07 | 607077-07RE | 0605021-02 | 605021-02RE | 605021-02RE2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 07/29/08 | 02/13/08 | 07/12/07 | 05/17/07 | 02/12/07 | 02/12/07 | 12/07/06 | 12/07/06 | 07/14/06 | 07/14/06 | 05/02/06 | 05/02/06 | 05/02/06 |
| Analyte | Units | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 |
| 1,1,1-Trichloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,1-Dichloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,1-Dichloroethene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,2-Dichloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 100% | 98.4% | 94.9% | 116% | 111% | 79.3% | 112% | 112% | 109% | 103% | 98.9% | 52.0% | 96.3% |
| 1,2-Dichloropropane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 2-Butanone | ug/L | <500 | <500 | <1000 | <1000 | 1080 [2] | <1000 | 213 | <200 | 905 | <1000 | 865 | <1000 | <1000 |
| 2-Chloroethylvinyl ether | ug/L | <500 | <500 [1] | <1000 [1] | <1000 [1] | <50.0 [1] | <1000 [1] | <100 | <200 [3] | <50.0 | <1000 | <100 | <1000 | <1000 |
| 2-Hexanone | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 98.5% | 98.2% | 89.6% | 102% | 104% | 93.2% | 103% | 102% | 97.0% | 95.6% | 93.4% | 48.1% | 92.1% |
| 4-Methyl-2-pentanone | ug/L | <500 | <500 | <1000 | <1000 | 470 | <1000 | <100 | <200 | 258 | <1000 | 330 | <1000 | <1000 |
| Acetone | ug/L | 7480 | 909 | 7100 | 6150 | 9050 [2] | 6470 | 2610 [2] | 2250 | 12000 [2] | 8280 | 10400 [2] | 8580 | 8990 [4] |
| Benzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Bromodichloromethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Bromoform | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Bromomethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Carbon disulfide | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | 50.7 | <1000 | <100 | <1000 | <1000 |
| Carbon tetrachloride | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Chlorobenzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Chloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Chloroform | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Chloromethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Dibromochloromethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Diethyl ether | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Ethyl acetate | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Ethylbenzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Methylene chloride | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Styrene | ug/L | <500 | <500 [1] | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Tetrachloroethene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Toluene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Toluene-d8 | [surr] | 98.7% | 99.5% | 92.8% | 97.2% | 112% | 99.8% | 103% | 105% | 100% | 95.5% | 100% | 51.7% | 98.5% |
| trans-1,2-Dichloroethene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Trichloroethene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Trichlorofluoromethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Vinyl acetate | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Vinyl chloride | ug/L | <500 | <500 [1] | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Xylenes, total | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |

| | | 1302105-03 | 1211120-03 | 1208078-07 | 1205142-03 | 1202062-07 | 1112105-03 | 1107076-07 | 1105128-02 | 1102051-08 | 1012072-03 | 1007059-08 | 1005079-03 | 1002080-08 | 0912057-02 | 0907120-08 | 0905095-04 | 0902088-08 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/25/13 | 11/30/12 | 08/22/12 | 05/25/12 | 02/14/12 | 12/22/11 | 07/19/11 | 05/23/11 | 02/15/11 | 12/15/10 | 07/13/10 | 05/18/10 | 02/18/10 | 12/10/09 | 07/21/09 | 05/18/09 | 02/17/09 |
| Analyte | Units | L62 | L62 | L62 | L62 | L62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 |
| 1,1,1-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,1,2-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,1-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,1-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,2-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,2-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 99.8% | 113% | 92.1% | 107% | 104% | 103% | 104% | 101% | 107% | 114% | 90.4% | 90.2% | 107% | 100% | 94.9% | 99.1% | 95.1% |
| 1,2-Dichloropropane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,3-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,4-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 2-Butanone | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | 125 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 2-Chloroethylvinyl ether | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 [3] | <100 | <100 | <100 | <100 | <100 | <100 |
| 2-Hexanone | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 4-Bromofluorobenzene | [surr] | 96.9% | 106% | 94.7% | 102% | 96.8% | 94.4% | 99.0% | 97.7% | 100% | 102% | 91.6% | 90.1% | 95.2% | 98.3% | 91.7% | 97.0% | 97.9% |
| 4-Methyl-2-pentanone | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Acetone | ug/L | 400 | <200 | 650 | <200 | 171 | 263 | 1490 | <100 | 349 | <50.0 | 103 | <100 | 117 | 571 | 616 | 299 | 306 |
| Benzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Bromodichloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Bromoform | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 [3] | <100 | <100 | <100 | <100 | <100 | <100 |
| Bromomethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Carbon disulfide | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Carbon tetrachloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Chlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Chloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Chloroform | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Chloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| cis-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Dibromochloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Diethyl ether | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Ethyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Ethylbenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Methylene chloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Styrene | ug/L | <600 | <600 | <600 | <600 | <300 | <300 | <300 | <300 | <150 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Tetrachloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Toluene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Toluene-d8 | [surr] | 103% | 111% | 105% | 107% | 103% | 99.9% | 103% | 99.6% | 100% | 102% | 94.0% | 94.4% | 101% | 102% | 94.7% | 98.2% | 100% |
| trans-1,2-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| trans-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Trichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Trichlorofluoromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Vinyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Vinyl chloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 [3] | <100 | <100 | <100 | <100 | <100 | <100 |
| Xylenes, total | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |

| | | 0812030-03 | 0807173-08 | 807173-08RE | 0805043-02 | 0802071-08 | 0712071-02 | 0707061-08 | 0705127-03 | 0702073-08 | 0612057-03 | 0607077-08 | 0605021-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 12/05/08 | 07/29/08 | 07/29/08 | 05/08/08 | 02/13/08 | 12/13/07 | 07/12/07 | 05/17/07 | 02/12/07 | 12/07/06 | 07/14/06 | 05/02/06 |
| Analyte | Units | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 |
| 1,1,1-Trichloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,1,2-Trichloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,1-Dichloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,1-Dichloroethene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,2-Dichlorobenzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,2-Dichloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 94.4% | 106% | 109% | 98.8% | 105% | 108% | 91.6% | 118% | 109% | 115% | 112% | 99.2% |
| 1,2-Dichloropropane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,3-Dichlorobenzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,4-Dichlorobenzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 2-Butanone | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 2-Chloroethylvinyl ether | ug/L | <100 | <100 | <200 | <100 [1] | <100 [1] | <200 [1] | <200 [1] | <50.0 [1] | <50.0 [1] | <100 | <50.0 | <100 |
| 2-Hexanone | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 4-Bromofluorobenzene | [surr] | 97.8% | 106% | 107% | 103% | 103% | 106% | 85.4% | 99.1% | 101% | 105% | 106% | 92.7% |
| 4-Methyl-2-pentanone | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Acetone | ug/L | 1990 | 2230 | 2690 | 686 | 229 | 340 | 1980 | 194 | <50.0 | <100 | 120 | <100 |
| Benzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Bromodichloromethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Bromoform | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Bromomethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Carbon disulfide | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Carbon tetrachloride | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Chlorobenzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Chloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Chloroform | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Chloromethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| cis-1,3-Dichloropropene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Dibromochloromethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Diethyl ether | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Ethyl acetate | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Ethylbenzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Methylene chloride | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Styrene | ug/L | <100 | <100 | <200 | <100 [1] | <100 [1] | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Tetrachloroethene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Toluene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Toluene-d8 | [surr] | 102% | 106% | 106% | 103% | 106% | 106% | 89.3% | 95.8% | 111% | 105% | 103% | 99.1% |
| trans-1,2-Dichloroethene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| trans-1,3-Dichloropropene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Trichloroethene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Trichlorofluoromethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Vinyl acetate | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Vinyl chloride | ug/L | <100 | <100 | <200 | <100 [1] | <100 [1] | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Xylenes, total | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |

| | | 1302105-04 | 1211120-04 | 1208078-08 | 1205142-04 | 1202062-08 | 1112105-04 | 1107076-08 | 1105128-03 | 1102051-09 | 1012072-04 | 1007059-09 | 1005079-04 | 1002080-09 | 0912057-03 | 0907120-09 | 0905095-05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/25/13 | 11/30/12 | 08/22/12 | 05/25/12 | 02/14/12 | 12/22/11 | 07/19/11 | 05/23/11 | 02/15/11 | 12/15/10 | 07/13/10 | 05/18/10 | 02/18/10 | 12/10/09 | 07/21/09 | 05/18/09 |
| Analyte | Units | L63 | L63 | L63 | L63 | L63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 |
| 1,1,1-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,1,2-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,1-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,1-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,2-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,2-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 104% | 108% | 91.1% | 97.2% | 96.2% | 99.3% | 99.8% | 103% | 102% | 113% | 87.9% | 89.6% | 104% | 100% | 99.4% | 99.0% |
| 1,2-Dichloropropane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,3-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,4-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 2-Butanone | ug/L | 305 | 302 | 239 | <200 | <200 | 331 | 293 | <100 | 266 | 216 | 399 | 472 | 699 | 420 | 673 | 877 |
| 2-Chloroethylvinyl ether | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 [5] | <200 | <200 | <200 | <500 | <100 |
| 2-Hexanone | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 4-Bromofluorobenzene | [surr] | 99.6% | 102% | 92.4% | 94.0% | 90.2% | 93.3% | 97.7% | 97.7% | 96.9% | 104% | 87.5% | 93.9% | 94.5% | 98.1% | 97.9% | 95.5% |
| 4-Methyl-2-pentanone | ug/L | <200 | <200 | <200 | <200 | <200 | 180 | <200 | <100 | <200 | <200 | 255 | 296 | 328 | <200 | <500 | 446 |
| Acetone | ug/L | 860 | 1260 | 1040 | 735 | 511 | 1300 | 889 | 164 | 985 | 846 | 1180 | 1330 | 2520 | 1210 | 2090 | 2880 |
| Benzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Bromodichloromethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Bromoform | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Bromomethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Carbon disulfide | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Carbon tetrachloride | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Chlorobenzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Chloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Chloroform | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Chloromethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| cis-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Dibromochloromethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Diethyl ether | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Ethyl acetate | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Ethylbenzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Methylene chloride | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Styrene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 [5] | <200 | <200 | <200 | <500 | <100 |
| Tetrachloroethene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Toluene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Toluene-d8 | [surr] | 106% | 105% | 104% | 98.7% | 96.9% | 98.4% | 100% | 101% | 98.0% | 106% | 89.3% | 96.1% | 99.7% | 103% | 98.8% | 97.9% |
| trans-1,2-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| trans-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Trichloroethene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Trichlorofluoromethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Vinyl acetate | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Vinyl chloride | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 [5] | <200 | <200 | <200 | <500 | <100 |
| Xylenes, total | ug/L | <600 | <600 | <600 | <600 | <600 | <300 | <600 | <300 | <600 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |

| | | 0902088-09 | 0812030-04 | 0807173-09 | 0805043-03 | 0802071-09 | 0712071-03 | 0707061-09 | 0705127-04 | 0702073-09 | 0612057-04 | 0610203-01 | 0607077-09 | 0605021-04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/17/09 | 12/05/08 | 07/29/08 | 05/08/08 | 02/13/08 | 12/13/07 | 07/12/07 | 05/17/07 | 02/12/07 | 12/07/06 | 10/20/06 | 07/14/06 | 05/02/06 |
| Analyte | Units | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 |
| 1,1,1-Trichloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,1,2-Trichloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,1-Dichloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | 11.8 | <50.0 | <100 |
| 1,1-Dichloroethene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,2-Dichlorobenzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,2-Dichloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 94.4% | 93.8% | 103% | 103% | 99.1% | 104% | 91.9% | 117% | 111% | 116% | 207% | 109% | 98.5% |
| 1,2-Dichloropropane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,3-Dichlorobenzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,4-Dichlorobenzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 2-Butanone | ug/L | <100 | 127 | <100 | 111 | <100 | <100 | <100 | 121 | 146 | <100 | 502 | 55.0 | <100 |
| 2-Chloroethylvinyl ether | ug/L | <100 | <100 | <100 | <100 | <100 [1] | <100 [1] | <100 [1] | <50.0 | <50.0 [1] | <100 | <10.0 | <50.0 | <100 |
| 2-Hexanone | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 4-Bromofluorobenzene | [surr] | 95.5% | 97.3% | 103% | 104% | 102% | 101% | 86.8% | 100% | 103% | 105% | 194% | 98.5% | 92.6% |
| 4-Methyl-2-pentanone | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | 60.7 | 92.4 | <100 | 232 | <50.0 | <100 |
| Acetone | ug/L | 945 | 852 | 312 | 507 | 350 | 280 | 256 | 637 | 903 | 634 | 2240 | 287 | <100 |
| Benzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Bromodichloromethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Bromoform | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Bromomethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Carbon disulfide | ug/L | <100 | <100 | <100 | <100 | 281 | 223 | <100 | 121 | 495 | <100 | 1090 | 76.4 | <100 |
| Carbon tetrachloride | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Chlorobenzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Chloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Chloroform | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Chloromethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| cis-1,3-Dichloropropene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Dibromochloromethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Diethyl ether | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Ethyl acetate | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Ethylbenzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Methylene chloride | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Styrene | ug/L | <100 | <100 | <100 | <100 | <100 [1] | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Tetrachloroethene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Toluene | ug/L | 629 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | 22.9 | <50.0 | <100 |
| Toluene-d8 | [surr] | 99.0% | 102% | 102% | 105% | 101% | 101% | 88.8% | 95.5% | 112% | 106% | 204% | 100% | 101% |
| trans-1,2-Dichloroethene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| trans-1,3-Dichloropropene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Trichloroethene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Trichlorofluoromethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Vinyl acetate | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Vinyl chloride | ug/L | <100 | <100 | <100 | <100 | <100 [1] | <100 | <100 | 55.8 | <50.0 | <100 | 142 | <50.0 | <100 |
| Xylenes, total | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |

| | | 1302105-05 | 1211120-05 | 1208078-09 | 1205142-05 | 1202076-02 | 1112081-01 | 1107076-09 | 1105128-04 | 1102051-10 | 1012072-05 | 1007059-10 | 1005079-05 | 1002080-10 | 0912057-04 | 0907120-10 | 0905095-06 | 0902088-10 | 0807173-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/25/13 | 11/30/12 | 08/22/12 | 05/25/12 | 02/16/12 | 12/19/11 | 07/19/11 | 05/23/11 | 02/15/11 | 12/15/10 | 07/13/10 | 05/18/10 | 02/18/10 | 12/10/09 | 07/21/09 | 05/18/09 | 02/17/09 | 07/29/08 |
| Analyte | Units | L64 | L64 | L64 | L64 | L64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 |
| 1,1,1-Trichloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,1,2,2-Tetrachloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,1,2-Trichloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,1-Dichloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,1-Dichloroethene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,2-Dichlorobenzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,2-Dichloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,2-Dichloroethane-d4 | [surr] | 103% | 108% | 92.7% | 93.7% | 105% | 96.5% | 98.6% | 102% | 102% | 113% | 89.8% | 90.7% | 105% | 95.8% | 100% | 102% | 95.2% | 102% |
| 1,2-Dichloropropane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,3-Dichlorobenzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,4-Dichlorobenzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 2-Butanone | ug/L | <10000 | <10000 | <10000 | <5000 | 4880 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | 668 | <500 | <1000 | 822 | <200 | <500 |
| 2-Chloroethylvinyl ether | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 [5] | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 2-Hexanone | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 4-Bromofluorobenzene | [surr] | 99.7% | 105% | 94.4% | 89.8% | 98.5% | 94.2% | 98.2% | 97.3% | 95.8% | 103% | 91.0% | 93.5% | 94.4% | 94.5% | 97.6% | 98.8% | 96.5% | 100% |
| 4-Methyl-2-pentanone | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | 344 | <200 | <500 |
| Acetone | ug/L | 27700 | 98600 | 114000 | 51600 | 56800 | 12700 | 19900 | 12100 | 13800 | 45800 | 24300 | 10100 | 16400 | 1570 | 11800 | 7500 [4] | 560 | 20200 [2] |
| Benzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Bromodichloromethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Bromoform | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Bromomethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Carbon disulfide | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Carbon tetrachloride | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Chlorobenzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Chloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Chloroform | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Chloromethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| cis-1,3-Dichloropropene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Dibromochloromethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Diethyl ether | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Ethyl acetate | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Ethylbenzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Methylene chloride | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Styrene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 [5] | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Tetrachloroethene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Toluene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | 1120 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | 216 | <200 | 638 |
| Toluene-d8 | [surr] | 103% | 107% | 105% | 94.4% | 101% | 100% | 99.8% | 99.9% | 96.8% | 105% | 92.3% | 94.5% | 100% | 97.6% | 99.1% | 99.9% | 101% | 101% |
| trans-1,2-Dichloroethene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| trans-1,3-Dichloropropene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Trichloroethene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Trichlorofluoromethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Vinyl acetate | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Vinyl chloride | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 [5] | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Xylenes, total | ug/L | <30000 | <30000 | <30000 | <15000 | <7500 | <3000 | <7500 | <3000 | <3000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |

| | | 807173-10RE | 0805043-04 | 805043-04RE | 0802071-10 | 0712071-04 | 0707061-10 | 0705127-05 | 0702073-10 | 702073-10RE | 0612057-05 | 0607077-10 | 607077-10RE | 0605021-05 | 605021-05RE | 605021-05RE2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 07/29/08 | 05/08/08 | 05/08/08 | 02/13/08 | 12/13/07 | 07/12/07 | 05/17/07 | 02/12/07 | 02/12/07 | 12/07/06 | 07/14/06 | 07/14/06 | 05/02/06 | 05/02/06 | 05/02/06 |
| Analyte | Units | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 |
| 1,1,1-Trichloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,1-Dichloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,1-Dichloroethene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,2-Dichloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 104% | 101% | 98.7% | 97.3% | 103% | 96.1% | 117% | 107% | 73.7% | 115% | 106% | 104% | 100% | 52.3% | 94.6% |
| 1,2-Dichloropropane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 2-Butanone | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | 58.0 | <1000 | <100 | 452 | <2500 | 342 | <1000 | <1000 |
| 2-Chloroethylvinyl ether | ug/L | <2500 | <500 | <2500 | <1000 [1] | <2500 [1] | <2500 [1] | <1000 [1] | <50.0 [1] | <1000 [1] | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 2-Hexanone | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 104% | 104% | 103% | 96.4% | 103% | 87.9% | 100% | 99.7% | 89.2% | 104% | 95.8% | 94.5% | 95.0% | 48.1% | 92.6% |
| 4-Methyl-2-pentanone | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | 102 | <2500 | 109 | <1000 | <1000 |
| Acetone | ug/L | 6630 [4] | 17000 [2] | 8670 [4] | 1000 | 8780 | 34300 | 2480 | 14500 [2] | 10300 | 1520 | 20900 [2] | 13300 | 16500 [2] | 12700 | 12600 [3] |
| Benzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Bromodichloromethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Bromoform | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Bromomethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Carbon disulfide | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Carbon tetrachloride | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Chlorobenzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Chloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Chloroform | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Chloromethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Dibromochloromethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Diethyl ether | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Ethyl acetate | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Ethylbenzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Methylene chloride | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Styrene | ug/L | <2500 | <500 | <2500 | <1000 [1] | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Tetrachloroethene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Toluene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | 2050 [2] | 1790 | 1130 | 543 | <2500 | 871 | <1000 | <1000 |
| Toluene-d8 | [surr] | 104% | 104% | 102% | 98.0% | 101% | 91.1% | 95.3% | 109% | 93.6% | 104% | 97.5% | 94.8% | 102% | 51.1% | 99.2% |
| trans-1,2-Dichloroethene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Trichloroethene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Trichlorofluoromethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Vinyl acetate | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Vinyl chloride | ug/L | <2500 | <500 | <2500 | <1000 [1] | <2500 | <2500 | <1000 | 84.5 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Xylenes, total | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 04/17/13 | 04/13/13 | 04/12/13 | 04/11/13 | 04/10/13 | 04/09/13 | 04/08/13 | 04/03/13 | 04/02/13 | 04/01/13 | 03/26/13 | 03/22/13 | 03/21/13 | 03/20/13 | 03/14/13 | 03/13/13 | 03/12/13 | 03/11/13 | 03/05/13 | 03/04/13 | 03/03/13 | 03/02/13 | 02/28/13 | 02/27/13 |
| | | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 |
| Analyte | Units | 4/17/2013 7:0 | 4/15/2013 6:4 | 4/12/2013 6:4 | 4/11/2013 7:0 | 4/10/2013 6:3 | 4/9/2013 6:55 | 4/9/2013 6:55 | 4/3/2013 6:45 | 4/2/2013 6:44 | 4/2/2013 6:48 | 3/26/2013 6:5 | 3/22/2013 6:3 | 3/21/2013 7:0 | 3/21/2013 7:0 | 3/14/2013 6:3 | 3/13/2013 6:5 | 3/12/2013 6:4 | 3/12/2013 6:3 | 3/5/2013 6:35 | 3/4/2013 6:40 | 3/4/2013 6:40 | 3/4/2013 6:40 | 2/28/2013 6:3 | 2/27/2013 6:3 |
| Chloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Vinyl chloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromomethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Trichlorofluoromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Diethyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Acetone | ug/L | 2570 | 2510 | 2850 | 4720 | 6000 | 5810 | 6200 | <2500 | 36500 | 37400 | 4590 | 4910 | 5480 | 5480 | 3300 | 3490 | 3390 | 3980 | 3140 | 3150 | 2870 | 3140 | 16100 | 11300 |
| 1,1-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Methylene chloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Carbon disulfide | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,2-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 2-Butanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | 1140 | <1000 | <1000 | <1000 | <1000 | 6420 | <1000 |
| Ethyl acetate | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chloroform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,1-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Carbon tetrachloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 107% | 109% | 106% | 107% | 106% | 105% | 107% | 109% | 109% | 106% | 104% | 103% | 104% | 105% | 104% | 102% | 103% | 104% | 109% | 107% | 111% | 111% | 102% | 110% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Benzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1,2-Dichloropropane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromodichloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 2-Chloroethylvinyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Methyl-2-pentanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | 1290 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Toluene-d8 | [surr] | 104% | 108% | 106% | 104% | 105% | 105% | 107% | 102% | 103% | 101% | 103% | 103% | 104% | 105% | 105% | 102% | 104% | 104% | 106% | 106% | 104% | 106% | 100% | 107% |
| Toluene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 96.7% | 99.8% | 100% | 100% | 100% | 103% | 107% | 99.4% | 102% | 98.9% | 99.4% | 101% | 101% | 103% | 101% | 99.6% | 100% | 100% | 99.2% | 101% | 97.3% | 99.7% | 99.3% | 104% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Tetrachloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| Chlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Ethylbenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Xylenes, total | ug/L | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <7500 | <7500 | <7500 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 |
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| Bromoform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/26/13 | 02/20/13 | 02/19/13 | 02/15/13 | 02/14/13 | 02/13/13 | 02/12/13 | 02/11/13 | 02/06/13 | 02/05/13 | 02/01/13 | 01/31/13 | 01/30/13 | 01/29/13 | 01/23/13 | 01/21/13 | 01/20/13 | 01/18/13 | 01/16/13 | 01/15/13 | 01/14/13 | 01/07/13 | 01/02/13 | 01/01/13 |
| | | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 |
| Analyte | Units | 2/26/2013 1:1 | 2/20/2013 6:2 | 2/19/2013 6:3 | 2/15/2013 6:4 | 2/14/2013 6:3 | 2/13/2013 6:3 | 2/12/2013 6:3 | 2/12/2013 6:2 | 2/6/2013 6:39 | 2/5/2013 6:48 | 2/1/2013 7:0 | 1/31/2013 6:3 | 1/30/2013 6:4 | 1/29/2013 6:2 | 1/23/2013 7:0 | 1/21/2013 6:4 | 1/21/2013 6:4 | 1/18/2013 8:3 | 1/16/2013 6:4 | 1/15/2013 6:3 | 1/14/2013 10 | 1/7/2013 6:36 | 1/2/2013 9:56 | 1/2/2013 6:25 |
| Chloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Vinyl chloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromomethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| Trichlorofluoromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Diethyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1,2-Dichloroethane-d4 | [surr] | 94.2% | 107% | 111% | 107% | 104% | 112% | 111% | 111% | 107% | 102% | 106% | 107% | 110% | 106% | 106% | 107% | 106% | 108% | 109% | 107% | 95.2% | 103% | 102% | 105% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| Toluene-d8 | [surr] | 99.3% | 102% | 106% | 103% | 102% | 107% | 106% | 107% | 104% | 101% | 100% | 104% | 106% | 102% | 105% | 104% | 100% | 104% | 104% | 105% | 96.0% | 103% | 99.6% | 103% |
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| trans-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 96.7% | 92.2% | 97.2% | 94.9% | 96.5% | 100% | 100% | 98.4% | 96.9% | 93.2% | 95.3% | 97.6% | 99.8% | 95.9% | 95.6% | 96.0% | 92.9% | 95.9% | 95.5% | 96.2% | 92.6% | 97.3% | 95.2% | 98.1% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 12/31/12 | 12/26/12 | 12/25/12 | 12/24/12 | 12/21/12 | 12/19/12 | 12/18/12 | 12/17/12 | 12/12/12 | 12/11/12 | 12/10/12 | 12/05/12 | 12/04/12 | 11/29/12 | 11/21/12 | 11/12/12 | 11/11/12 | 11/10/12 | 11/09/12 | 11/05/12 | 11/04/12 | 11/02/12 | 11/01/12 | 10/31/12 |
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| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1,2-Dichloroethane-d4 | [surr] | 105% | 109% | 109% | 108% | 113% | 105% | 107% | 91.5% | 99.7% | 101% | 103% | 99.3% | 102% | 114% | 109% | 105% | 107% | 105% | 100% | 106% | 106% | 100% | 92.2% | 90.6% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| Toluene-d8 | [surr] | 102% | 105% | 107% | 106% | 109% | 104% | 110% | 90.7% | 95.5% | 95.0% | 96.9% | 94.5% | 96.7% | 108% | 105% | 104% | 106% | 104% | 100% | 108% | 106% | 102% | 94.3% | 93.9% |
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| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 98.9% | 101% | 105% | 101% | 105% | 102% | 105% | 83.1% [2] | 87.4% | 89.5% | 91.0% | 90.9% | 94.4% | 105% | 101% | 99.1% | 100% | 98.9% | 95.4% | 102% | 99.3% | 96.9% | 89.8% | 88.9% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10/30/12 | 10/29/12 | 10/28/12 | 10/27/12 | 10/26/12 | 10/25/12 | 10/24/12 | 10/23/12 | 10/19/12 | 10/16/12 | 10/15/12 | 10/12/12 | 10/11/12 | 10/10/12 | 10/02/12 | 10/01/12 | 09/28/12 | 09/27/12 | 09/26/12 | 09/20/12 | 09/18/12 | 09/16/12 | 09/15/12 | 09/14/12 |
| | | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 |
| Analyte | Units | 10/30/2012 6 | 10/29/2012 6 | 10/29/2012 6 | 10/29/2012 6 | 10/26/2012 6 | 10/25/2012 6 | 10/24/2012 6 | 10/23/2012 6 | 10/19/2012 1 | 10/16/2012 6 | 10/15/2012 1 | 10/12/2012 8 | 10/11/2012 6 | 10/10/2012 1 | 10/2/2012 7:( | 10/1/2012 11 | 9/28/2012 7:( | 9/27/2012 10 | 9/27/2012 11 | 9/20/2012 8:3 | 9/18/2012 1:3 | 9/17/2012 9:4 | 9/17/2012 9:3 | 9/14/2012 7:( |
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| 1,2-Dichloroethane-d4 | [surr] | 94.4% | 94.5% | 96.0% | 94.8% | 94.3% | 89.7% | 92.8% | 94.7% | 109% | 115% | 120% [1] | 114% | 108% | 108% | 101% | 113% | 105% | 104% | 108% | 100% | 102% | 96.8% | 101% | 90.2% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 2-Chloroethylvinyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Methyl-2-pentanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Toluene-d8 | [surr] | 97.4% | 94.2% | 97.4% | 94.8% | 94.4% | 91.7% | 95.3% | 93.7% | 104% | 99.7% | 108% | 100% | 95.6% | 98.0% | 93.1% | 102% | 98.5% | 98.3% | 101% | 97.3% | 99.4% | 94.7% | 102% | 95.7% |
| Toluene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 92.4% | 89.3% | 92.6% | 91.9% | 90.7% | 89.5% | 94.4% | 92.3% | 102% | 98.4% | 105% | 98.7% | 95.6% | 95.2% | 91.6% | 101% | 97.8% | 95.1% | 99.7% | 95.7% | 99.1% | 93.6% | 100% | 93.0% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| | | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 |
| Analyte | Units | 9/13/2012 7:0 | 9/12/2012 7:0 | 9/11/2012 8:2 | 9/10/2012 7:0 | 9/10/2012 7:0 | 9/10/2012 7:0 | 9/10/2012 7:0 | 9/5/2012 7:0 | 9/5/2012 7:0 | 8/31/2012 7:0 | 8/30/2012 8:2 | 8/29/2012 7:0 | 8/28/2012 7:0 | 8/22/2012 7:0 | 8/22/2012 7:0 | 8/15/2012 7:0 | 8/10/2012 7:0 | 8/9/2012 11:2 | 8/7/2012 7:0 | 8/6/2012 9:15 | 7/30/2012 10 | 7/27/2012 8:3 | 7/26/2012 11 | 7/26/2012 9:3 |
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| 1,2-Dichloroethane-d4 | [surr] | 86.0% | 95.7% | 93.3% | 101% | 89.7% | 102% | 102% | 101% | 101% | 99.1% | 96.4% | 98.3% | 97.8% | 91.6% | 93.2% | 104% | 98.2% | 104% | 103% | 109% | 89.6% | 102% | 102% | 101% |
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| Toluene-d8 | [surr] | 94.6% | 97.4% | 97.8% | 97.1% | 94.7% | 95.9% | 96.8% | 96.6% | 97.4% | 96.9% | 94.1% | 97.3% | 95.8% | 104% | 105% | 104% | 101% | 101% | 99.7% | 104% | 101% | 102% | 100% | 83.2% [1] |
| Toluene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 4-Bromofluorobenzene | [surr] | 93.0% | 95.2% | 95.0% | 95.1% | 93.8% | 94.9% | 95.5% | 95.0% | 95.4% | 95.2% | 91.9% | 94.7% | 93.0% | 93.7% | 95.7% | 97.6% | 94.7% | 97.3% | 94.0% | 101% | 99.0% | 97.9% | 96.4% | 87.9% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Tetrachloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Dibromochloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Chlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Ethylbenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Xylenes, total | ug/L | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <7500 | <7500 | <3000 | <3000 | <7500 | <3000 | <3000 | <3000 | <3000 | <7500 | <3000 |
| Styrene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Bromoform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |

| | | 1207071-06 | 1207067-06 | 1207063-03 | 1207045-06 | 1207035-06 | 1207034-01 | 1207009-06 | 1206099-06 | 1206098-03 | 1206077-06 | 1206076-03 | 1206061-06 | 1206056-06 | 1206055-03 | 1206017-06 | 1206013-06 | 1206009-03 | 1206005-04 | 1205167-03 | 1205160-06 | 1205117-06 | 1205097-06 | 1205084-06 | 1205074-06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 07/19/12 | 07/18/12 | 07/17/12 | 07/12/12 | 07/11/12 | 07/10/12 | 07/03/12 | 06/26/12 | 06/25/12 | 06/19/12 | 06/18/12 | 06/14/12 | 06/13/12 | 06/12/12 | 06/06/12 | 06/05/12 | 06/04/12 | 06/03/12 | 05/31/12 | 05/30/12 | 05/22/12 | 05/17/12 | 05/15/12 | 05/14/12 |
| | | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 |
| Analyte | Units | 7/19/2012 7:( | 7/18/2012 7:( | 7/17/2012 10 | 7/12/2012 7:( | 7/11/2012 7:( | 7/11/2012 7:( | 7/3/2012 7:44 | 6/26/2012 7:( | 6/25/2012 1:1 | 6/19/2012 7:( | 6/19/2012 7:( | 6/14/2012 9:3 | 6/13/2012 7:( | 6/13/2012 7:( | 6/6/2012 7:0( | 6/5/2012 7:15 | 6/4/2012 11:1 | 6/4/2012 7:0( | 5/31/2012 1( | 5/30/2012 7:( | 5/22/2012 7:( | 5/17/2012 8:( | 5/15/2012 7:( | 5/14/2012 7:( |
| Chloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Vinyl chloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromomethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Trichlorofluoromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Diethyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Acetone | ug/L | 11100 | 8240 | 9150 | 5900 | 5330 | 9290 | 8290 | 11000 | 13900 | 7820 | 7900 | 4690 | 5910 | 6700 | 3250 | 5130 | 5410 | 7380 | 7880 | 7500 | 7400 | 4040 | 2590 | 2720 |
| 1,1-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Methylene chloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | 1780 | <1000 | <1000 | 1640 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Carbon disulfide | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,2-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Vinyl acetate | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 2-Butanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | 1910 | <1000 | <1000 | 2370 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Ethyl acetate | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chloroform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,1-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Carbon tetrachloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 109% | 98.5% | 96.3% | 91.5% | 90.3% | 92.0% | 98.6% | 105% | 110% | 104% | 102% | 89.9% | 95.4% | 95.4% | 104% | 104% | 103% | 104% | 99.6% | 100% | 98.6% | 89.0% | 89.5% | 86.9% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Benzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Trichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichloropropane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromodichloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 2-Chloroethylvinyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Methyl-2-pentanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Toluene-d8 | [surr] | 98.5% | 92.9% | 90.5% | 92.2% | 92.6% | 92.5% | 96.5% | 95.6% | 101% | 97.7% | 97.4% | 90.0% | 96.0% | 95.5% | 104% | 103% | 103% | 104% | 97.6% | 101% | 95.9% | 97.4% | 95.6% | 94.1% |
| Toluene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 97.8% | 91.6% | 90.5% | 91.3% | 92.4% | 91.9% | 94.4% | 96.9% | 102% | 97.9% | 97.6% | 88.6% | 93.0% | 93.6% | 102% | 100% | 100% | 102% | 94.9% | 97.0% | 94.1% | 94.6% | 91.5% | 93.9% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Tetrachloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Dibromochloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Ethylbenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Xylenes, total | ug/L | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 |
| Styrene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromoform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |

**Leachate Analytical Data - T-160**
**AWTS & FacPond Evaluation**

**CWM Chemical Services, LLC**
**Model City, NY**

**May 2012 - rev. 1**

**SLF 12 standpipe**

SLF 12 lift station

RMU-1, SLF-12 | tank sampl 120202028 | T160 AES 0 120210022 | 120215024 | 120216018CMW.xls, | T160 021512.xlsx | 120215035 | 120215034 | Old Landfill | Old Landfill Leachates_ 111116033

| Parameter | Units | Analytical Method | RMU-1 T-160 1/31/2012 | RMU-1 T-160 2/1/2012 | RMU-1 T-160 2/7/2012 | RMU-1 T-160 2/9/2012 | RMU-1 T-160 2/14/2012 | RMU-1 T-160 2/15/2012 | RMU-1 8/22/12 | L-54 2/14/2012 | T-150 2/14/2012 | T-150 2/14/2012 | T-150 7/23/2012 | Combined T-102 11/15/2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Samples Collected*** | | | | | | ***6*** | | | | ***1*** | ***1*** | | | ***1*** |
| ***Samples Required*** | | | | | | ***6*** | | | | ***3*** | ***3*** | | | ***24*** |
| **Conventional/General Water Quality** | | | | | | | | | | | | | | |
| Total Organic Carbon | mg/L | SM 5310C | | 167 | 263 | 262 | 277 | 290 | | 257 | 49.5 | | 66.6 | 315 |
| Total Suspended Solids | mg/L | SM 2540D | | 86.7 | 55 | 96 | 133 | 65 | | 72.0 | 10 | | 44 | 16.5 |
| Total Dissolved Solids | mg/L | SM 2540C | | 11900 | 17700 | 18600 | 22000 | 21300 | | 27200.00 | 1430 | | 4090 | 18000 |
| Total Petroleum Hydrocarbon | mg/L | E1664 | | 25.6 | 40 | 47.9 | 64.9 | 57.9 | | 12.5 | 13.4 | | <1 | 16.8 |
| Liquid Volume Processed | gpd | ---- | 28393 | 80254 | 6480 | 26374 | | | | | | | | |
| Sulfide | mg/L | | <0.200 | <0.200 | <1.00 | <1.00 | <0.200 | <0.200 | | 125 | <0.200 | <0.200 | | |
| **Metals** | | | | | | | | | | | | | | |
| Phenolic, Total | mg/L | 420.4, 420.1 | | 2.55 | 5.1 | 6.5 | 6.5 | | | 0.800 | 0.108 | | 0.031 | 6.79 |
| **Volatile Organic Compounds - Purgeables (10)** | | | | | | | | | | | | | | |
| Chloromethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Vinyl Chloride | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Bromomethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Chloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Trichlorofluoromethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Diethyl ether | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,1,2-Trichloro-1,2,2-trifluoroe | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Acetone | µg/L | 8260C | 4200 | 4440 | 7160 | 7380 | 8260 | 9040 | | <50.0 | 60.1 | 362 | | |
| 1,1-Dichloroethene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Methylene chloride | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | 2280 | | |
| Carbon disulfide | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| trans-1,2-Dichlorethene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,1-Dichloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Vinyl acetate | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 2-Butanone | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Ethyl acetate | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Chloroform | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,1,1-Trichloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Carbon tetrachloride | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,2-Dichloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Benzene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Trichloroethene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,2-Dichlropropane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Bromodichloromethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 2-Chloroethylvinyl ether | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 4-Methyl-2-pentanone | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| cis-1,3-Dichloropropene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Toluene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| trans-1,3-Dichloropropene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,1,2-Trichloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 2-Hexanone | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Tetrachloroethene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Dibromochloromethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Chlorobenzene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Ethylbenezene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Xylenes, total | µg/L | 8260C | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | | <150 | <60.0 | <150 | | |
| Styrene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Bromoform | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,1,2,2-Tetrachloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,3-Dichlorobenzene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,4-Dichlorobenzene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,2-Dichlorobenzene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| **Semi-Volatile Organic Compounds - Base Acid/Neutrals** | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 1,2-Dichlorobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 1,3-Dichlorobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 1,4-Dichlorobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2,4,5-Trichlorophenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2,4,6-Trichlorophenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2,4-Dichlorophenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2,4-Dimethylphenol | µg/L | 625 | | 71 | 140 | 110 | 120 | 110 | | <50 | <50 | | <5 | 140 |
| 2,4-Dinitrophenol | µg/L | 625 | | <250 | <500 | <500 | <500 | <500 | | <250 | <250 | | <25 | <500 |
| 2,4-Dinitrotoluene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2,6-Dinitrotoluene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2-Chloronaphthalene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2-Chlorophenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2-Methylnaphthalene | µg/L | 625 | | | | | | | | | | | | |
| 2-Methylphenol | µg/L | 625 | | | | | | | | | | | | |
| 2-Nitrophenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 3,3´-Dichlorobenzidine | µg/L | 625 | | <100 | <200 | <200 | <200 | <200 | | <100 | <100 | | <10 | <200 |
| 4,6-Dinitro-2-methylphenol | µg/L | 625 | | <250 | <500 | <500 | <500 | <500 | | <250 | <250 | | <25 | <500 |
| 4-Bromophenyl phenyl ether | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 4-Chloro-3-methylphenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 4-Chlorophenyl phenyl ether | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 4-Methylphenol | µg/L | 625 | | | | | | | | | | | | |
| 4-Nitrophenol | µg/L | 625 | | <250 | <500 | 500 | <500 | <500 | | <250 | <250 | | <25 | <500 |
| Acenaphthene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |

**Leachate Analytical Data - T-160**
**AWTS & FacPond Evaluation**

**CWM Chemical Services, LLC**
**Model City, NY**

**May 2012 - rev. 1**

**SLF 12 standpipe**

SLF 12 lift station

RMU-1, SLF-12 tank sampl 120202028 T160 AES 0 120210022 120215024 120216018CMW.xls, T160 021512.xlsx 120215035 120215034 Old Landfill Old Landfill Leachates_ 111116033

| Parameter | Units | Analytical Method | RMU-1 T-160 1/31/2012 | RMU-1 T-160 2/1/2012 | RMU-1 T-160 2/7/2012 | RMU-1 T-160 2/9/2012 | RMU-1 T-160 2/14/2012 | RMU-1 T-160 2/15/2012 | RMU-1 8/22/12 | L-54 2/14/2012 | T-150 2/14/2012 | T-150 2/14/2012 | T-150 7/23/2012 | Combined T-102 11/15/2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Samples Collected*** | | | | | | ***6*** | | | | ***1*** | ***1*** | | | ***1*** |
| ***Samples Required*** | | | | | | ***6*** | | | | ***3*** | ***3*** | | | ***24*** |
| Acenaphthylene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Anthracene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Azobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benz(a)anthracene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benzidine | µg/L | 625 | | <250 | <500 | <500 | <500 | <500 | | <250 | <250 | | <25 | <500 |
| Benzo(a)pyrene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benzo(b)fluoranthene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benzo(g,h,i)perylene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benzo(k)fluoranthene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benzothiazole | µg/L | 625 | | | | | | | | | | | | |
| Bis(2-chloroethoxy)methane | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Bis(2-chloroethyl)ether | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Bis(2-chloroisopropyl)ether | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Bis(2-ethylhexyl)phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | 330 | | <5 | <100 |
| Butyl benzyl phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Carbazole | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Chrysene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Dibenz(a,h)anthracene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Dibenzofuran | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Diethyl phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Dimethyl phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Di-n-butyl phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Di-n-octyl phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Fluoranthene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Fluorene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Hexachlorobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Hexachlorobutadiene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Hexachlorocyclopentadiene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Hexachloroethane | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Hexamethylbenzene | µg/L | 625 | | | | | | | | | | | | |
| Indeno(1,2,3-cd)pyrene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Isophorone | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Naphthalene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| n-decane | µg/L | 625 | | | | | | | | | | | | |
| Nitrobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| N-Nitrosodimethylamine | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| N-Nitrosodi-n-propylamine | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| N-Nitrosodiphenylamine | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| n-Octadecane | µg/L | 625 | | | | | | | | | | | | |
| Pentachlorophenol | µg/L | 625 | | <250 | <500 | <500 | <500 | <100 | | <250 | <250 | | <25 | <500 |
| Phenanthrene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Phenol | µg/L | 625 | | 630 | 1100 | 990 | 1200 | <100 | | <50 | <50 | | <5 | <100 |
| Pyrene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Pyridine | µg/L | 625 | | | | | | | | | | | | |
| **PCB Aroclor** | | | | | | | | | | | | | | |
| Aroclor 1016 | µg/L | 608 | | <1.3 | <5.2 | <0.26 | <0.074 | <0.349 | | <0.357 | <13.1 | | <16.8 | <3.25 |
| Aroclor 1221 | µg/L | 608 | | <1.3 | <5.2 | <0.26 | <0.074 | <0.349 | | <0.357 | <13.1 | | <16.8 | <3.25 |
| Aroclor 1232 | µg/L | 608 | | <1.3 | <5.2 | <0.26 | <0.074 | <0.349 | | <0.357 | <13.1 | | <16.8 | <3.25 |
| Aroclor 1242 | µg/L | 608 | | 3 | 29.6 | <0.26 | 2.04 | <0.349 | | <0.357 | 34.6 | | 226 | 5.32 |
| Aroclor 1248 | µg/L | 608 | | <1.3 | <5.2 | <0.26 | <0.074 | <0.349 | | <0.357 | <13.1 | | <16.8 | <3.25 |
| Aroclor 1254 | µg/L | 608 | | <1.3 | <5.2 | <0.26 | <0.074 | <0.349 | | <0.357 | 289 | | 92.5 | <3.25 |
| Aroclor 1260 | µg/L | 608 | | 1.67 | 112 | <0.26 | <0.074 | <0.349 | | <0.357 | 227 | | 69.7 | <3.25 |
| | | | | | | | | | | | | | | |
| Aroclor 1016 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1221 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1232 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1242 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1248 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1254 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1260 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1262 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1268 | µg/L | 8082A | | | | | | | | | | | | |
| **Chlorinated Pesticides** | | | | | | | | | | | | | | |
| 4,4´-DDD | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| 4,4´-DDE | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| 4,4´-DDT | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| Aldrin | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| alpha-BHC | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| alpha-Chlordane | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| beta-BHC | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Chlordane | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| delta-BHC | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Dieldrin | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| Endosulfan I | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Endosulfan II | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| Endosulfan sulfate | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| Endrin | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |

**Leachate Analytical Data - T-160**
**AWTS & FacPond Evaluation**

**CWM Chemical Services, LLC**
**Model City, NY**

**May 2012 - rev. 1**

RMU-1, SLF-12 tank sampl 120202028 T160 AES 0 120210022 120215024 120216018CMW.xls, T160 021512.xlsx 120215035 120215034 Old Landfill Old Landfill Leachates_ 111116033

**SLF 12 standpipe**

SLF 12 lift station

| Parameter | Units | Analytical Method | RMU-1 T-160 1/31/2012 | RMU-1 T-160 2/1/2012 | RMU-1 T-160 2/7/2012 | RMU-1 T-160 2/9/2012 | RMU-1 T-160 2/14/2012 | RMU-1 T-160 2/15/2012 | RMU-1 8/22/12 | L-54 2/14/2012 | T-150 2/14/2012 | T-150 2/14/2012 | T-150 7/23/2012 | Combined T-102 11/15/2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Samples Collected*** | | | | | | ***6*** | | | | ***1*** | ***1*** | | | ***1*** |
| ***Samples Required*** | | | | | | ***6*** | | | | ***3*** | ***3*** | | | ***24*** |
| Endrin aldehyde | µg/L | 608 | | <8 | <0.114 | <0.108 | | | | <0.110 | <20.2 | | <25.8 | <1.11 |
| Endrin Ketone | µg/L | 608 | | <8 | <0.108 | <0.108 | | | | <0.110 | <20.2 | | <25.8 | <1.11 |
| gamma-BHC | µg/L | 608 | | <4 | <0.054 | <0.054 | | | | <0.055 | <10.1 | | <12.9 | <0.56 |
| gamma-Chlordane | µg/L | 608 | | <4 | <0.054 | <0.054 | | | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Heptachlor | µg/L | 608 | | <4 | <0.054 | <0.054 | | | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Heptachlor epoxide | µg/L | 608 | | <4 | <0.054 | <0.054 | | | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Methoxychlor | µg/L | 608 | | <40 | <0.538 | <0.538 | | | | <0.549 | <101 | | <129 | <5.56 |
| Toxaphene | µg/L | 608 | | <80 | <1.08 | <1.08 | | | | <1.10 | <202 | | <258 | <11.1 |
| **Other key considerations** | | | | | | | | | | | | | | |

Key:

# Attachment 8
# Tanks Software Model Output for Leachate Tanks

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-102 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 32.00 |
| *Diameter (ft)* | 44.00 |
| *Liquid Height (ft)* | 29.50 |
| *Avg. Liquid Height (ft)* | 15.00 |
| *Volume (gal)* | 350,000.00 |
| *Turnovers* | 42.8571 |
| *Net Throughput (gal/yr)* | 15,000,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-102 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *RMU-1 & SLF-12 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3385 | 0.3385 | 0.3385 | 18.0099 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0001 | 0.0007 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0000 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0000 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9999 | 0.9992 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *RMU-1 & SLF-12 Leachate* | All | 49.26 | - | - | 47.70 | 0.3385 | - | - | 18.0099 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | 18.0099 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0001 | 0.0007 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 114000 | 0.000114 | 0.000002 | 0.000035 | 0.0134 |
| Carbon disulfide | | | | | | 3.7484 | - | - | 76.1300 | 0.0000 | 0.0000 | 76.13 | Option 2: A=6.942 B=1169.11 C=241.59 | 6.9420 | 1169.110 | 241.59 | 76.13 | 1090 | 0.0000011 | 0.000000 | 0.000000 | 0.0002 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 6420 | 6.42E-06 | 0.000000 | 0.000002 | 0.0003 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 470 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 1780 | 1.78E-06 | 0.000000 | 0.000000 | 0.0004 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 2050 | 2.05E-06 | 0.000000 | 0.000000 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9999 | 0.9992 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999874048.4 | 0.999874 | 0.055549 | 0.999962 | 17.9956 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0000 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 29.6 | 2.96E-08 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1260 | | | | | | 7.83E-07 | - | - | 395.3300 | 0.0000 | 0.0000 | 395.33 | --- | - | - | - | 395.33 | 112 | 1.12E-07 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-102 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 244.1874 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 244.2025 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 26545.9343 | | | $V_V$ = | 26545.9343 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.7615 | | | $K_S$ = | 0.7615 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 26545.9343 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 26545.9343 | cu ft | | | |
| D = Tank Diameter | 44.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 17.4583 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 17.4583 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 32.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 15.0000 | ft | | | | | | | |
| Roof Outage | 0.4583 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.4583 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.4583 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 1.3750 | ft | | | |
| $R_S$ = Shell Radius | 22.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0099 | | | $M_V$ = | 18.0099 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | As per sources listed on page 6-5 of TANKS user manual: |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | $P_{VX}$ = | 0.3414 |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.0600 | psia | $P_{VN}$ = | 0.3414 |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.7615 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.7615 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Space Outage | 17.4583 | ft | | | | | | |
| *Working Losses* | 1886.7554 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 1886.7619 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0099 | | | $M_V$ = | 18.0099 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 15,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 357,142.86 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 42.8571 | | | N = | 42.8571 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 0.8667 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.8667 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 350000.0000 | gal | | | | | | for crude oils $K_P = 0.75$ |
| Maximum Liquid Height | 29.5000 | ft | | | | | | |
| Tank Diameter | 44.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 2130.9427 | lb | | $L_T$ = | 2130.9644 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-102 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| RMU-1 & SLF-12 Leachate | 1886.76 | 244.19 | 2130.94 |
| Carbon disulfide | 0.02 | 0.00 | 0.03 |
| Methylene chloride | 0.04 | 0.01 | 0.05 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.02 | 0.00 | 0.02 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 1.40 | 0.18 | 1.58 |
| Water | 1885.27 | 243.99 | 2129.26 |
| Aroclor 1242 | -- | -- | -- |
| Aroclor 1260 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 1886.76193 | 244.20249 | 2130.96442 |
| 0.02277 | 0.00295 | 0.02571 |
| 0.04312 | 0.00558 | 0.04871 |
| 0.00268 | 0.00035 | 0.00302 |
| 0.02807 | 0.00363 | 0.03171 |
| 0.00038 | 0.00005 | 0.00043 |
| 1.40070 | 0.18129 | 1.58199 |
| 1885.26422 | 244.00864 | 2129.27286 |
| 0.0000000013 | 0.0000000002 | 0.0000000015 |
| 0.0000000005 | 0.0000000001 | 0.0000000006 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-103 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 32.00 |
| *Diameter (ft)* | 44.00 |
| *Liquid Height (ft)* | 29.50 |
| *Avg. Liquid Height (ft)* | 15.00 |
| *Volume (gal)* | 350,000.00 |
| *Turnovers* | 1.43 |
| *Net Throughput (gal/yr)* | 500,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-103 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | - | - | 18.04 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | ###### | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate* | All | 49.26 | - | - | 47.70 | 0.3394 | - | - | 18.1467 | - | - | 18.04 | - | - | - | - | - | - | - | - | - | 18.1467 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 740000 | 0.00074 | 0.000013 | 0.000230 | 0.0867 |
| Acetonitrile | | | | | | 0.8304 | - | - | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119 B=1314.4 C=230 | 7.1190 | 1314.400 | 230.00 | 41.05 | 6400 | 0.0000064 | 0.000000 | 0.000003 | 0.0003 |
| Acrylonitrile | | | | | | 1.0305 | - | - | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038 B=1232.53 C=222.47 | 7.0380 | 1232.530 | 222.47 | 53.06 | 160 | 0.00000016 | 0.000000 | 0.000000 | 0.0000 |
| Aniline | | | | | | 0.0038 | - | - | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32 B=1731.515 C=206.049 | 7.3200 | 1731.515 | 206.05 | 93.10 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 920 | 0.00000092 | 0.000000 | 0.000000 | 0.0000 |
| Butanol-(1) | | | | | | 0.0339 | - | - | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768 B=1362.39 C=178.77 | 7.4768 | 1362.390 | 178.77 | 74.12 | 290000 | 0.00029 | 0.000004 | 0.000071 | 0.0005 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 1000 | 0.000001 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 7800 | 0.0000078 | 0.000000 | 0.000001 | 0.0008 |
| Cresol (-m) | | | | | | 0.0008 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508 B=1856.36 C=199.07 | 7.5080 | 1856.360 | 199.07 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cyclohexanone | | | | | | 0.0377 | - | - | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492 B=2137.192 C=273.16 | 7.8492 | 2137.192 | 273.16 | 98.20 | 2100 | 0.0000021 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2012 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | - | - | - | 98.97 | 2700 | 0.0000027 | 0.000000 | 0.000000 | 0.0003 |
| Ethylene dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 6900 | 0.0000069 | 0.000000 | 0.000001 | 0.0003 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | - | - | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965 B=1141.9 C=231.9 | 6.9650 | 1141.900 | 231.90 | 96.95 | 300 | 0.0000003 | 0.000000 | 0.000000 | 0.0001 |
| Diethyl ether | | | | | | 5.5303 | - | - | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92 B=1064.07 C=228.8 | 6.9200 | 1064.070 | 228.80 | 74.12 | 9400 | 0.0000094 | 0.000000 | 0.000002 | 0.0028 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 280 | 0.00000028 | 0.000000 | 0.000000 | 0.0000 |
| Dioxane (1,4) | | | | | | 0.3139 | - | - | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431 B=1554.68 C=240.34 | 7.4310 | 1554.680 | 240.34 | 88.10 | 95000 | 0.000095 | 0.000001 | 0.000019 | 0.0016 |
| Ethyl chloride | | | | | | 13.2558 | - | - | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986 B=1030.01 C=238.61 | 6.9860 | 1030.010 | 238.61 | 64.52 | 110 | 0.00000011 | 0.000000 | 0.000000 | 0.0001 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 170 | 0.00000017 | 0.000000 | 0.000000 | 0.0000 |
| Iso-butyl alcohol | | | | | | 0.0584 | - | - | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636 B=1236.991 | 7.3064 | 1236.991 | 171.62 | 74.12 | 37000 | 0.000037 | 0.000000 | 0.000009 | 0.0001 |
| Methyl alcohol | | | | | | 1.0194 | - | - | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897 B=1474.08 C=229.13 | 7.8970 | 1474.080 | 229.13 | 32.04 | 970000 | 0.00097 | 0.000030 | 0.000546 | 0.0525 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0006 | 0.0013 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 550000 | 0.00055 | 0.000008 | 0.000138 | 0.0229 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 79000 | 0.000079 | 0.000001 | 0.000014 | 0.0006 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 220000 | 0.00022 | 0.000003 | 0.000047 | 0.0508 |
| Pyridine | | | | | | 0.1621 | - | - | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041 B=1373.8 C=214.98 | 7.0410 | 1373.800 | 214.98 | 79.10 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 12000 | 0.000012 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 500 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0001 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 3900 | 0.0000039 | 0.000000 | 0.000001 | 0.0003 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 13000 | 0.000013 | 0.000000 | 0.000002 | 0.0004 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 410 | 0.00000041 | 0.000000 | 0.000000 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9969 | 0.9878 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 996893675 | 0.996893675 | 0.055383 | 0.998905 | 17.9253 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 820 | 0.00000082 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0000 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 2810 | 0.00000281 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1254 | | | | | | 1.49E-06 | - | - | 326.4400 | 0.0000 | 0.0000 | 326.44 | --- | - | - | - | 326.44 | 795 | 0.000000795 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1260 | | | | | | 7.83E-07 | - | - | 395.3300 | 0.0000 | 0.0000 | 395.33 | --- | - | - | - | 395.33 | 690 | 0.00000069 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | | | | | | | | | | | | check: | **1.00000** | |
| | | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-103 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 246.7768 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 246.5656 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 26545.9343 | | | $V_V$ = | 26545.9343 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.7610 | | | $K_S$ = | 0.7610 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 26545.9343 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 26545.9343 | cu ft | | | |
| D = Tank Diameter | 44.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 17.4583 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 17.4583 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 32.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 15.0000 | ft | | | | | | | |
| Roof Outage | 0.4583 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.4583 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.4583 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 1.3750 | ft | | | |
| $R_S$ = Shell Radius | 22.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_V\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | R $T_{LX}$ $W_V$ / $M_V$ = $P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA}$ - 0.25 delta $T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA}$ + 0.25 delta $T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.7610 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.7610 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Space Outage | 17.4583 | ft | | | | | | |
| *Working Losses* | 73.3280 | lbs | $L_W = 0.0010$ $M_V$ $P_{VA}$ Q $K_N$ $K_P$ | $L_W$ = | 73.3280 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Q = Annual Net Throughput | 500,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 11,904.76 | bbl/yr | | |
| Annual Turnovers | 1.4286 | | | N = | 1.4286 | | | |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | |
| Maximum Liquid Volume | 350000.0000 | gal | | | | | | |
| Maximum Liquid Height | 29.5000 | ft | | | | | | |
| Tank Diameter | 44.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 320.1048 | lb | | $L_T$ = | 319.8936 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-103 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 1-6 Leachate | 73.33 | 246.78 | 320.10 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.01 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.09 | 0.31 | 0.40 |
| Methyl isobutyl ketone | 0.00 | 0.01 | 0.00 |
| Acetone | 0.35 | 1.18 | 1.53 |
| Methylene chloride | 0.21 | 0.69 | 0.90 |
| Trichloroethylene | 0.00 | 0.01 | 0.01 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Ethylene dichloride | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.02 | 0.03 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.01 | 0.01 |
| Diethyl ether | 0.01 | 0.04 | 0.05 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.21 | 0.71 | 0.93 |
| Butanol-(1) | 0.00 | 0.01 | 0.01 |
| Water | 72.43 | 243.77 | 316.20 |
| Aroclor 1242 | -- | -- | -- |
| Aroclor 1254 | -- | -- | -- |
| Aroclor 1260 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 73.32800 | 246.56565 | 319.89365 |
| 0.00103 | 0.00346 | 0.00449 |
| 0.00017 | 0.00059 | 0.00076 |
| 0.00128 | 0.00429 | 0.00557 |
| 0.00056 | 0.00188 | 0.00244 |
| 0.00007 | 0.00024 | 0.00031 |
| 0.09268 | 0.31165 | 0.40434 |
| 0.00245 | 0.00823 | 0.01068 |
| 0.35038 | 1.17814 | 1.52852 |
| 0.20539 | 0.69064 | 0.89603 |
| 0.00164 | 0.00551 | 0.00715 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00001 | 0.00001 |
| 0.00102 | 0.00344 | 0.00446 |
| 0.00640 | 0.02153 | 0.02794 |
| 0.00114 | 0.00384 | 0.00498 |
| 0.00004 | 0.00012 | 0.00015 |
| 0.00017 | 0.00057 | 0.00074 |
| 0.00002 | 0.00007 | 0.00009 |
| 0.00031 | 0.00105 | 0.00137 |
| 0.00304 | 0.01023 | 0.01327 |
| 0.01116 | 0.03753 | 0.04869 |
| 0.00000 | 0.00001 | 0.00001 |
| 0.00046 | 0.00156 | 0.00202 |
| 0.00002 | 0.00005 | 0.00007 |
| 0.00024 | 0.00081 | 0.00105 |
| 0.00021 | 0.00072 | 0.00094 |
| 0.00001 | 0.00004 | 0.00005 |
| 0.00002 | 0.00006 | 0.00007 |
| 0.00000 | 0.00000 | 0.00001 |
| 0.00000 | 0.00001 | 0.00001 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00014 | 0.00049 | 0.00063 |
| 0.21232 | 0.71394 | 0.92626 |
| 0.00211 | 0.00710 | 0.00921 |
| 72.43348 | 243.55784 | 315.99133 |
| 0.0000000047 | 0.0000000159 | 0.0000000207 |
| 0.0000000003 | 0.0000000009 | 0.0000000011 |
| 0.0000000001 | 0.0000000004 | 0.0000000005 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-105 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | Lift Station for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 8.00 |
| *Diameter (ft)* | 8.00 |
| *Liquid Height (ft)* | 8.00 |
| *Avg. Liquid Height (ft)* | 4.00 |
| *Volume (gal)* | 3,000.00 |
| *Turnovers* | 166.67 |
| *Net Throughput (gal/yr)* | 500,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-105 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3410 | 0.3406 | 0.3415 | 18.8182 | - | - | 18.31 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0010 | 0.0061 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0001 | 0.0001 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0003 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Carbon tetrachloride | | | | | | 1.0831 | 0.9599 | 1.2191 | 153.8400 | 0.0001 | 0.0002 | 153.84 | Option 2: A=6.934, B=1242.43, C=230 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0006 | 0.0001 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0002 | 0.0012 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0002 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0001 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0004 | 0.0001 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0008 | 0.0019 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0004 | 0.0002 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0020 | 0.0242 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Naphthalene | | | | | | 0.0015 | 0.0012 | 0.0019 | 128.2000 | 0.0000 | 0.0000 | 128.20 | Option 2: A=7.3729, B=1968.36, C=222.61 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0013 | 0.0001 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0017 | 0.0007 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0024 | 0.0016 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0025 | 0.0089 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0001 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0045 | 0.0076 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0001 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9797 | 0.9459 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0021 | 0.0004 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate* | All | 49.26 | - | - | 47.70 | 0.3409 | - | - | 18.8136 | - | - | 18.31 | - | - | - | - | - | - | - | - | - | 18.8136 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0010 | 0.0061 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 969665 | 0.0009697 | 0.000017 | 0.000306 | 0.1148 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0001 | 0.0001 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 60250 | 0.0000603 | 0.000001 | 0.000014 | 0.0028 |
| Carbon disulfide | | | | | | 3.7484 | - | - | 76.1300 | 0.0000 | 0.0003 | 76.13 | Option 2: A=6.942 B=1169.11 C=241.59 | 6.9420 | 1169.110 | 241.59 | 76.13 | 25238 | 0.0000252 | 0.000000 | 0.000006 | 0.0051 |
| Carbon tetrachloride | | | | | | 1.0831 | - | - | 153.8400 | 0.0001 | 0.0002 | 153.84 | Option 2: A=6.934 B=1242.43 C=230 | 6.9340 | 1242.430 | 230.00 | 153.84 | 71768 | 0.0000718 | 0.000000 | 0.000009 | 0.0042 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0006 | 0.0001 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 556562 | 0.0005566 | 0.000005 | 0.000090 | 0.0028 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0002 | 0.0012 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 224333 | 0.0002243 | 0.000002 | 0.000034 | 0.0219 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 4867 | 0.0000049 | 0.000000 | 0.000001 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 25745 | 0.0000257 | 0.000000 | 0.000004 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2012 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | - | - | - | 98.97 | 7686 | 0.0000077 | 0.000000 | 0.000001 | 0.0009 |
| Ethylene dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0001 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 39633 | 0.0000396 | 0.000000 | 0.000007 | 0.0015 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 5277 | 0.0000053 | 0.000000 | 0.000000 | 0.0000 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0004 | 0.0001 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 436369 | 0.0004364 | 0.000004 | 0.000075 | 0.0017 |
| Methyl ethyl ketone | | | | | | 0.7848 | | | 72.1000 | 0.0008 | 0.0018 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 826000 | 0.0008260 | 0.000011 | 0.000210 | 0.0348 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0004 | 0.0002 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 366931 | 0.0003669 | 0.000004 | 0.000067 | 0.0028 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0020 | 0.0242 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 1952690 | 0.0019527 | 0.000023 | 0.000421 | 0.4558 |
| Naphthalene | | | | | | 0.0015 | - | - | 128.2000 | 0.0000 | 0.0000 | 128.20 | Option 2: A=7.3729 B=1968.36 C=222.61 | 7.3729 | 1968.360 | 222.61 | 128.20 | 30704 | 0.0000307 | 0.000000 | 0.000004 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0013 | 0.0001 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 1286782 | 0.0012868 | 0.000008 | 0.000140 | 0.0019 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0017 | 0.0007 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 1667635 | 0.0016676 | 0.000010 | 0.000184 | 0.0129 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0024 | 0.0016 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 2369878 | 0.0023699 | 0.000026 | 0.000471 | 0.0298 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0025 | 0.0089 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 2546767 | 0.0025468 | 0.000019 | 0.000349 | 0.1681 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0001 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 90055 | 0.0000901 | 0.000001 | 0.000012 | 0.0008 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0045 | 0.0076 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 4520666 | 0.0045207 | 0.000034 | 0.000630 | 0.1426 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 1950 | 0.0000020 | 0.000000 | 0.000000 | 0.0007 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9798 | 0.9462 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 979784851 | 0.9797849 | 0.054432 | 0.996309 | 17.8008 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0021 | 0.0004 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 2127698 | 0.002127698 | 0.000020 | 0.000367 | 0.0070 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0044 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 4418565 | 0.004418565 | 0.000015 | 0.000277 | 0.0000 |
| Aroclor 1254 | | | | | | 1.49E-06 | - | - | 326.4400 | 0.0000 | 0.0000 | 326.44 | --- | - | - | - | 326.44 | 387 | 0.000000387 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1260 | | | | | | 7.83E-07 | - | - | 395.3300 | 0.0002 | 0.0000 | 395.33 | --- | - | - | - | 395.33 | 195144 | 0.00195144 | 0.000000 | 0.000009 | 0.0000 |
| | | | | | | | | | | | | | | | | | | | | check: | 1.00000 | |
| | | | | | | | | | check: | 1.0046 | 1.0000 | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-105 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 2.4359 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 2.4294 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 205.2507 | | | $V_V$ = | 205.2507 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0012 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9313 | | | $K_S$ = | 0.9313 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 205.2507 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 205.2507 | cu ft | | | |
| D = Tank Diameter | 8.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 4.0833 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 4.0833 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 8.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 4.0000 | ft | | | | | | | |
| Roof Outage | 0.0833 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.0833 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0833 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.2500 | ft | | | |
| $R_S$ = Shell Radius | 4.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0012 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_v$ = Vapor Molecular Weight | 18.8182 | | | $M_V$ = | 18.8136 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3406 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3415 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9313 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9313 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | | |
| Vapor Space Outage | 4.0833 | ft | | | | | | |
| *Working Losses* | 26.4855 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 26.4701 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.8182 | | | $M_V$ = | 18.8136 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | | |
| Q = Annual Net Throughput | 500,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 11,904.76 | bbl/yr | | |
| Annual Turnovers | 166.6667 | | | N = | 166.6667 | | | |
| $K_N$ = Turnover Factor | 0.3467 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.3467 | | | |
| Maximum Liquid Volume | 3000.0000 | gal | | | | | | |
| Maximum Liquid Height | 8.0000 | ft | | | | | | |
| Tank Diameter | 8.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 28.9213 | lb | | $L_T$ = | 28.8995 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-105 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 1-6 Leachate | 26.49 | 2.44 | 28.92 |
| Acetone | 0.16 | 0.01 | 0.18 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Carbon disulfide | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.05 | 0.00 | 0.05 |
| Carbon tetrachloride | 0.01 | 0.00 | 0.01 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.03 | 0.00 | 0.03 |
| Dichloroethane (1,1) | 0.01 | 0.00 | 0.01 |
| Ethylene dichloride | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.64 | 0.06 | 0.70 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Naphthalene | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.02 | 0.00 | 0.02 |
| Toluene | 0.04 | 0.00 | 0.05 |
| Trichloroethane (1,1,1) | 0.24 | 0.02 | 0.26 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.20 | 0.02 | 0.22 |
| Xylenes (mixed isomers) | 0.01 | 0.00 | 0.01 |
| Water | 25.05 | 2.30 | 27.36 |
| Aroclor 1242 | -- | -- | -- |
| Aroclor 1254 | -- | -- | -- |
| Aroclor 1260 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 26.47013 | 2.42935 | 28.89948 |
| 0.16152 | 0.01482 | 0.17634 |
| 0.00392 | 0.00036 | 0.00427 |
| 0.00715 | 0.00066 | 0.00780 |
| 0.04897 | 0.00449 | 0.05346 |
| 0.00587 | 0.00054 | 0.00641 |
| 0.00387 | 0.00036 | 0.00422 |
| 0.03077 | 0.00282 | 0.03360 |
| 0.00128 | 0.00012 | 0.00140 |
| 0.00207 | 0.00019 | 0.00226 |
| 0.00094 | 0.00009 | 0.00102 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00244 | 0.00022 | 0.00266 |
| 0.64135 | 0.05886 | 0.70021 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00400 | 0.00037 | 0.00437 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00265 | 0.00024 | 0.00290 |
| 0.01820 | 0.00167 | 0.01987 |
| 0.04193 | 0.00385 | 0.04577 |
| 0.23656 | 0.02171 | 0.25827 |
| 0.00115 | 0.00011 | 0.00126 |
| 0.20060 | 0.01841 | 0.21901 |
| 0.00986 | 0.00090 | 0.01076 |
| 25.04504 | 2.29856 | 27.34360 |
| 0.0000026201 | 0.0000002405 | 0.0000028606 |
| 0.0000000000 | 0.0000000000 | 0.0000000000 |
| 0.0000000115 | 0.0000000011 | 0.0000000126 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-107 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | SLF-7 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 6.58 |
| *Diameter (ft)* | 3.20 |
| *Liquid Height (ft)* | 6.58 |
| *Avg. Liquid Height (ft)* | 3.29 |
| *Volume (gal)* | 395.00 |
| *Turnovers* | 253.16 |
| *Net Throughput (gal/yr)* | 100,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-107 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 7 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3387 | 0.3386 | 0.3387 | 18.0507 | - | - | 18.01 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0012 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0002 | 0.0004 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0021 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9995 | 0.9963 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 131.40 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 7 Leachate* | All | 49.26 | - | - | 47.70 | 0.3387 | - | - | 18.0507 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | 18.0507 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0002 | 0.0012 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 180000 | 0.00018 | 0.000003 | 0.000056 | 0.0211 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0002 | 0.0004 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 179000 | 0.000179 | 0.000002 | 0.000045 | 0.0075 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0021 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 167000 | 0.000167 | 0.000002 | 0.000035 | 0.0386 |
| Toluene | | | | | | 0.2342 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 100.20 | 5990 | 0.00000599 | 0.000000 | 0.000001 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9994 | 0.9963 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999449930 | 0.9994499 | 0.055525 | 0.999861 | 17.9834 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 131.40 | 17600 | 0.0000176 | 0.000000 | 0.000002 | 0.0001 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0000 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 480 | 0.00000048 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-107 - Vertical Fixed Roof Tank**
**Model City, New York**

| Annual Emission Calculations | FROM TANKS DETAILED PDF | | AP-42 EQUATIONS | CALCULATIONS | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 0.3027 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.3027 | lbs | | |
| $V_V$ = Vapor Space Volume (cu ft) | 26.4597 | | | $V_V$ = | 26.4597 | cu ft | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9442 | | | $K_S$ = | 0.9442 | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume | 26.4597 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 26.4597 | cu ft | | |
| D = Tank Diameter | 3.2000 | ft | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 3.2900 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 3.2900 | ft | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 6.5800 | ft | | | | | | |
| $H_L$ = Average Liquid Height | 3.2900 | ft | | | | | | |
| Roof Outage | 0.0000 | ft | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | |
| Roof Outage | 0.0000 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0000 | ft | | |
| Roof Height | 0.0000 | ft | | | | | | |
| $S_R$ = Roof Slope | 0.0000 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.0000 | ft | | |
| $R_S$ = Shell Radius | 1.6000 | ft | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0507 | | | $M_V$ = | 18.0507 | lb/lb-mole | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

As per sources listed on page 6-5 of TANKS user manual:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0001 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9442 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9442 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| Vapor Space Outage | 3.2900 | ft | | | | | | |
| *Working Losses* | 4.1506 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 4.1506 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0507 | | | $M_V$ = | 18.0507 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| Q = Annual Net Throughput | 100,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 2,380.95 | bbl/yr | | |
| Annual Turnovers | 253.1646 | | | N = | 253.1646 | | | |
| $K_N$ = Turnover Factor | 0.2852 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.2852 | | | |
| Maximum Liquid Volume | 395.0000 | gal | | | | | | |
| Maximum Liquid Height | 6.5800 | ft | | | | | | |
| Tank Diameter | 3.2000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 4.4532 | lb | | $L_T$ = | 4.4532 | lbs | | |

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-107 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 7 Leachate | 4.15 | 0.30 | 4.45 |
| Acetone | 0.00 | 0.00 | 0.01 |
| Methylene chloride | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Water | 4.14 | 0.30 | 4.44 |
| Aroclor 1242 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 4.15056 | 0.30268 | 4.45324 |
| 0.00485 | 0.00035 | 0.00521 |
| 0.00888 | 0.00065 | 0.00953 |
| 0.00172 | 0.00013 | 0.00184 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00001 | 0.00000 | 0.00001 |
| 4.13508 | 0.30155 | 4.43663 |
| 0.0000000000 | 0.0000000000 | 0.0000000000 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-108 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | SLF-11 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 16.00 |
| *Diameter (ft)* | 10.33 |
| *Liquid Height (ft)* | 16.00 |
| *Avg. Liquid Height (ft)* | 5.17 |
| *Volume (gal)* | 10,000.00 |
| *Turnovers* | 20.00 |
| *Net Throughput (gal/yr)* | 200,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-108 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 11 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3384 | 0.3384 | 0.3384 | 18.003 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0000 | 0.0002 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9998 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 11 Leachate* | All | 49.26 | - | - | 47.70 | 0.3384 | - | - | 18.0030 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | 18.0030 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0000 | 0.0002 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 32000 | 0.000032 | 0.000001 | 0.000010 | 0.0038 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 14100 | 0.0000141 | 0.000000 | 0.000004 | 0.0006 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 2580 | 0.00000258 | 0.000000 | 0.000000 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9999 | 0.9998 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999948381 | 0.9999484 | 0.055553 | 0.999986 | 17.9987 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0000 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 457 | 4.57E-07 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1254 | | | | | | 1.49E-06 | - | - | 326.4400 | 0.0000 | 0.0000 | 326.44 | --- | - | - | - | 326.44 | 1590 | 0.00000159 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1260 | | | | | | 7.83E-07 | - | - | 395.3300 | 0.0000 | 0.0000 | 395.33 | --- | - | - | - | 395.33 | 892 | 8.92E-07 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | check: | **1.00000** | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-108 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 9.1756 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 9.1751 | lbs | | |
| $V_V$ = Vapor Space Volume (cu ft) | 907.6512 | | | $V_V$ = | 907.6512 | cu ft | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0296 | | | $K_E$ = | 0.0296 | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8373 | | | $K_S$ = | 0.8373 | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume | 907.6512 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 907.6512 | cu ft | | |
| D = Tank Diameter | 10.3300 | ft | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 10.8300 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 10.8300 | ft | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 16.0000 | ft | | | | | | |
| $H_L$ = Average Liquid Height | 5.1700 | ft | | | | | | |
| Roof Outage | 0.0000 | ft | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | |
| Roof Outage | 0.0000 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0000 | ft | | |
| Roof Height | 0.0000 | ft | | | | | | |
| $S_R$ = Roof Slope | 0.0000 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.0000 | ft | | |
| $R_S$ = Shell Radius | 5.1650 | ft | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | 0 deg F = 459.67 R |
| $M_v$ = Vapor Molecular Weight | 18.0030 | | | $M_V$ = | 18.0030 | lb/lb-mole | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0296 | | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA}$ - 0.25 delta $T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA}$ + 0.25 delta $T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8373 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.8373 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Vapor Space Outage | 10.8300 | ft | | | | | | |
| *Working Losses* | 29.0118 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 29.0118 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0030 | | | $M_V$ = | 18.0030 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 200,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 4,761.90 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 20.0000 | | | N = | 20.0000 | | | for turnovers <36, $K_N$ = 1 |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 10000.0000 | gal | | | | | | for crude oils $K_P$ = 0.75 |
| Maximum Liquid Height | 16.0000 | ft | | | | | | |
| Tank Diameter | 10.3300 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 38.1873 | lb | | $L_T$ = | 38.1869 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-108 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 11 Leachate | 29.01 | 9.18 | 38.19 |
| Acetone | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 29.00 | 9.17 | 38.18 |
| Aroclor 1242 | -- | -- | -- |
| Aroclor 1254 | -- | -- | -- |
| Aroclor 1260 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 29.01179 | 9.17510 | 38.18690 |
| 0.00605 | 0.00191 | 0.00796 |
| 0.00095 | 0.00030 | 0.00125 |
| 0.00003 | 0.00001 | 0.00004 |
| 29.00477 | 9.17288 | 38.17764 |
| 0.0000000003 | 0.0000000001 | 0.0000000004 |
| 0.0000000002 | 0.0000000001 | 0.0000000003 |
| 0.0000000001 | 0.0000000000 | 0.0000000001 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-109 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | SLF-10 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 8.00 |
| *Diameter (ft)* | 8.00 |
| *Liquid Height (ft)* | 8.00 |
| *Avg. Liquid Height (ft)* | 4.00 |
| *Volume (gal)* | 3,000.00 |
| *Turnovers* | 33.33 |
| *Net Throughput (gal/yr)* | 100,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-109 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 10 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0253 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0003 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9997 | 0.9980 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i$ / $MW_i$ | $X_i$ | $M_V$ = $M_i$ [(P $X_i$)/$P_{VA}$] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 10 Leachate* | All | 49.26 | - | - | 47.70 | 0.3386 | - | - | 18.0253 | - | - | 18.00 | - | - | - | - | | - | - | - | - | 18.0253 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 236000 | 0.000236 | 0.000004 | 0.000073 | 0.0277 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0001 | 0.0001 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 50300 | 0.0000503 | 0.000001 | 0.000013 | 0.0021 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 11900 | 0.0000119 | 0.000000 | 0.000002 | 0.0001 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0003 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 24900 | 0.0000249 | 0.000000 | 0.000005 | 0.0058 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9997 | 0.9980 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999676879.5 | 0.9996769 | 0.055538 | 0.999907 | 17.9897 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0000 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 15.3 | 1.53E-08 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1254 | | | | | | 1.49E-06 | - | - | 326.4400 | 0.0000 | 0.0000 | 326.44 | --- | - | - | - | 326.44 | 5.25 | 5.25E-09 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | check: | **1.00000** | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-109 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 2.2688 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 2.2688 | lbs | | |
| $V_V$ = Vapor Space Volume (cu ft) | 201.0619 | | | $V_V$ = | 201.0619 | cu ft | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9330 | | | $K_S$ = | 0.9330 | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume | 201.0619 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 201.0619 | cu ft | | |
| D = Tank Diameter | 8.0000 | ft | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 4.0000 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 4.0000 | ft | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 8.0000 | ft | | | | | | |
| $H_L$ = Average Liquid Height | 4.0000 | ft | | | | | | |
| Roof Outage | 0.0000 | ft | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | |
| Roof Outage | 0.0000 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0000 | ft | | |
| Roof Height | 0.0000 | ft | | | | | | |
| $S_R$ = Roof Slope | 0.0000 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.0000 | ft | | |
| $R_S$ = Shell Radius | 4.0000 | ft | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0253 | | | $M_V$ = | 18.0253 | lb/lb-mole | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9330 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9330 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Space Outage | 4.0000 | ft | | | | | | |
| *Working Losses* | 14.5300 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 14.5299 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0253 | | | $M_V$ = | 18.0253 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Q = Annual Net Throughput | 100,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 2,380.95 | bbl/yr | | |
| Annual Turnovers | 33.3333 | | | N = | 33.3333 | | | |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | |
| Maximum Liquid Volume | 3000.0000 | gal | | | | | | |
| Maximum Liquid Height | 8.0000 | ft | | | | | | |
| Tank Diameter | 8.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 16.7988 | lb | | $L_T$ = | 16.7988 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-109 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 10 Leachate | 14.53 | 2.27 | 16.80 |
| Acetone | 0.02 | 0.00 | 0.03 |
| Methylene chloride | 0.00 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 14.50 | 2.26 | 16.77 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Aroclor 1242 | -- | -- | -- |
| Aroclor 1254 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 14.52995 | 2.26884 | 16.79879 |
| 0.02231 | 0.00348 | 0.02579 |
| 0.00464 | 0.00072 | 0.00537 |
| 0.00169 | 0.00026 | 0.00196 |
| 14.50123 | 2.26436 | 16.76559 |
| 0.00007 | 0.00001 | 0.00009 |
| 0.0000000000 | 0.0000000000 | 0.0000000000 |
| 0.0000000000 | 0.0000000000 | 0.0000000000 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-110 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | SLF-10 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 6.58 |
| *Diameter (ft)* | 3.20 |
| *Liquid Height (ft)* | 6.58 |
| *Avg. Liquid Height (ft)* | 3.29 |
| *Volume (gal)* | 395.00 |
| *Turnovers* | 253.16 |
| *Net Throughput (gal/yr)* | 100,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-110 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 10 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0253 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0003 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9997 | 0.9980 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 10 Leachate* | All | 49.26 | - | - | 47.70 | 0.3386 | - | - | 18.0253 | - | - | 18.00 | - | - | - | - | | - | - | - | - | 18.0253 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 236000 | 0.000236 | 0.000004 | 0.000073 | 0.0277 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0001 | 0.0001 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 50300 | 0.0000503 | 0.000001 | 0.000013 | 0.0021 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 11900 | 0.0000119 | 0.000000 | 0.000002 | 0.0001 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0003 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 24900 | 0.0000249 | 0.000000 | 0.000005 | 0.0058 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9997 | 0.9980 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999676879.5 | 0.9996769 | 0.055538 | 0.999907 | 17.9897 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0000 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 15.3 | 1.53E-08 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1254 | | | | | | 1.49E-06 | - | - | 326.4400 | 0.0000 | 0.0000 | 326.44 | --- | - | - | - | 326.44 | 5.25 | 5.25E-09 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-110 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 0.3022 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.3022 | lbs | | |
| $V_V$ = Vapor Space Volume (cu ft) | 26.4597 | | | $V_V$ = | 26.4597 | cu ft | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9443 | | | $K_S$ = | 0.9443 | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume | 26.4597 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 26.4597 | cu ft | | |
| D = Tank Diameter | 3.2000 | ft | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 3.2900 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 3.2900 | ft | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 6.5800 | ft | | | | | | |
| $H_L$ = Average Liquid Height | 3.2900 | ft | | | | | | |
| Roof Outage | 0.0000 | ft | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | |
| Roof Outage | 0.0000 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0000 | ft | | |
| Roof Height | 0.0000 | ft | | | | | | |
| $S_R$ = Roof Slope | 0.0000 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.0000 | ft | | |
| $R_S$ = Shell Radius | 1.6000 | ft | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | 0 deg F = 459.67 R |
| $M_v$ = Vapor Molecular Weight | 18.0253 | | | $M_V$ = | 18.0253 | lb/lb-mole | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Vapor Space Expansion Factor* | | | | | | | | As per sources listed on page 6-5 of TANKS user manual: |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{delta}P_V - \text{delta } P_B)/(P_A - P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX} - T_{AN}) + 0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |
| *Vented Vapor Saturation Factor* | | | | | | | | |
| Vented Vapor Saturation Factor | 0.9443 | | $K_S = 1/[1 + (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9443 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Space Outage | 3.2900 | ft | | | | | | |
| *Working Losses* | 4.1435 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 4.1435 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0253 | | | $M_V$ = | 18.0253 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 100,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 2,380.95 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 253.1646 | | | N = | 253.1646 | | | for turnovers <36, $K_N$ = 1 |
| $K_N$ = Turnover Factor | 0.2852 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.2852 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 395.0000 | gal | | | | | | for crude oils $K_P$ = 0.75 |
| Maximum Liquid Height | 6.5800 | ft | | | | | | |
| Tank Diameter | 3.2000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 4.4456 | lb | | $L_T$ = | 4.4456 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-110 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 10 Leachate | 4.14 | 0.30 | 4.45 |
| Acetone | 0.01 | 0.00 | 0.01 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 4.14 | 0.30 | 4.44 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Aroclor 1242 | -- | -- | -- |
| Aroclor 1254 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 4.14346 | 0.30217 | 4.44563 |
| 0.00636 | 0.00046 | 0.00683 |
| 0.00132 | 0.00010 | 0.00142 |
| 0.00048 | 0.00004 | 0.00052 |
| 4.13527 | 0.30157 | 4.43684 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.0000000000 | 0.0000000000 | 0.0000000000 |
| 0.0000000000 | 0.0000000000 | 0.0000000000 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-111 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | SLF-11 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 6.58 |
| *Diameter (ft)* | 3.20 |
| *Liquid Height (ft)* | 6.58 |
| *Avg. Liquid Height (ft)* | 3.29 |
| *Volume (gal)* | 395.00 |
| *Turnovers* | 506.33 |
| *Net Throughput (gal/yr)* | 200,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-111 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 11 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3384 | 0.3384 | 0.3384 | 18.003 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0000 | 0.0002 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9998 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 11 Leachate* | All | 49.26 | - | - | 47.70 | 0.3384 | - | - | 18.0030 | - | - | 18.00 | - | - | - | - | | - | - | - | - | 18.0030 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0000 | 0.0002 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 32000 | 0.000032 | 0.000001 | 0.000010 | 0.0038 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 14100 | 0.0000141 | 0.000000 | 0.000004 | 0.0006 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 2580 | 0.00000258 | 0.000000 | 0.000000 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9999 | 0.9998 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999948381 | 0.9999484 | 0.055553 | 0.999986 | 17.9987 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0000 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 457 | 4.57E-07 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1254 | | | | | | 1.49E-06 | - | - | 326.4400 | 0.0000 | 0.0000 | 326.44 | --- | - | - | - | 326.44 | 1590 | 0.00000159 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1260 | | | | | | 7.83E-07 | - | - | 395.3300 | 0.0000 | 0.0000 | 395.33 | --- | - | - | - | 395.33 | 892 | 8.92E-07 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-111 - Vertical Fixed Roof Tank**
**Model City, New York**

| Annual Emission Calculations | FROM TANKS DETAILED PDF | | AP-42 EQUATIONS | CALCULATIONS | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 0.3016 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.3016 | lbs | | |
| $V_V$ = Vapor Space Volume (cu ft) | 26.4597 | | | $V_V$ = | 26.4597 | cu ft | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0296 | | | $K_E$ = | 0.0296 | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9443 | | | $K_S$ = | 0.9443 | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume | 26.4597 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 26.4597 | cu ft | | |
| D = Tank Diameter | 3.2000 | ft | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 3.2900 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 3.2900 | ft | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 6.5800 | ft | | | | | | |
| $H_L$ = Average Liquid Height | 3.2900 | ft | | | | | | |
| Roof Outage | 0.0000 | ft | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | |
| Roof Outage | 0.0000 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0000 | ft | | |
| Roof Height | 0.0000 | ft | | | | | | |
| $S_R$ = Roof Slope | 0.0000 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.0000 | ft | | |
| $R_S$ = Shell Radius | 1.6000 | ft | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0030 | | | $M_V$ = | 18.0030 | lb/lb-mole | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0296 | | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9443 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9443 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Vapor Space Outage | 3.2900 | ft | | | | | | |
| *Working Losses* | 6.5542 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 6.5542 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0030 | | | $M_V$ = | 18.0030 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Q = Annual Net Throughput | 200,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 4,761.90 | bbl/yr | | |
| Annual Turnovers | 506.3291 | | | N = | 506.3291 | | | |
| $K_N$ = Turnover Factor | 0.2259 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.2259 | | | |
| Maximum Liquid Volume | 395.0000 | gal | | | | | | |
| Maximum Liquid Height | 6.5800 | ft | | | | | | |
| Tank Diameter | 3.2000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 6.8559 | lb | | $L_T$ = | 6.8559 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-111 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 11 Leachate | 6.55 | 0.30 | 6.86 |
| Acetone | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 6.55 | 0.30 | 6.85 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Aroclor 1242 | -- | -- | -- |
| Aroclor 1254 | -- | -- | -- |
| Aroclor 1260 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 6.55425 | 0.30163 | 6.85587 |
| 0.00137 | 0.00006 | 0.00143 |
| 0.00021 | 0.00001 | 0.00022 |
| 6.55266 | 0.30155 | 6.85421 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.0000000001 | 0.0000000000 | 0.0000000001 |
| 0.0000000000 | 0.0000000000 | 0.0000000000 |
| 0.0000000000 | 0.0000000000 | 0.0000000000 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-130 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 10.00 |
| *Diameter (ft)* | 7.60 |
| *Liquid Height (ft)* | 10.00 |
| *Avg. Liquid Height (ft)* | 5.00 |
| *Volume (gal)* | 3,393.52 |
| *Turnovers* | 147.34 |
| *Net Throughput (gal/yr)* | 500,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-130 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3410 | 0.3406 | 0.3415 | 18.8182 | - | - | 18.31 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0010 | 0.0061 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0001 | 0.0001 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0003 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Carbon tetrachloride | | | | | | 1.0831 | 0.9599 | 1.2191 | 153.8400 | 0.0001 | 0.0002 | 153.84 | Option 2: A=6.934, B=1242.43, C=230 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0006 | 0.0001 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0002 | 0.0012 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0002 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0001 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0004 | 0.0001 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0008 | 0.0019 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0004 | 0.0002 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0020 | 0.0242 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Naphthalene | | | | | | 0.0015 | 0.0012 | 0.0019 | 128.2000 | 0.0000 | 0.0000 | 128.20 | Option 2: A=7.3729, B=1968.36, C=222.61 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0013 | 0.0001 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0017 | 0.0007 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0024 | 0.0016 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0025 | 0.0089 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0001 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0045 | 0.0076 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0001 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9797 | 0.9459 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0021 | 0.0004 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_v = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate* | All | 49.26 | - | - | 47.70 | 0.3409 | - | - | 18.8175 | - | - | 18.31 | - | - | - | - | - | - | - | - | - | 18.8175 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0010 | 0.0061 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 969665 | 0.0009697 | 0.000017 | 0.000307 | 0.1153 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0001 | 0.0001 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 60250 | 0.0000603 | 0.000001 | 0.000014 | 0.0028 |
| Carbon disulfide | | | | | | 3.7484 | - | - | 76.1300 | 0.0000 | 0.0003 | 76.13 | Option 2: A=6.942 B=1169.11 C=241.59 | 6.9420 | 1169.110 | 241.59 | 76.13 | 25238 | 0.0000252 | 0.000000 | 0.000006 | 0.0051 |
| Carbon tetrachloride | | | | | | 1.0831 | - | - | 153.8400 | 0.0001 | 0.0002 | 153.84 | Option 2: A=6.934 B=1242.43 C=230 | 6.9340 | 1242.430 | 230.00 | 153.84 | 71768 | 0.0000718 | 0.000000 | 0.000009 | 0.0042 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0006 | 0.0001 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 556562 | 0.0005566 | 0.000005 | 0.000091 | 0.0028 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0002 | 0.0012 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 224333 | 0.0002243 | 0.000002 | 0.000035 | 0.0220 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 4867 | 0.0000049 | 0.000000 | 0.000001 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 25745 | 0.0000257 | 0.000000 | 0.000004 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2074 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | 6.9853 | 1171.420 | 228.13 | 98.97 | 7686 | 0.0000077 | 0.000000 | 0.000001 | 0.0009 |
| Ethylene dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0001 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 39633 | 0.0000396 | 0.000000 | 0.000007 | 0.0015 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 5277 | 0.0000053 | 0.000000 | 0.000000 | 0.0000 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0004 | 0.0001 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 436369 | 0.0004364 | 0.000004 | 0.000076 | 0.0017 |
| Methyl ethyl ketone | | | | | | 0.7848 | | | 72.1000 | 0.0008 | 0.0019 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 826000 | 0.0008260 | 0.000011 | 0.000211 | 0.0350 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0004 | 0.0002 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 366931 | 0.0003669 | 0.000004 | 0.000067 | 0.0029 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0020 | 0.0243 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 1952690 | 0.0019527 | 0.000023 | 0.000423 | 0.4580 |
| Naphthalene | | | | | | 0.0015 | - | - | 128.2000 | 0.0000 | 0.0000 | 128.20 | Option 2: A=7.3729 B=1968.36 C=222.61 | 7.3729 | 1968.360 | 222.61 | 128.20 | 30704 | 0.0000307 | 0.000000 | 0.000004 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0013 | 0.0001 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 1286782 | 0.0012868 | 0.000008 | 0.000141 | 0.0019 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0017 | 0.0007 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 1667635 | 0.0016676 | 0.000010 | 0.000185 | 0.0130 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0024 | 0.0016 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 2369878 | 0.0023699 | 0.000026 | 0.000473 | 0.0299 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0025 | 0.0090 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 2546767 | 0.0025468 | 0.000019 | 0.000351 | 0.1689 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0001 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 90055 | 0.0000901 | 0.000001 | 0.000012 | 0.0008 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0045 | 0.0076 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 4520666 | 0.0045207 | 0.000034 | 0.000633 | 0.1432 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 1950 | 0.0000020 | 0.000000 | 0.000000 | 0.0007 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9752 | 0.9459 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 975170755 | 0.9751708 | 0.054176 | 0.996292 | 17.7998 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0021 | 0.0004 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 2127698 | 0.002127698 | 0.000020 | 0.000369 | 0.0070 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0044 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 4418565 | 0.004418565 | 0.000015 | 0.000278 | 0.0000 |
| Aroclor 1254 | | | | | | 1.49E-06 | - | - | 326.4400 | 0.0000 | 0.0000 | 326.44 | --- | - | - | - | 326.44 | 387 | 0.000000387 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1260 | | | | | | 7.83E-07 | - | - | 395.3300 | 0.0002 | 0.0000 | 395.33 | --- | - | - | - | 395.33 | 195144 | 0.000195144 | 0.000000 | 0.000009 | 0.0000 |
| | | | | | | | | | | | | | | | | | | | | check: | 1.00000 | |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-130 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 2.6894 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 2.6829 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 230.4144 | | | $V_V$ = | 230.4144 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0012 | | | $W_V$ = | 0.0012 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9159 | | | $K_S$ = | 0.9159 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 230.4144 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 230.4144 | cu ft | | | |
| D = Tank Diameter | 7.6000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 5.0792 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 5.0792 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 10.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 5.0000 | ft | | | | | | | |
| Roof Outage | 0.0792 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.0792 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0792 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.2375 | ft | | | |
| $R_S$ = Shell Radius | 3.8000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0012 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0012 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.8182 | | | $M_V$ = | 18.8175 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3406 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3415 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9159 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9159 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | | |
| Vapor Space Outage | 5.0792 | ft | | | | | | |
| *Working Losses* | 28.2894 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 28.2797 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.8182 | | | $M_V$ = | 18.8175 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | | |
| Q = Annual Net Throughput | 500,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 11,904.76 | bbl/yr | | |
| Annual Turnovers | 147.3396 | | | N = | 147.3396 | | | |
| $K_N$ = Turnover Factor | 0.3703 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.3703 | | | |
| Maximum Liquid Volume | 3393.5200 | gal | | | | | | |
| Maximum Liquid Height | 10.0000 | ft | | | | | | |
| Tank Diameter | 7.6000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 30.9788 | lb | | $L_T$ = | 30.9626 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-130 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 1-6 Leachate | 28.29 | 2.69 | 30.98 |
| Acetone | 0.17 | 0.02 | 0.19 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Carbon disulfide | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.05 | 0.01 | 0.06 |
| Carbon tetrachloride | 0.01 | 0.00 | 0.01 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.03 | 0.00 | 0.04 |
| Dichloroethane (1,1) | 0.01 | 0.00 | 0.01 |
| Ethylene dichloride | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.69 | 0.07 | 0.75 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Naphthalene | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.02 | 0.00 | 0.02 |
| Toluene | 0.04 | 0.00 | 0.05 |
| Trichloroethane (1,1,1) | 0.25 | 0.02 | 0.28 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.21 | 0.02 | 0.23 |
| Xylenes (mixed isomers) | 0.01 | 0.00 | 0.01 |
| Water | 26.76 | 2.54 | 29.30 |
| Aroclor 1242 | -- | -- | -- |
| Aroclor 1254 | -- | -- | -- |
| Aroclor 1260 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 28.27970 | 2.68287 | 30.96257 |
| 0.17333 | 0.01644 | 0.18978 |
| 0.00420 | 0.00040 | 0.00460 |
| 0.00767 | 0.00073 | 0.00840 |
| 0.05255 | 0.00499 | 0.05754 |
| 0.00630 | 0.00060 | 0.00690 |
| 0.00415 | 0.00039 | 0.00455 |
| 0.03302 | 0.00313 | 0.03616 |
| 0.00138 | 0.00013 | 0.00151 |
| 0.00222 | 0.00021 | 0.00243 |
| 0.00101 | 0.00010 | 0.00110 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00261 | 0.00025 | 0.00286 |
| 0.68826 | 0.06530 | 0.75356 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00429 | 0.00041 | 0.00470 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00285 | 0.00027 | 0.00312 |
| 0.01953 | 0.00185 | 0.02138 |
| 0.04499 | 0.00427 | 0.04926 |
| 0.25386 | 0.02408 | 0.27794 |
| 0.00124 | 0.00012 | 0.00136 |
| 0.21527 | 0.02042 | 0.23569 |
| 0.01058 | 0.00100 | 0.01158 |
| 26.75037 | 2.53778 | 29.28815 |
| 0.0000028118 | 0.0000002667 | 0.0000030785 |
| 0.0000000000 | 0.0000000000 | 0.0000000001 |
| 0.0000000124 | 0.0000000012 | 0.0000000136 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-150 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 14.00 |
| *Diameter (ft)* | 10.00 |
| *Liquid Height (ft)* | 14.00 |
| *Avg. Liquid Height (ft)* | 5.00 |
| *Volume (gal)* | 8,000.00 |
| *Turnovers* | 125.0000 |
| *Net Throughput (gal/yr)* | 1,000,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-150 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 12 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3386 | 0.3387 | 18.0496 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0001 | 0.0007 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0000 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9997 | 0.9964 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_v = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 12 Leachate* | All | 49.26 | - | - | 47.70 | 0.3384 | - | - | 18.0004 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | 18.0004 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0000 | 0.0000 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 362 | 0.0000004 | 0.000000 | 0.000000 | 0.0000 |
| Carbon disulfide | | | | | | 3.7484 | - | - | 76.1300 | 0.0000 | 0.0000 | 76.13 | Option 2: A=6.942 B=1169.11 C=241.59 | 6.9420 | 1169.110 | 241.59 | 76.13 | 0 | 0.0000000 | 0.000000 | 0.000000 | 0.0000 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 10 | 0.0000000 | 0.000000 | 0.000000 | 0.0000 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 10 | 0.0000000 | 0.000000 | 0.000000 | 0.0000 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 2280 | 0.0000023 | 0.000000 | 0.000000 | 0.0005 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 0 | 0.0000000 | 0.000000 | 0.000000 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 1.0000 | 1.0000 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999996596 | 0.9999966 | 0.055555 | 0.999999 | 17.9999 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0000 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 226 | 2.26E-07 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1254 | | | | | | 1.49E-06 | - | - | 326.4400 | 0.0000 | 0.0000 | 326.44 | --- | - | - | - | 326.44 | 289 | 2.89E-07 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1260 | | | | | | 7.83E-07 | - | - | 395.3300 | 0.0000 | 0.0000 | 395.33 | --- | - | - | - | 395.33 | 227 | 2.27E-07 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-150 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 7.4454 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 7.4440 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 715.0396 | | | $V_V$ = | 715.0396 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8595 | | | $K_S$ = | 0.8596 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 715.0396 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 715.0396 | cu ft | | | |
| D = Tank Diameter | 10.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 9.1042 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 9.1042 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 14.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 5.0000 | ft | | | | | | | |
| Roof Outage | 0.1042 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1042 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.1042 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.3125 | ft | | | |
| $R_S$ = Shell Radius | 5.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_V\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0496 | | | $M_V$ = | 18.0004 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | As per sources listed on page 6-5 of TANKS user manual: |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0001 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA}$ - 0.25 delta $T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA}$ + 0.25 delta $T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8595 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.8596 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Space Outage | 9.1042 | ft | | | | | | |
| *Working Losses* | 59.1843 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 58.9790 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0496 | | | $M_V$ = | 18.0004 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 1,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 23,809.52 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 125.0000 | | | N = | 125.0000 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 0.4067 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.4067 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 8000.0000 | gal | | | | | | for crude oils $K_P = 0.75$ |
| Maximum Liquid Height | 14.0000 | ft | | | | | | |
| Tank Diameter | 10.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 66.6296 | lb | | $L_T$ = | 66.4230 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-150 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 12 Leachate | 59.18 | 7.45 | 66.63 |
| Carbon disulfide | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.17 | 0.02 | 0.19 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.04 | 0.01 | 0.05 |
| Water | 58.97 | 7.42 | 66.39 |
| Aroclor 1242 | -- | -- | -- |
| Aroclor 1254 | -- | -- | -- |
| Aroclor 1260 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 58.97901 | 7.44397 | 66.42298 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00173 | 0.00022 | 0.00195 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00014 | 0.00002 | 0.00016 |
| 58.97714 | 7.44374 | 66.42088 |
| 0.0000000003 | 0.0000000000 | 0.0000000003 |
| 0.0000000001 | 0.0000000000 | 0.0000000001 |
| 0.0000000000 | 0.0000000000 | 0.0000000000 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-158 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 18.00 |
| *Diameter (ft)* | 12.00 |
| *Liquid Height (ft)* | 18.00 |
| *Avg. Liquid Height (ft)* | 9.00 |
| *Volume (gal)* | 15,000.00 |
| *Turnovers* | 33.33 |
| *Net Throughput (gal/yr)* | 500,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-158 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3410 | 0.3406 | 0.3415 | 18.8182 | - | - | 18.31 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0010 | 0.0061 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0001 | 0.0001 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0003 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Carbon tetrachloride | | | | | | 1.0831 | 0.9599 | 1.2191 | 153.8400 | 0.0001 | 0.0002 | 153.84 | Option 2: A=6.934, B=1242.43, C=230 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0006 | 0.0001 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0002 | 0.0012 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0002 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0001 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0004 | 0.0001 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0008 | 0.0019 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0004 | 0.0002 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0020 | 0.0242 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Naphthalene | | | | | | 0.0015 | 0.0012 | 0.0019 | 128.2000 | 0.0000 | 0.0000 | 128.20 | Option 2: A=7.3729, B=1968.36, C=222.61 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0013 | 0.0001 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0017 | 0.0007 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0024 | 0.0016 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0025 | 0.0089 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0001 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0045 | 0.0076 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0001 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9797 | 0.9459 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0021 | 0.0004 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_v = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate* | All | 49.26 | - | - | 47.70 | 0.3409 | - | - | 18.8175 | - | - | 18.31 | - | - | - | - | - | - | - | - | - | 18.8175 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0010 | 0.0061 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 969665 | 0.0009697 | 0.000017 | 0.000307 | 0.1153 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0001 | 0.0001 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 60250 | 0.0000603 | 0.000001 | 0.000014 | 0.0028 |
| Carbon disulfide | | | | | | 3.7484 | - | - | 76.1300 | 0.0000 | 0.0003 | 76.13 | Option 2: A=6.942 B=1169.11 C=241.59 | 6.9420 | 1169.110 | 241.59 | 76.13 | 25238 | 0.0000252 | 0.000000 | 0.000006 | 0.0051 |
| Carbon tetrachloride | | | | | | 1.0831 | - | - | 153.8400 | 0.0001 | 0.0002 | 153.84 | Option 2: A=6.934 B=1242.43 C=230 | 6.9340 | 1242.430 | 230.00 | 153.84 | 71768 | 0.0000718 | 0.000000 | 0.000009 | 0.0042 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0006 | 0.0001 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 556562 | 0.0005566 | 0.000005 | 0.000091 | 0.0028 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0002 | 0.0012 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 224333 | 0.0002243 | 0.000002 | 0.000035 | 0.0220 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 4867 | 0.0000049 | 0.000000 | 0.000001 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 25745 | 0.0000257 | 0.000000 | 0.000004 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2012 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | - | - | - | 98.97 | 7686 | 0.0000077 | 0.000000 | 0.000001 | 0.0009 |
| Ethylene dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0001 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 39633 | 0.0000396 | 0.000000 | 0.000007 | 0.0015 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 5277 | 0.0000053 | 0.000000 | 0.000000 | 0.0000 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0004 | 0.0001 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 436369 | 0.0004364 | 0.000004 | 0.000076 | 0.0017 |
| Methyl ethyl ketone | | | | | | 0.7848 | | | 72.1000 | 0.0008 | 0.0019 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 826000 | 0.0008260 | 0.000011 | 0.000211 | 0.0350 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0004 | 0.0002 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 366931 | 0.0003669 | 0.000004 | 0.000067 | 0.0029 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0020 | 0.0243 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 1952690 | 0.0019527 | 0.000023 | 0.000423 | 0.4580 |
| Naphthalene | | | | | | 0.0015 | - | - | 128.2000 | 0.0000 | 0.0000 | 128.20 | Option 2: A=7.3729 B=1968.36 C=222.61 | 7.3729 | 1968.360 | 222.61 | 128.20 | 30704 | 0.0000307 | 0.000000 | 0.000004 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0013 | 0.0001 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 1286782 | 0.0012868 | 0.000008 | 0.000141 | 0.0019 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0017 | 0.0007 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 1667635 | 0.0016676 | 0.000010 | 0.000185 | 0.0130 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0024 | 0.0016 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 2369878 | 0.0023699 | 0.000026 | 0.000473 | 0.0299 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0025 | 0.0090 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 2546767 | 0.0025468 | 0.000019 | 0.000351 | 0.1689 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0001 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 90055 | 0.0000901 | 0.000001 | 0.000012 | 0.0008 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0045 | 0.0076 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 4520666 | 0.0045207 | 0.000034 | 0.000633 | 0.1432 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 1950 | 0.0000020 | 0.000000 | 0.000000 | 0.0007 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9752 | 0.9459 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 975170755 | 0.9751708 | 0.054176 | 0.996292 | 17.7998 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0021 | 0.0004 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 2127698 | 0.002127698 | 0.000020 | 0.000369 | 0.0070 |
| Aroclor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0044 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 4418565 | 0.004418565 | 0.000015 | 0.000278 | 0.0000 |
| Aroclor 1254 | | | | | | 1.49E-06 | - | - | 326.4400 | 0.0000 | 0.0000 | 326.44 | --- | - | - | - | 326.44 | 387 | 0.000000387 | 0.000000 | 0.000000 | 0.0000 |
| Aroclor 1260 | | | | | | 7.83E-07 | - | - | 395.3300 | 0.0002 | 0.0000 | 395.33 | --- | - | - | - | 395.33 | 195144 | 0.000195144 | 0.000000 | 0.000009 | 0.0000 |
| | | | | | | | | | | | | | | | | | | | | check: | 1.00000 | |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-158 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 11.2896 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 11.2623 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 1032.0132 | | | $V_V$ = | 1032.0132 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0012 | | | $W_V$ = | 0.0012 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8584 | | | $K_S$ = | 0.8585 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 1032.0132 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 1032.0132 | cu ft | | | |
| D = Tank Diameter | 12.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 9.1250 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 9.1250 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 18.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 9.0000 | ft | | | | | | | |
| Roof Outage | 0.125 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.125 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.1250 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.3750 | ft | | | |
| $R_S$ = Shell Radius | 6.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0012 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0012 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.8182 | | | $M_V$ = | 18.8175 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0009 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3406 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3415 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

As per sources listed on page 6-5 of TANKS user manual:

*Vented Vapor Saturation Factor*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8584 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.8585 | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | |
| Vapor Space Outage | 9.1250 | ft | | | | | |
| *Working Losses* | 76.4004 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 76.3742 | lbs | |
| $M_V$ = Vapor Molecular Weight | 18.8182 | | | $M_V$ = | 18.8175 | lb/lb-mole | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3410 | psia | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 500,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 11,904.76 | bbl/yr | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 33.3333 | | | N = | 33.3333 | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 15000.0000 | gal | | | | | for crude oils $K_P = 0.75$ |
| Maximum Liquid Height | 18.0000 | ft | | | | | |
| Tank Diameter | 12.0000 | ft | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | |
| Total Losses | 87.6900 | lb | | $L_T$ = | 87.6365 | lbs | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-158 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 1-6 Leachate | 76.40 | 11.29 | 87.69 |
| Acetone | 0.47 | 0.07 | 0.53 |
| Benzene | 0.01 | 0.00 | 0.01 |
| Carbon disulfide | 0.02 | 0.00 | 0.02 |
| Methyl ethyl ketone | 0.14 | 0.02 | 0.16 |
| Carbon tetrachloride | 0.02 | 0.00 | 0.02 |
| Chlorobenzene | 0.01 | 0.00 | 0.01 |
| Chloroform | 0.09 | 0.01 | 0.10 |
| Dichloroethane (1,1) | 0.02 | 0.00 | 0.02 |
| Ethylene dichloride | 0.01 | 0.00 | 0.01 |
| Vinylidene chloride | 0.01 | 0.00 | 0.01 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.01 | 0.00 | 0.01 |
| Methylene chloride | 1.85 | 0.27 | 2.12 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.01 | 0.00 | 0.01 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Naphthalene | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.01 | 0.00 | 0.01 |
| Tetrachloroethylene | 0.05 | 0.01 | 0.06 |
| Toluene | 0.12 | 0.02 | 0.14 |
| Trichloroethane (1,1,1) | 0.68 | 0.10 | 0.78 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.58 | 0.09 | 0.66 |
| Xylenes (mixed isomers) | 0.03 | 0.00 | 0.03 |
| Water | 72.27 | 10.68 | 82.94 |
| Aroclor 1242 | -- | -- | -- |
| Aroclor 1254 | -- | -- | -- |
| Aroclor 1260 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 76.37425 | 11.26230 | 87.63655 |
| 0.46812 | 0.06903 | 0.53715 |
| 0.01135 | 0.00167 | 0.01302 |
| 0.02071 | 0.00305 | 0.02377 |
| 0.14192 | 0.02093 | 0.16285 |
| 0.01702 | 0.00251 | 0.01953 |
| 0.01121 | 0.00165 | 0.01287 |
| 0.08919 | 0.01315 | 0.10234 |
| 0.00370 | 0.00055 | 0.00425 |
| 0.00599 | 0.00088 | 0.00687 |
| 0.00272 | 0.00040 | 0.00312 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00706 | 0.00104 | 0.00810 |
| 1.85878 | 0.27410 | 2.13288 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.01160 | 0.00171 | 0.01331 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00769 | 0.00113 | 0.00883 |
| 0.05274 | 0.00778 | 0.06052 |
| 0.12151 | 0.01792 | 0.13943 |
| 0.68559 | 0.10110 | 0.78669 |
| 0.00335 | 0.00049 | 0.00384 |
| 0.58137 | 0.08573 | 0.66710 |
| 0.02857 | 0.00421 | 0.03278 |
| 72.24404 | 10.65325 | 82.89730 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-160 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 6.50 |
| *Diameter (ft)* | 9.00 |
| *Liquid Height (ft)* | 6.50 |
| *Avg. Liquid Height (ft)* | 3.25 |
| *Volume (gal)* | 3,000.00 |
| *Turnovers* | 5000.0000 |
| *Net Throughput (gal/yr)* | 15,000,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-160 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *RMU-1 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3386 | 0.3387 | 18.0496 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0001 | 0.0007 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0000 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9997 | 0.9964 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *RMU-1 Leachate* | All | 49.26 | - | - | 47.70 | 0.3386 | - | - | 18.0497 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | 18.0497 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0001 | 0.0007 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 114000 | 0.000114 | 0.000002 | 0.000035 | 0.0134 |
| Carbon disulfide | | | | | | 3.7484 | - | - | 76.1300 | 0.0000 | 0.0000 | 76.13 | Option 2: A=6.942 B=1169.11 C=241.59 | 6.9420 | 1169.110 | 241.59 | 76.13 | 1090 | 0.0000011 | 0.000000 | 0.000000 | 0.0002 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 6420 | 6.42E-06 | 0.000000 | 0.000002 | 0.0003 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 470 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 220000 | 0.00022 | 0.000003 | 0.000047 | 0.0509 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 2050 | 2.05E-06 | 0.000000 | 0.000000 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9997 | 0.9964 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999655828.4 | 0.9996558 | 0.055536 | 0.999916 | 17.9850 |
| Arcolor 1242 | | | | | | 7.85E-06 | - | - | 291.9900 | 0.0000 | 0.0000 | 291.99 | --- | - | - | - | 291.99 | 29.6 | 2.96E-08 | 0.000000 | 0.000000 | 0.0000 |
| Arcolor 1260 | | | | | | 7.83E-07 | - | - | 395.3300 | 0.0000 | 0.0000 | 395.33 | --- | - | - | - | 395.33 | 112 | 1.12E-07 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-160 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 2.4310 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 2.4307 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 212.7202 | | | $V_V$ = | 212.7202 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9434 | | | $K_S$ = | 0.9434 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 212.7202 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 212.7202 | cu ft | | | |
| D = Tank Diameter | 9.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 3.3438 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 3.3438 | ft | | | $H_{VO} = H_S/2$ for horizontal tank |
| $H_S$ = Tank Shell Length | 6.5000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 3.2500 | ft | | | | | | | |
| Roof Outage | 0.0938 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.0938 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0938 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.2813 | ft | | | |
| $R_S$ = Shell Radius | 4.5000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0496 | | | $M_V$ = | 18.0497 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0001 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9434 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9434 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Space Outage | 3.3438 | ft | | | | | | |
| *Working Losses* | 376.9358 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 376.9372 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0496 | | | $M_V$ = | 18.0497 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 15,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 357,142.86 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 5000.0000 | | | N = | 5,000.0000 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 0.1727 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.1727 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 3000.0000 | gal | | | | | | for crude oils $K_P = 0.75$ |
| Maximum Liquid Height | 6.5000 | ft | | | | | | |
| Tank Diameter | 9.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 379.3668 | lb | | $L_T$ = | 379.3678 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-160 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| RMU-1 Leachate | 376.94 | 2.43 | 379.37 |
| Carbon disulfide | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 1.06 | 0.01 | 1.07 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.28 | 0.00 | 0.28 |
| Water | 375.59 | 2.42 | 378.01 |
| Arcolor 1242 | -- | -- | -- |
| Arcolor 1260 | -- | -- | -- |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 376.93718 | 2.43066 | 379.36784 |
| 0.00454 | 0.00003 | 0.00457 |
| 1.06207 | 0.00685 | 1.06892 |
| 0.00053 | 0.00000 | 0.00054 |
| 0.00559 | 0.00004 | 0.00563 |
| 0.00008 | 0.00000 | 0.00008 |
| 0.27911 | 0.00180 | 0.28091 |
| 375.58526 | 2.42194 | 378.00720 |
| 0.0000000003 | 0.0000000000 | 0.0000000003 |
| 0.0000000001 | 0.0000000000 | 0.0000000001 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-102 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 32.00 |
| Diameter (ft): | 44.00 |
| Liquid Height (ft) : | 29.50 |
| Avg. Liquid Height (ft): | 15.00 |
| Volume (gallons): | 350,000.00 |
| Turnovers: | 42.86 |
| Net Throughput(gal/yr): | 15,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Liquid Contents of Storage Tank

**T-102 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3385 | 0.3385 | 0.3385 | 18.0099 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0001 | 0.0007 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0000 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9999 | 0.9992 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

## T-102 - Vertical Fixed Roof Tank
## Model City, NY

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 244.1874 |
| Vapor Space Volume (cu ft): | 26,545.9343 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.7615 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 26,545.9343 |
| Tank Diameter (ft): | 44.0000 |
| Vapor Space Outage (ft): | 17.4583 |
| Tank Shell Height (ft): | 32.0000 |
| Average Liquid Height (ft): | 15.0000 |
| Roof Outage (ft): | 0.4583 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.4583 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 22.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0099 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3385 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.7615 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3385 |

| | |
|---|---|
| Vapor Space Outage (ft): | 17.4583 |
| Working Losses (lb): | 1,886.7554 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0099 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Annual Net Throughput (gal/yr.): | 15,000,000.0000 |
| Annual Turnovers: | 42.8571 |
| Turnover Factor: | 0.8667 |
| Maximum Liquid Volume (gal): | 350,000.0000 |
| Maximum Liquid Height (ft): | 29.5000 |
| Tank Diameter (ft): | 44.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 2,130.9427 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Individual Tank Emission Totals

## Emissions Report for: Annual

**T-102 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 1,886.76 | 244.19 | 2,130.94 |
| Carbon disulfide | 0.02 | 0.00 | 0.03 |
| Methylene chloride | 0.04 | 0.01 | 0.05 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.02 | 0.00 | 0.02 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 1.40 | 0.18 | 1.58 |
| Water | 1,885.27 | 243.99 | 2,129.26 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-103 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 32.00 |
| Diameter (ft): | 44.00 |
| Liquid Height (ft) : | 29.50 |
| Avg. Liquid Height (ft): | 15.00 |
| Volume (gallons): | 350,000.00 |
| Turnovers: | 1.43 |
| Net Throughput(gal/yr): | 500,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-103 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | | | 18.04 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | 12.0759 | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-103 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 246.7768 |
| Vapor Space Volume (cu ft): | 26,545.9343 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.7610 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 26,545.9343 |
| Tank Diameter (ft): | 44.0000 |
| Vapor Space Outage (ft): | 17.4583 |
| Tank Shell Height (ft): | 32.0000 |
| Average Liquid Height (ft): | 15.0000 |
| Roof Outage (ft): | 0.4583 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.4583 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 22.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0004 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3393 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3396 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.7610 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3394 |
| Vapor Space Outage (ft): | 17.4583 |
| Working Losses (lb): | 73.3280 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Annual Net Throughput (gal/yr.): | 500,000.0000 |
| Annual Turnovers: | 1.4286 |
| Turnover Factor: | 1.0000 |
| Maximum Liquid Volume (gal): | 350,000.0000 |
| Maximum Liquid Height (ft): | 29.5000 |
| Tank Diameter (ft): | 44.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 320.1048 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-103 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 73.33 | 246.78 | 320.10 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.01 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.09 | 0.31 | 0.40 |
| Methyl isobutyl ketone | 0.00 | 0.01 | 0.01 |
| Acetone | 0.35 | 1.18 | 1.53 |
| Methylene chloride | 0.21 | 0.69 | 0.90 |
| Trichloroethylene | 0.00 | 0.01 | 0.01 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,2) | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.02 | 0.03 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.01 | 0.01 |
| Diethyl ether | 0.01 | 0.04 | 0.05 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.21 | 0.71 | 0.93 |
| Butanol-(1) | 0.00 | 0.01 | 0.01 |
| Water | 72.43 | 243.77 | 316.20 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-105 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | Lift Station for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 8.00 |
| Diameter (ft): | 8.00 |
| Liquid Height (ft) : | 8.00 |
| Avg. Liquid Height (ft): | 4.00 |
| Volume (gallons): | 3,000.00 |
| Turnovers: | 166.67 |
| Net Throughput(gal/yr): | 500,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-105 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3410 | 0.3406 | 0.3415 | 18.8182 | | | 18.31 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0010 | 0.0061 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0001 | 0.0001 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0003 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Carbon tetrachloride | | | | | | 1.0831 | 0.9599 | 1.2191 | 153.8400 | 0.0001 | 0.0002 | 153.84 | Option 2: A=6.934, B=1242.43, C=230 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0006 | 0.0001 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0002 | 0.0012 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0002 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0001 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0004 | 0.0001 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0008 | 0.0019 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0004 | 0.0002 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0020 | 0.0242 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Naphthalene | | | | | | 0.0015 | 0.0012 | 0.0019 | 128.2000 | 0.0000 | 0.0000 | 128.20 | Option 2: A=7.3729, B=1968.36, C=222.61 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0013 | 0.0001 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0017 | 0.0007 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0024 | 0.0016 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0025 | 0.0089 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0001 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0045 | 0.0076 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0001 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9797 | 0.9459 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0021 | 0.0004 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-105 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 2.4359 |
| Vapor Space Volume (cu ft): | 205.2507 |
| Vapor Density (lb/cu ft): | 0.0012 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9313 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 205.2507 |
| Tank Diameter (ft): | 8.0000 |
| Vapor Space Outage (ft): | 4.0833 |
| Tank Shell Height (ft): | 8.0000 |
| Average Liquid Height (ft): | 4.0000 |
| Roof Outage (ft): | 0.0833 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0833 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 4.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0012 |
| Vapor Molecular Weight (lb/lb-mole): | 18.8182 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3410 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0009 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3410 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3406 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3415 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9313 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3410 |
| Vapor Space Outage (ft): | 4.0833 |
| Working Losses (lb): | 26.4855 |
| Vapor Molecular Weight (lb/lb-mole): | 18.8182 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3410 |
| Annual Net Throughput (gal/yr.): | 500,000.0000 |
| Annual Turnovers: | 166.6667 |
| Turnover Factor: | 0.3467 |
| Maximum Liquid Volume (gal): | 3,000.0000 |
| Maximum Liquid Height (ft): | 8.0000 |
| Tank Diameter (ft): | 8.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 28.9213 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-105 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 26.49 | 2.44 | 28.92 |
| Acetone | 0.16 | 0.01 | 0.18 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Carbon disulfide | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.05 | 0.00 | 0.05 |
| Carbon tetrachloride | 0.01 | 0.00 | 0.01 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.03 | 0.00 | 0.03 |
| Dichloroethane (1,1) | 0.01 | 0.00 | 0.01 |
| Dichloroethane (1,2) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.64 | 0.06 | 0.70 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Naphthalene | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.02 | 0.00 | 0.02 |
| Toluene | 0.04 | 0.00 | 0.05 |
| Trichloroethane (1,1,1) | 0.24 | 0.02 | 0.26 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.20 | 0.02 | 0.22 |
| Xylenes (mixed isomers) | 0.01 | 0.00 | 0.01 |
| Water | 25.05 | 2.30 | 27.36 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | Tank T-107 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | SLF-7 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 6.58 |
| Diameter (ft): | 3.20 |
| Liquid Height (ft) : | 6.58 |
| Avg. Liquid Height (ft): | 3.29 |
| Volume (gallons): | 395.00 |
| Turnovers: | 253.16 |
| Net Throughput(gal/yr): | 100,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Liquid Contents of Storage Tank

**Tank T-107 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 7 Leachate | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3387 | 0.3386 | 0.3387 | 18.0507 | | | 18.01 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0012 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0002 | 0.0004 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0021 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9995 | 0.9963 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

## Tank T-107 - Vertical Fixed Roof Tank
## Model City, NY

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 0.3027 |
| Vapor Space Volume (cu ft): | 26.4597 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9442 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 26.4597 |
| Tank Diameter (ft): | 3.2000 |
| Vapor Space Outage (ft): | 3.2900 |
| Tank Shell Height (ft): | 6.5800 |
| Average Liquid Height (ft): | 3.2900 |
| Roof Outage (ft): | 0.0000 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0000 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0000 |
| Shell Radius (ft): | 1.6000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0507 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3387 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0001 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3387 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3387 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9442 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3387 |

| | |
|---|---|
| Vapor Space Outage (ft): | 3.2900 |
| Working Losses (lb): | 4.1506 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0507 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3387 |
| Annual Net Throughput (gal/yr.): | 100,000.0000 |
| Annual Turnovers: | 253.1646 |
| Turnover Factor: | 0.2852 |
| Maximum Liquid Volume (gal): | 395.0000 |
| Maximum Liquid Height (ft): | 6.5800 |
| Tank Diameter (ft): | 3.2000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 4.4532 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Individual Tank Emission Totals

## Emissions Report for: Annual

**Tank T-107 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 7 Leachate | 4.15 | 0.30 | 4.45 |
| Acetone | 0.00 | 0.00 | 0.01 |
| Methylene chloride | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Water | 4.14 | 0.30 | 4.44 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-108 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | SLF-11 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 16.00 |
| Diameter (ft): | 10.33 |
| Liquid Height (ft) : | 16.00 |
| Avg. Liquid Height (ft): | 5.17 |
| Volume (gallons): | 10,000.00 |
| Turnovers: | 20.00 |
| Net Throughput(gal/yr): | 200,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Liquid Contents of Storage Tank

**T-108 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 11 Leachate | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3384 | 0.3384 | 0.3384 | 18.0030 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0000 | 0.0002 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9998 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

## T-108 - Vertical Fixed Roof Tank
## Model City, NY

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 9.1756 |
| Vapor Space Volume (cu ft): | 907.6512 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0296 |
| Vented Vapor Saturation Factor: | 0.8373 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 907.6512 |
| Tank Diameter (ft): | 10.3300 |
| Vapor Space Outage (ft): | 10.8300 |
| Tank Shell Height (ft): | 16.0000 |
| Average Liquid Height (ft): | 5.1700 |
| Roof Outage (ft): | 0.0000 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0000 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0000 |
| Shell Radius (ft): | 5.1650 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0030 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0296 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.8373 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3384 |

| | |
|---|---|
| Vapor Space Outage (ft): | 10.8300 |
| Working Losses (lb): | 29.0118 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0030 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Annual Net Throughput (gal/yr.): | 200,000.0000 |
| Annual Turnovers: | 20.0000 |
| Turnover Factor: | 1.0000 |
| Maximum Liquid Volume (gal): | 10,000.0000 |
| Maximum Liquid Height (ft): | 16.0000 |
| Tank Diameter (ft): | 10.3300 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 38.1873 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Individual Tank Emission Totals

## Emissions Report for: Annual

**T-108 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 11 Leachate | 29.01 | 9.18 | 38.19 |
| Acetone | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 29.00 | 9.17 | 38.18 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-109 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | SLF-10 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 8.00 |
| Diameter (ft): | 8.00 |
| Liquid Height (ft) : | 8.00 |
| Avg. Liquid Height (ft): | 4.00 |
| Volume (gallons): | 3,000.00 |
| Turnovers: | 33.33 |
| Net Throughput(gal/yr): | 100,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Liquid Contents of Storage Tank

**T-109 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 10 Leachate | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0253 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0003 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9997 | 0.9980 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

## T-109 - Vertical Fixed Roof Tank
## Model City, NY

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 2.2688 |
| Vapor Space Volume (cu ft): | 201.0619 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9330 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 201.0619 |
| Tank Diameter (ft): | 8.0000 |
| Vapor Space Outage (ft): | 4.0000 |
| Tank Shell Height (ft): | 8.0000 |
| Average Liquid Height (ft): | 4.0000 |
| Roof Outage (ft): | 0.0000 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0000 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0000 |
| Shell Radius (ft): | 4.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0253 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9330 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3386 |

| | |
|---|---|
| Vapor Space Outage (ft): | 4.0000 |
| Working Losses (lb): | 14.5300 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0253 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Annual Net Throughput (gal/yr.): | 100,000.0000 |
| Annual Turnovers: | 33.3333 |
| Turnover Factor: | 1.0000 |
| Maximum Liquid Volume (gal): | 3,000.0000 |
| Maximum Liquid Height (ft): | 8.0000 |
| Tank Diameter (ft): | 8.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 16.7988 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Individual Tank Emission Totals

## Emissions Report for: Annual

**T-109 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 10 Leachate | 14.53 | 2.27 | 16.80 |
| Acetone | 0.02 | 0.00 | 0.03 |
| Methylene chloride | 0.00 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 14.50 | 2.26 | 16.77 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-110 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | SLF-10 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 6.58 |
| Diameter (ft): | 3.20 |
| Liquid Height (ft) : | 6.58 |
| Avg. Liquid Height (ft): | 3.29 |
| Volume (gallons): | 395.00 |
| Turnovers: | 253.16 |
| Net Throughput(gal/yr): | 100,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Liquid Contents of Storage Tank

**T-110 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 10 Leachate | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0253 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0003 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9997 | 0.9980 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

## T-110 - Vertical Fixed Roof Tank
## Model City, NY

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 0.3022 |
| Vapor Space Volume (cu ft): | 26.4597 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9443 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 26.4597 |
| Tank Diameter (ft): | 3.2000 |
| Vapor Space Outage (ft): | 3.2900 |
| Tank Shell Height (ft): | 6.5800 |
| Average Liquid Height (ft): | 3.2900 |
| Roof Outage (ft): | 0.0000 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0000 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0000 |
| Shell Radius (ft): | 1.6000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0253 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9443 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3386 |

| | |
|---|---|
| Vapor Space Outage (ft): | 3.2900 |
| Working Losses (lb): | 4.1435 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0253 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Annual Net Throughput (gal/yr.): | 100,000.0000 |
| Annual Turnovers: | 253.1646 |
| Turnover Factor: | 0.2852 |
| Maximum Liquid Volume (gal): | 395.0000 |
| Maximum Liquid Height (ft): | 6.5800 |
| Tank Diameter (ft): | 3.2000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 4.4456 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Individual Tank Emission Totals

## Emissions Report for: Annual

**T-110 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 10 Leachate | 4.14 | 0.30 | 4.45 |
| Acetone | 0.01 | 0.00 | 0.01 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 4.14 | 0.30 | 4.44 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-111 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | SLF-11 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 6.58 |
| Diameter (ft): | 3.20 |
| Liquid Height (ft) : | 6.58 |
| Avg. Liquid Height (ft): | 3.29 |
| Volume (gallons): | 395.00 |
| Turnovers: | 506.33 |
| Net Throughput(gal/yr): | 200,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Liquid Contents of Storage Tank

**T-111 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 11 Leachate | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3384 | 0.3384 | 0.3384 | 18.0030 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0000 | 0.0002 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9998 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

## T-111 - Vertical Fixed Roof Tank
## Model City, NY

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 0.3016 |
| Vapor Space Volume (cu ft): | 26.4597 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0296 |
| Vented Vapor Saturation Factor: | 0.9443 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 26.4597 |
| Tank Diameter (ft): | 3.2000 |
| Vapor Space Outage (ft): | 3.2900 |
| Tank Shell Height (ft): | 6.5800 |
| Average Liquid Height (ft): | 3.2900 |
| Roof Outage (ft): | 0.0000 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0000 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0000 |
| Shell Radius (ft): | 1.6000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0030 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0296 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9443 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3384 |

| | |
|---|---|
| Vapor Space Outage (ft): | 3.2900 |
| Working Losses (lb): | 6.5542 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0030 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Annual Net Throughput (gal/yr.): | 200,000.0000 |
| Annual Turnovers: | 506.3291 |
| Turnover Factor: | 0.2259 |
| Maximum Liquid Volume (gal): | 395.0000 |
| Maximum Liquid Height (ft): | 6.5800 |
| Tank Diameter (ft): | 3.2000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 6.8559 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Individual Tank Emission Totals

## Emissions Report for: Annual

**T-111 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 11 Leachate | 6.55 | 0.30 | 6.86 |
| Acetone | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 6.55 | 0.30 | 6.85 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-130 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 10.00 |
| Diameter (ft): | 7.60 |
| Liquid Height (ft) : | 10.00 |
| Avg. Liquid Height (ft): | 5.00 |
| Volume (gallons): | 3,393.52 |
| Turnovers: | 147.34 |
| Net Throughput(gal/yr): | 500,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-130 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3410 | 0.3406 | 0.3415 | 18.8182 | | | 18.31 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0010 | 0.0061 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0001 | 0.0001 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0003 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Carbon tetrachloride | | | | | | 1.0831 | 0.9599 | 1.2191 | 153.8400 | 0.0001 | 0.0002 | 153.84 | Option 2: A=6.934, B=1242.43, C=230 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0006 | 0.0001 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0002 | 0.0012 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0002 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0001 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0004 | 0.0001 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0008 | 0.0019 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0004 | 0.0002 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0020 | 0.0242 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Naphthalene | | | | | | 0.0015 | 0.0012 | 0.0019 | 128.2000 | 0.0000 | 0.0000 | 128.20 | Option 2: A=7.3729, B=1968.36, C=222.61 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0013 | 0.0001 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0017 | 0.0007 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0024 | 0.0016 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0025 | 0.0089 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0001 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0045 | 0.0076 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0001 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9797 | 0.9459 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0021 | 0.0004 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-130 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 2.6894 |
| Vapor Space Volume (cu ft): | 230.4144 |
| Vapor Density (lb/cu ft): | 0.0012 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9159 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 230.4144 |
| Tank Diameter (ft): | 7.6000 |
| Vapor Space Outage (ft): | 5.0792 |
| Tank Shell Height (ft): | 10.0000 |
| Average Liquid Height (ft): | 5.0000 |
| Roof Outage (ft): | 0.0792 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0792 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 3.8000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0012 |
| Vapor Molecular Weight (lb/lb-mole): | 18.8182 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3410 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0009 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3410 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3406 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3415 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9159 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3410 |
| Vapor Space Outage (ft): | 5.0792 |
| Working Losses (lb): | 28.2894 |
| Vapor Molecular Weight (lb/lb-mole): | 18.8182 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3410 |
| Annual Net Throughput (gal/yr.): | 500,000.0000 |
| Annual Turnovers: | 147.3397 |
| Turnover Factor: | 0.3703 |
| Maximum Liquid Volume (gal): | 3,393.5188 |
| Maximum Liquid Height (ft): | 10.0000 |
| Tank Diameter (ft): | 7.6000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 30.9788 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-130 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 28.29 | 2.69 | 30.98 |
| Acetone | 0.17 | 0.02 | 0.19 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Carbon disulfide | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.05 | 0.01 | 0.06 |
| Carbon tetrachloride | 0.01 | 0.00 | 0.01 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.03 | 0.00 | 0.04 |
| Dichloroethane (1,1) | 0.01 | 0.00 | 0.01 |
| Dichloroethane (1,2) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.69 | 0.07 | 0.75 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Naphthalene | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.02 | 0.00 | 0.02 |
| Toluene | 0.04 | 0.00 | 0.05 |
| Trichloroethane (1,1,1) | 0.25 | 0.02 | 0.28 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.21 | 0.02 | 0.23 |
| Xylenes (mixed isomers) | 0.01 | 0.00 | 0.01 |
| Water | 26.76 | 2.54 | 29.30 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-150 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 14.00 |
| Diameter (ft): | 10.00 |
| Liquid Height (ft) : | 14.00 |
| Avg. Liquid Height (ft): | 5.00 |
| Volume (gallons): | 8,000.00 |
| Turnovers: | 125.00 |
| Net Throughput(gal/yr): | 1,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-150 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3386 | 0.3387 | 18.0496 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0001 | 0.0007 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0000 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9997 | 0.9964 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-150 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 7.4454 |
| Vapor Space Volume (cu ft): | 715.0396 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.8595 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 715.0396 |
| Tank Diameter (ft): | 10.0000 |
| Vapor Space Outage (ft): | 9.1042 |
| Tank Shell Height (ft): | 14.0000 |
| Average Liquid Height (ft): | 5.0000 |
| Roof Outage (ft): | 0.1042 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.1042 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 5.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0496 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0001 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3387 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.8595 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3386 |
| Vapor Space Outage (ft): | 9.1042 |
| Working Losses (lb): | 59.1843 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0496 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Annual Net Throughput (gal/yr.): | 1,000,000.0000 |
| Annual Turnovers: | 125.0000 |
| Turnover Factor: | 0.4067 |
| Maximum Liquid Volume (gal): | 8,000.0000 |
| Maximum Liquid Height (ft): | 14.0000 |
| Tank Diameter (ft): | 10.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 66.6296 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-150 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 59.18 | 7.45 | 66.63 |
| Carbon disulfide | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.17 | 0.02 | 0.19 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.04 | 0.01 | 0.05 |
| Water | 58.97 | 7.42 | 66.39 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-158 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 18.00 |
| Diameter (ft): | 12.00 |
| Liquid Height (ft) : | 18.00 |
| Avg. Liquid Height (ft): | 9.00 |
| Volume (gallons): | 15,000.00 |
| Turnovers: | 33.33 |
| Net Throughput(gal/yr): | 500,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-158 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3410 | 0.3406 | 0.3415 | 18.8182 | | | 18.31 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0010 | 0.0061 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0001 | 0.0001 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0003 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Carbon tetrachloride | | | | | | 1.0831 | 0.9599 | 1.2191 | 153.8400 | 0.0001 | 0.0002 | 153.84 | Option 2: A=6.934, B=1242.43, C=230 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0006 | 0.0001 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0002 | 0.0012 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0002 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0001 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0004 | 0.0001 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0008 | 0.0019 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0004 | 0.0002 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0020 | 0.0242 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Naphthalene | | | | | | 0.0015 | 0.0012 | 0.0019 | 128.2000 | 0.0000 | 0.0000 | 128.20 | Option 2: A=7.3729, B=1968.36, C=222.61 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0013 | 0.0001 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0017 | 0.0007 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0024 | 0.0016 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0025 | 0.0089 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0001 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0045 | 0.0076 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0001 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9797 | 0.9459 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0021 | 0.0004 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-158 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 11.2896 |
| Vapor Space Volume (cu ft): | 1,032.0132 |
| Vapor Density (lb/cu ft): | 0.0012 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.8584 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 1,032.0132 |
| Tank Diameter (ft): | 12.0000 |
| Vapor Space Outage (ft): | 9.1250 |
| Tank Shell Height (ft): | 18.0000 |
| Average Liquid Height (ft): | 9.0000 |
| Roof Outage (ft): | 0.1250 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.1250 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 6.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0012 |
| Vapor Molecular Weight (lb/lb-mole): | 18.8182 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3410 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0009 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3410 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3406 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3415 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.8584 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3410 |
| Vapor Space Outage (ft): | 9.1250 |
| Working Losses (lb): | 76.4004 |
| Vapor Molecular Weight (lb/lb-mole): | 18.8182 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3410 |
| Annual Net Throughput (gal/yr.): | 500,000.0000 |
| Annual Turnovers: | 33.3333 |
| Turnover Factor: | 1.0000 |
| Maximum Liquid Volume (gal): | 15,000.0000 |
| Maximum Liquid Height (ft): | 18.0000 |
| Tank Diameter (ft): | 12.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 87.6900 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-158 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 76.40 | 11.29 | 87.69 |
| Acetone | 0.47 | 0.07 | 0.53 |
| Benzene | 0.01 | 0.00 | 0.01 |
| Carbon disulfide | 0.02 | 0.00 | 0.02 |
| Methyl ethyl ketone | 0.14 | 0.02 | 0.16 |
| Carbon tetrachloride | 0.02 | 0.00 | 0.02 |
| Chlorobenzene | 0.01 | 0.00 | 0.01 |
| Chloroform | 0.09 | 0.01 | 0.10 |
| Dichloroethane (1,1) | 0.02 | 0.00 | 0.02 |
| Dichloroethane (1,2) | 0.01 | 0.00 | 0.01 |
| Vinylidene chloride | 0.01 | 0.00 | 0.01 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.01 | 0.00 | 0.01 |
| Methylene chloride | 1.85 | 0.27 | 2.12 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.01 | 0.00 | 0.01 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Naphthalene | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.01 | 0.00 | 0.01 |
| Tetrachloroethylene | 0.05 | 0.01 | 0.06 |
| Toluene | 0.12 | 0.02 | 0.14 |
| Trichloroethane (1,1,1) | 0.68 | 0.10 | 0.78 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.58 | 0.09 | 0.66 |
| Xylenes (mixed isomers) | 0.03 | 0.00 | 0.03 |
| Water | 72.27 | 10.68 | 82.94 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-160 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | Storage Tank for SLF 1-6 Leachate |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 6.50 |
| Diameter (ft): | 9.00 |
| Liquid Height (ft) : | 6.50 |
| Avg. Liquid Height (ft): | 3.25 |
| Volume (gallons): | 3,000.00 |
| Turnovers: | 5,000.00 |
| Net Throughput(gal/yr): | 15,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-160 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3386 | 0.3387 | 18.0496 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0001 | 0.0007 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Carbon disulfide | | | | | | 3.7484 | 3.3805 | 4.1482 | 76.1300 | 0.0000 | 0.0000 | 76.13 | Option 2: A=6.942, B=1169.11, C=241.59 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9997 | 0.9964 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-160 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 2.4310 |
| Vapor Space Volume (cu ft): | 212.7202 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9434 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 212.7202 |
| Tank Diameter (ft): | 9.0000 |
| Vapor Space Outage (ft): | 3.3438 |
| Tank Shell Height (ft): | 6.5000 |
| Average Liquid Height (ft): | 3.2500 |
| Roof Outage (ft): | 0.0938 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0938 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 4.5000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0496 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0001 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3387 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9434 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3386 |
| Vapor Space Outage (ft): | 3.3438 |
| Working Losses (lb): | 376.9358 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0496 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Annual Net Throughput (gal/yr.): | 15,000,000.0000 |
| Annual Turnovers: | 5,000.0000 |
| Turnover Factor: | 0.1727 |
| Maximum Liquid Volume (gal): | 3,000.0000 |
| Maximum Liquid Height (ft): | 6.5000 |
| Tank Diameter (ft): | 9.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 379.3668 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-160 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 376.94 | 2.43 | 379.37 |
| Carbon disulfide | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 1.06 | 0.01 | 1.07 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.28 | 0.00 | 0.28 |
| Water | 375.59 | 2.42 | 378.01 |

# Attachment 9
# Tanks Software Model Output for Groundwater Tanks

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-8001 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Cone Bottom |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 13 |
| *Diameter (ft)* | 8 |
| *Volume (gal)* | 5,000 |
| *Turnovers* | 200 |
| *Net Throughput (gal/yr)* | 1,000,000 |
| *Is tank heated (y/n)* | N |
| *Is tank underground (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York(Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8001 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8001 Liquid* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0025 | | | 18.00 | |
| Benzene | | | | | | 1.1140 | 0.8320 | 1.4713 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Methylene chloride | | | | | | 5.4129 | 4.2270 | 6.8607 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloro (1,1,2) trifluoroethane | | | | | | 4.2021 | 3.2712 | 5.3366 | 187.3800 | 0.0000 | 0.0000 | 187.38 | Option 2: A=6.88, B=1099.9, C=227.5 |
| Trichloroethane (1,1,1) | | | | | | 1.5780 | 1.1909 | 2.0704 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethylene | | | | | | 0.7781 | 0.5664 | 1.0511 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 7.8064 | 6.1950 | 9.7374 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9998 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | VOC | HAP | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8001 Liquid* | All | 58.30 | - | - | 52.02 | 0.3384 | - | - | 18.0050 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | - | - | - | 18.00501 |
| Benzene | | | | | | 1.1140 | - | - | 78.11 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.905 | 1211.033 | 220.79 | 71-43-2 | X | X | 78.11 | 1600 | 1.60E-06 | 2.05E-08 | 3.69E-07 | 0.0001 |
| Methylene chloride | | | | | | 5.4129 | - | - | 84.94 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.409 | 1325.900 | 252.60 | 75-09-2 | | X | 84.94 | 3470 | 3.47E-06 | 4.09E-08 | 7.35E-07 | 0.0010 |
| Trichloro (1,1,2) trifluoroethane | | | | | | 4.2021 | - | - | 187.38 | 0.0000 | 0.0001 | 187.38 | Option 2: A=6.88 B=1099.9 C=227.5 | 6.880 | 1099.900 | 227.50 | 76-13-1 | X | | 187.38 | 5660 | 5.66E-06 | 3.02E-08 | 5.44E-07 | 0.0013 |
| Trichloroethane (1,1,1) | | | | | | 1.5780 | - | - | 133.42 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.643 | 2136.600 | 302.80 | 71-55-6 | X | X | 133.42 | 8670 | 8.67E-06 | 6.50E-08 | 1.17E-06 | 0.0007 |
| Trichloroethylene | | | | | | 0.7781 | - | - | 131.40 | 0.0000 | 0.0001 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.518 | 1018.600 | 192.70 | 79-01-6 | X | X | 131.40 | 29000 | 2.90E-05 | 2.21E-07 | 3.97E-06 | 0.0012 |
| Vinylidene chloride | | | | | | 7.8063 | - | - | 96.50 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.972 | 1099.400 | 237.20 | 75-35-4 | X | X | 96.50 | 1000 | 1.00E-06 | 1.04E-08 | 1.87E-07 | 0.0004 |
| Chloroform | | | | | | 2.3280 | - | - | 119.38 | 0.0000 | 0.0000 | 119.38 | | 6.493 | 929.440 | 196.03 | 67-66-3 | X | X | 119.38 | 4820 | 4.82E-06 | 4.04E-08 | 7.27E-07 | 0.0006 |
| Carbon tetrachloride | | | | | | 1.3843 | - | - | 153.84 | 0.0000 | 0.0000 | 153.84 | | 6.934 | 1242.430 | 230.00 | 56-23-5 | X | X | 153.84 | 3870 | 3.87E-06 | 2.52E-08 | 4.53E-07 | 0.0003 |
| Ethylene dichloride | | | | | | 0.9008 | - | - | 98.95 | 0.0000 | 0.0000 | 98.95 | | 7.025 | 1272.300 | 222.90 | 107-06-2 | X | X | 98.95 | 4740 | 4.74E-06 | 4.79E-08 | 8.62E-07 | 0.0002 |
| Trichloroethane (1,1,2) | | | | | | 0.2315 | - | - | 133.40 | 0.0000 | 0.0000 | 133.40 | | 6.951 | 1314.410 | 209.20 | 79-00-5 | X | X | 133.4 | 2390 | 2.39E-06 | 1.79E-08 | 3.23E-07 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1959 | - | - | 165.83 | 0.0000 | 0.0000 | 165.83 | | 6.98 | 1386.920 | 217.53 | 127-18-4 | X | X | 165.83 | 2010 | 2.01E-06 | 1.21E-08 | 2.18E-07 | 0.0000 |
| Chlorobenzene | | | | | | 0.1260 | - | - | 112.60 | 0.0000 | 0.0000 | 112.60 | | 6.978 | 1431.050 | 217.55 | 108-90-7 | X | X | 112.6 | 2960 | 2.96E-06 | 2.63E-08 | 4.73E-07 | 0.0000 |
| Tetrachloroethane(1,1,2,2) | | | | | | 0.0401 | - | - | 167.85 | 0.0000 | 0.0000 | 167.85 | | 6.631 | 1228.100 | 179.90 | 79-34-5 | X | | 167.848 | 1290 | 1.29E-06 | 7.69E-09 | 1.38E-07 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.00 | 0.9999 | 0.9997 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | - | - | - | 18.00 | 999928520 | 1.00E+00 | 5.56E-02 | 1.00E+00 | 17.9991 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8001 - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | **AP-42 EQUATIONS** | | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 11.5611 | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 11.5610 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 416.2110 | | $V_V$ = | 416.2110 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | | $K_E$ = | 0.0744 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9331 | | $K_S$ = | 0.9331 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 416.2110 | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 416.2110 | cu ft | | | |
| D = Tank Diameter (ft) | 8.0000 | | | | | | | |
| $D_E$ = Effective Diameter (ft) | 11.5102 | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 11.5102 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | 4.0000 | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 4.0000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | 13.0000 | | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | $W_V = M_V\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight (lb/lb-mole) | 18.0025 | | | | | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | 517.9736 | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | 47.6792 | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | 10.7310 | | | | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | 511.6892 | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | 0.8900 | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | 1165.4120 | | | 1,165.41 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Vapor Space Expansion Factor* | | | | | | | As per sources listed on page 6-5 of TANKS user manual: |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0744 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | 40.7601 | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | 0.0000 | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | 0.0600 | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | 517.9736 | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | 507.7836 | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | 528.1636 | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | 16.2750 | | delta $T_A$ = | 16.2750 | R | | |
| *Vented Vapor Saturation Factor* | | | | | | | |
| Vented Vapor Saturation Factor | 0.9331 | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9331 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Space Outage (ft) | 4.0000 | | | | | | |
| *Working Losses (lb)* | 45.9324 | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 45.9394 | lbs | | |
| Vapor Molecular Weight (lb/lb-mole) | 18.0025 | | | | | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput (gal/yr) | 1,000,000 | 1 bbl/yr = 42 US gal/yr | Q = | 23,809.52 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 200.0000 | | | | | | for turnovers <36, $K_N$ = 1 |
| Turnover Factor | 0.3167 | $K_N = (180 + N)/6N$ | $K_N$ = | 0.3167 | | | $K_P$ = working loss product factor, dimensionless |
| Tank Diameter (ft) | 8.0000 | | | | | | for crude oils $K_P$ = 0.75 |
| Working Loss Product Factor | 1.0000 | | $K_P$ = | 1 | | | for all other organic liquids, $K_P$ = 1 |
| Total Losses (lb) | 57.4934 | | $L_T$ = | 57.5004 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8001 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 8001 Liquid | 45.93 | 11.56 | 57.49 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Trichloro (1,1,2) trifluoroethane | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | | | |
| Carbon tetrachloride | | | |
| Ethylene dichloride | | | |
| Trichloroethane (1,1,2) | | | |
| Tetrachloroethylene | | | |
| Chlorobenzene | | | |
| Tetrachloroethane(1,1,2,2) | | | |
| Water | 45.92 | 11.56 | 57.48 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 45.93940 | 11.56104 | 57.50044 |
| 0.00024 | 0.00006 | 0.00030 |
| 0.00255 | 0.00064 | 0.00319 |
| 0.00323 | 0.00081 | 0.00404 |
| 0.00186 | 0.00047 | 0.00232 |
| 0.00306 | 0.00077 | 0.00383 |
| 0.00106 | 0.00027 | 0.00133 |
| 0.00152 | 0.00038 | 0.00191 |
| 0.00073 | 0.00018 | 0.00091 |
| 0.00058 | 0.00015 | 0.00073 |
| 0.00008 | 0.00002 | 0.00009 |
| 0.00005 | 0.00001 | 0.00007 |
| 0.00005 | 0.00001 | 0.00006 |
| 0.00001 | 0.00000 | 0.00001 |
| 45.92438 | 11.55726 | 57.48165 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-8002 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Cone Bottom |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 5 |
| *Diameter (ft)* | 4 |
| *Volume (gal)* | 470 |
| *Turnovers* | 2,127.16 |
| *Net Throughput (gal/yr)* | 1,000,000 |
| *Is tank heated (y/n)* | N |
| *Is tank underground (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York(Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8002 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8001 Liquid* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0025 | | | 18.00 | |
| Benzene | | | | | | 1.1140 | 0.8320 | 1.4713 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Methylene chloride | | | | | | 5.4129 | 4.2270 | 6.8607 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloro (1,1,2) trifluoroethane | | | | | | 4.2021 | 3.2712 | 5.3366 | 187.3800 | 0.0000 | 0.0000 | 187.38 | Option 2: A=6.88, B=1099.9, C=227.5 |
| Trichloroethane (1,1,1) | | | | | | 1.5780 | 1.1909 | 2.0704 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethylene | | | | | | 0.7781 | 0.5664 | 1.0511 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 7.8064 | 6.1950 | 9.7374 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9998 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | VOC | HAP | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8001 Liquid* | All | 58.30 | - | - | 52.02 | 0.3384 | - | - | 18.0050 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | - | - | - | 18.00501 |
| Benzene | | | | | | 1.1140 | - | - | 78.11 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.905 | 1211.033 | 220.79 | 71-43-2 | X | X | 78.11 | 1600 | 1.60E-06 | 2.05E-08 | 3.69E-07 | 0.0001 |
| Methylene chloride | | | | | | 5.4129 | - | - | 84.94 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.409 | 1325.900 | 252.60 | 75-09-2 | | X | 84.94 | 3470 | 3.47E-06 | 4.09E-08 | 7.35E-07 | 0.0010 |
| Trichloro (1,1,2) trifluoroethane | | | | | | 4.2021 | - | - | 187.38 | 0.0000 | 0.0001 | 187.38 | Option 2: A=6.88 B=1099.9 C=227.5 | 6.880 | 1099.900 | 227.50 | 76-13-1 | X | | 187.38 | 5660 | 5.66E-06 | 3.02E-08 | 5.44E-07 | 0.0013 |
| Trichloroethane (1,1,1) | | | | | | 1.5780 | - | - | 133.42 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.643 | 2136.600 | 302.80 | 71-55-6 | X | X | 133.42 | 8670 | 8.67E-06 | 6.50E-08 | 1.17E-06 | 0.0007 |
| Trichloroethylene | | | | | | 0.7781 | - | - | 131.40 | 0.0000 | 0.0001 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.518 | 1018.600 | 192.70 | 79-01-6 | X | X | 131.40 | 29000 | 2.90E-05 | 2.21E-07 | 3.97E-06 | 0.0012 |
| Vinylidene chloride | | | | | | 7.8063 | - | - | 96.50 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.972 | 1099.400 | 237.20 | 75-35-4 | X | X | 96.50 | 1000 | 1.00E-06 | 1.04E-08 | 1.87E-07 | 0.0004 |
| Chloroform | | | | | | 2.3280 | - | - | 119.38 | 0.0000 | 0.0000 | 119.38 | | 6.493 | 929.440 | 196.03 | 67-66-3 | X | X | 119.38 | 4820 | 4.82E-06 | 4.04E-08 | 7.27E-07 | 0.0006 |
| Carbon tetrachloride | | | | | | 1.3843 | - | - | 153.84 | 0.0000 | 0.0000 | 153.84 | | 6.934 | 1242.430 | 230.00 | 56-23-5 | X | X | 153.84 | 3870 | 3.87E-06 | 2.52E-08 | 4.53E-07 | 0.0003 |
| Ethylene dichloride | | | | | | 0.9008 | - | - | 98.95 | 0.0000 | 0.0000 | 98.95 | | 7.025 | 1272.300 | 222.90 | 107-06-2 | X | X | 98.95 | 4740 | 4.74E-06 | 4.79E-08 | 8.62E-07 | 0.0002 |
| Trichloroethane (1,1,2) | | | | | | 0.2315 | - | - | 133.40 | 0.0000 | 0.0000 | 133.40 | | 6.951 | 1314.410 | 209.20 | 79-00-5 | X | X | 133.4 | 2390 | 2.39E-06 | 1.79E-08 | 3.23E-07 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1959 | - | - | 165.83 | 0.0000 | 0.0000 | 165.83 | | 6.98 | 1386.920 | 217.53 | 127-18-4 | X | X | 165.83 | 2010 | 2.01E-06 | 1.21E-08 | 2.18E-07 | 0.0000 |
| Chlorobenzene | | | | | | 0.1260 | - | - | 112.60 | 0.0000 | 0.0000 | 112.60 | | 6.978 | 1431.050 | 217.55 | 108-90-7 | X | X | 112.6 | 2960 | 2.96E-06 | 2.63E-08 | 4.73E-07 | 0.0000 |
| Tetrachloroethane(1,1,2,2) | | | | | | 0.0401 | - | - | 167.85 | 0.0000 | 0.0000 | 167.85 | | 6.631 | 1228.100 | 179.90 | 79-34-5 | X | | 167.848 | 1290 | 1.29E-06 | 7.69E-09 | 1.38E-07 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.00 | 0.9999 | 0.9997 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | - | - | - | 18.00 | 999928520 | 1.00E+00 | 5.56E-02 | 1.00E+00 | 17.9991 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8002 - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | **AP-42 EQUATIONS** | | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 11.5611 | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 1.1501 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 416.2110 | | $V_V$ = | 40.0203 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | | $K_E$ = | 0.0744 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9331 | | $K_S$ = | 0.9654 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 416.2110 | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 40.0203 | cu ft | | | |
| D = Tank Diameter (ft) | 4.0000 | | | | | | | |
| $D_E$ = Effective Diameter (ft) | 11.5102 | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 5.0475 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | 2.0000 | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 2.0000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | 5.0000 | | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | $W_V = M_V\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight (lb/lb-mole) | 18.0025 | | | | | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | 517.9736 | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | 47.6792 | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | 10.7310 | | | | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | 511.6892 | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | 0.8900 | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | 1165.4120 | | | 1,165.41 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{delta}P_V - \text{delta } P_B)/(P_A - P_{VA})]$ | $K_E$ = | 0.0744 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | 40.7601 | $\text{delta } T_V = 0.72(T_{AX} - T_{AN}) + 0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | 0.0000 | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | 0.0600 | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | 517.9736 | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | 507.7836 | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | 528.1636 | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | 16.2750 | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9331 | $K_S = 1/[1 + (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9654 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Space Outage (ft) | 2.0000 | | | | | | |

*Working Losses (lb)*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 45.9324 | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 26.2246 | lbs | | |
| Vapor Molecular Weight (lb/lb-mole) | 18.0025 | | | | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 | |
| Q = Annual Net Throughput (gal/yr) | 1,000,000 | 1 bbl/yr = 42 US gal/yr | Q = | 23,809.52 | bbl/yr | for turnovers >36, $K_N = (180 + N)/6N$ | |
| Annual Turnovers | 2127.1617 | | | | | for turnovers <36, $K_N$ = 1 | |
| Turnover Factor | 0.3167 | $K_N = (180 + N)/6N$ | $K_N$ = | 0.1808 | | $K_P$ = working loss product factor, dimensionless | |
| Tank Diameter (ft) | 4.0000 | | | | | for crude oils $K_P$ = 0.75 | |
| Working Loss Product Factor | 1.0000 | | $K_P$ = | 1 | | for all other organic liquids, $K_P$ = 1 | |
| Total Losses (lb) | 57.4934 | | $L_T$ = | 27.3748 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8002 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 8002 Liquid | 26.22 | 1.15 | 27.37 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Trichloro (1,1,2) trifluoroethane | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | | | |
| Carbon tetrachloride | | | |
| Ethylene dichloride | | | |
| Trichloroethane (1,1,2) | | | |
| Tetrachloroethylene | | | |
| Chlorobenzene | | | |
| Tetrachloroethane(1,1,2,2) | | | |
| Water | 26.22 | 1.15 | 27.37 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 26.22462 | 1.15013 | 27.37475 |
| 0.00014 | 0.00001 | 0.00014 |
| 0.00146 | 0.00006 | 0.00152 |
| 0.00184 | 0.00008 | 0.00192 |
| 0.00106 | 0.00005 | 0.00111 |
| 0.00175 | 0.00008 | 0.00182 |
| 0.00060 | 0.00003 | 0.00063 |
| 0.00087 | 0.00004 | 0.00091 |
| 0.00042 | 0.00002 | 0.00043 |
| 0.00033 | 0.00001 | 0.00035 |
| 0.00004 | 0.00000 | 0.00004 |
| 0.00003 | 0.00000 | 0.00003 |
| 0.00003 | 0.00000 | 0.00003 |
| 0.00000 | 0.00000 | 0.00000 |
| 26.21605 | 1.14976 | 27.36581 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-8004 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 4.66 |
| *Diameter (ft)* | 4.00 |
| *Volume (gal)* | 550 |
| *Turnovers* | 9.09 |
| *Net Throughput (gal/yr)* | 5,000 |
| *Is tank heated (y/n)* | N |
| *Is tank underground (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8007 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18 | | | | |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | $MW_i$ (g/mol) | Detected Compounds Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8004 Liquid* | All | 58.30 | - | - | 52.02 | 0.3384 | - | - | 18.0051 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | - | 18.0051 |
| Methylene chloride | | | | | | 5.4129 | - | - | 84.9400 | 0.0000 | 0.0002 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.409 | 1325.900 | 252.60 | 75-09-2 | 84.93 | 13300 | 0.000013 | 0.000000 | 0.000003 | 0.0038 |
| Trichloroethane (1,1,1) | | | | | | 1.5780 | - | - | 133.4200 | 0.0000 | 0.0001 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.643 | 2136.600 | 302.80 | 71-55-6 | 133.4 | 23800 | 0.000024 | 0.000000 | 0.000003 | 0.0020 |
| Trichloroethylene | | | | | | 0.7781 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.518 | 1018.600 | 192.70 | 79-01-6 | 131.39 | 7280 | 0.000007 | 0.000000 | 0.000001 | 0.0003 |
| Xylenes (mixed isomers) | | | | | | 0.0851 | | | 106.1600 | 0.0000 | 0.0000 | 106.16 | | 7.009 | 1462.266 | 215.11 | 1330-20-7 | 106.16 | 9550 | 0.000010 | 0.000000 | 0.000002 | 0.0000 |
| Toluene | | | | | | 0.3131 | | | 92.1400 | 0.0000 | 0.0000 | 92.14 | | 6.954 | 1344.800 | 219.48 | 108-88-3 | 92.14 | 5460 | 0.000005 | 0.000000 | 0.000001 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9999 | 0.9997 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | - | 18.00 | 999940610 | 0.999941 | 0.055552 | 0.999990 | 17.9989 |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | check: | **1.00000** | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8007 - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 1.1500 | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 1.0718 | lbs | | |
| $V_V$ = Vapor Space Volume (cu ft) | 40.0203 | | $V_V$ = | 37.2989 | cu ft | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | $W_V$ = | 0.0011 | lb / cu ft | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | | $K_E$ = | 0.0744 | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9654 | | $K_S$ = | 0.9654 | | | |
| *Tank Vapor Space Volume* | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 40.0203 | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 37.2989 | cu ft | | |
| D = Tank Diameter (ft) | 4.0000 | | | | | | |
| $D_E$ = Effective Diameter (ft) | 5.0475 | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 4.8729 | ft | | |
| $H_{VO}$ = Vapor Space Outage (ft) | 2.0000 | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 2.0000 | ft | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | 4.6600 | | | | | | |
| *Vapor Density* | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0000 | | $M_V$ = | 18.0051 | lb/lb-mole | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | 517.9736 | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | 47.6792 | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | 10.7310 | | | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | 511.6892 | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | |
| Tank Paint Solar Absorptance (Shell) | 0.8900 | | | 0.89 | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | 1165.4120 | | | 1,165.412 | Btu/sqft d | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Vapor Space Expansion Factor* | | | | | | | As per sources listed on page 6-5 of TANKS user manual: |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0744 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | 40.7601 | $\text{delta } T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | 0.0000 | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | 0.0600 | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | 517.9736 | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | 507.7836 | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.7836 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | 528.1636 | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | 16.2750 | | delta $T_A$ = | 16.2750 | R | | |
| *Vented Vapor Saturation Factor* | | | | | | | |
| Vented Vapor Saturation Factor | 0.9654 | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9654 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Space Outage (ft) | 2.0000 | | | | | | |
| *Working Losses (lb)* | 1.4504 | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 0.7254 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0000 | | $M_V$ = | 18.0051 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput (gal/yr) | 5,000 | 1 bbl/yr = 42 US gal/yr | Q = | 119.05 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 9.09 | | N = | 9.09 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 1.0000 | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | | $K_P$ = working loss product factor, dimensionless |
| Tank Diameter (ft) | 4.0000 | | | | | | for crude oils $K_P = 0.75$ |
| $K_P$ = Working Loss Product Factor | 1.0000 | | $K_P$ = | 1.00 | | | for all other organic liquids, $K_P = 1$ |
| Total Losses (lb) | 2.6004 | | $L_T$ = | 1.7971 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8007 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 8004 Liquid | | | |
| Methylene chloride | | | |
| Trichloroethane (1,1,1) | | | |
| Trichloroethylene | | | |
| Xylenes (mixed isomers) | | | |
| Toluene | | | |
| Water | | | |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 0.72537 | 1.07177 | 1.79715 |
| 0.00015 | 0.00023 | 0.00038 |
| 0.00008 | 0.00012 | 0.00020 |
| 0.00001 | 0.00002 | 0.00003 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00001 | 0.00001 |
| 0.72512 | 1.07140 | 1.79652 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-8005 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

**Tank Dimensions**

| | | |
|---|---|---|
| *Shell Length (ft)* | 6.25 | |
| *Diameter (ft)* | 3.00 | |
| *Volume (gal)* | 300 | |
| *Turnovers* | 33.22 | 33.33 |
| *Net Throughput (gal/yr)* | 10,000 | |
| *Is tank heated (y/n)* | N | |
| *Is tank underground (y/n)* | N | |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8005 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8005 Liquid* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0003 | | | 18.00 | |
| Trichloroethylene | | | | | | 0.7781 | 0.5664 | 1.0511 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9998 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | VOC | HAP | Detected Compounds MW$_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i$ / MW$_i$ | $X_i$ | $M_v$ = $M_i$ [(P $X_i$)/$P_{VA}$] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8005 Liquid* | All | 58.30 | - | - | 52.02 | 0.3384 | - | - | 18.0006 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | - | - | - | 18.00056 |
| Trichloroethylene | | | | | | 0.7781 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.518 | 1018.600 | 192.70 | 79-01-6 | X | X | 131.39 | 15400 | 1.54E-05 | 1.17E-07 | 2.11E-06 | 0.0006 |
| Chloroethene | | | | | | 38.1072 | - | - | 62.4980 | 0.0000 | 0.0000 | 62.50 | | 6.4971 | 783.400 | 230.01 | 75-01-4 | X | X | 62.498 | 6.7 | 6.70E-09 | 1.07E-10 | 1.93E-09 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 1.0000 | 1.0000 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | - | - | - | 18 | 999984593.3 | 1.00E+00 | 5.56E-02 | 1.00E+00 | 17.9999 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8005 - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 0.8156 | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.8157 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 28.1393 | | $V_V$ = | 28.1393 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | | $K_E$ = | 0.0744 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9738 | | $K_S$ = | 0.9738 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 28.1393 | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 28.1393 | cu ft | | | |
| D = Tank Diameter (ft) | 3.0000 | | | | | | | |
| $D_E$ = Effective Diameter (ft) | 4.8873 | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 4.8873 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | 1.5000 | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 1.5000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | 6.2500 | | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_v$ = Vapor Molecular Weight | 18.0003 | | $M_V$ = | 18.0006 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | 517.9736 | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | 47.6792 | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | 10.7310 | | | | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | 511.6892 | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | 0.8900 | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | 1165.4120 | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0744 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | 40.7601 | $\text{delta } T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | 0.0000 | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | 0.0600 | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | 517.9736 | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | 507.7836 | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | 528.1636 | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | 16.2750 | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9738 | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9738 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Space Outage (ft) | 1.5000 | | | | | | |
| *Working Losses (lb)* | 1.4503 | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 1.4503 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0003 | | $M_V$ = | 18.0006 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Q = Annual Net Throughput (gal/yr) | 10,000 | 1 bbl/yr = 42 US gal/yr | Q = | 238.10 | bbl/yr | | |
| Annual Turnovers | 33.2200 | | N = | 33.33 | | | |
| $K_N$ = Turnover Factor | 1.0000 | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | | |
| Tank Diameter (ft) | 3.0000 | | | | | | |
| Working Loss Product Factor | 1.0000 | | $K_P$ = | 1.00 | | | |
| Total Losses (lb) | 2.2659 | | $L_T$ = | 2.2660 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

for all other organic liquids, $K_P = 1$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8005 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 8005 Liquid | 1.45 | 0.82 | 2.27 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Vinyl Chloride | | | |
| Water | 1.45 | 0.82 | 2.27 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 1.45031 | 0.81565 | 2.26596 |
| 0.00005 | 0.00003 | 0.00008 |
| 0.00000 | 0.00000 | 0.00000 |
| 1.45026 | 0.81562 | 2.26588 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-8006 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

**Tank Dimensions**

| | | |
|---|---|---|
| *Shell Length (ft)* | 6.25 | |
| *Diameter (ft)* | 3.00 | |
| *Volume (gal)* | 300 | |
| *Turnovers* | 33.2226 | 33.33 |
| *Net Throughput (gal/yr)* | 10,000 | |
| *Is tank heated (y/n)* | N | |
| *Is tank underground (y/n)* | N | |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8006 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8006 Liquid* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0066 | - | - | 18.00 | - |
| Carbon tetrachloride | | | | | | 1.3843 | 1.0493 | 1.8035 | 153.8400 | 0.0001 | 0.0004 | 153.84 | Option 2: A=6.934, B=1242.43, C=230 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9999 | 0.9996 | 18.00 | Option 1: VP50 = .3383936375<br>VP60 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | $MW_i$ (g/mol) | Detected Compounds: Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8006 Liquid* | All | 58.30 | - | - | 52.02 | 0.3384 | - | - | 18.0085 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | - | 18.0085 |
| Carbon tetrachloride | | | | | | 1.3843 | - | - | 153.8400 | 0.0001 | 0.0005 | 153.84 | Option 2: A=6.934 B=1242.43 C=230 | 6.934 | 1242.430 | 230.00 | 56-23-5 | 153.84 | 116000 | 0.000116 | 0.000001 | 0.000014 | 0.0085 |
| Chloroform | | | | | | 2.3280 | - | - | 119.3800 | 0.0000 | 0.0001 | 119.38 | | 6.493 | 929.440 | 196.03 | 67-66-3 | 119.38 | 8710 | 0.000009 | 0.000000 | 0.000001 | 0.0011 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9999 | 0.9995 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | - | 18.00 | 999875290 | 0.999875 | 0.055549 | 0.999985 | 17.9988 |
| | | | | | | | | check: | | **1.0000** | **1.0000** | | | | | | | | | | check: | **1.00000** | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8006 - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | **AP-42 EQUATIONS** | | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 0.8160 | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.8159 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 28.1393 | | $V_V$ = | 28.1393 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | | $K_E$ = | 0.0744 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9738 | | $K_S$ = | 0.9738 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 28.1393 | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 28.1393 | cu ft | | | |
| D = Tank Diameter (ft) | 3.0000 | | | | | | | |
| $D_E$ = Effective Diameter (ft) | 4.8873 | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 4.8873 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | 1.5000 | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 1.5000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | 6.2500 | | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0066 | | $M_V$ = | 18.0085 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | 517.9736 | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | 47.6792 | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | 10.7310 | | | | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | 511.6892 | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | 0.8900 | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | 1165.4120 | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Vapor Space Expansion Factor* | | | | | | | As per sources listed on page 6-5 of TANKS user manual: |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0744 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | 40.7601 | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | 0.0000 | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | 0.0600 | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | 517.9736 | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | 507.7836 | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.7836 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | 528.1636 | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | 16.2750 | | delta $T_A$ = | 16.2750 | R | | |
| *Vented Vapor Saturation Factor* | | | | | | | |
| Vented Vapor Saturation Factor | 0.9738 | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9738 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Space Outage (ft) | 1.5000 | | | | | | |
| *Working Losses (lb)* | 1.4508 | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 1.4510 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0066 | | $M_V$ = | 18.0085 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput (gal/yr) | 10,000 | 1 bbl/yr = 42 US gal/yr | Q = | 238.10 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 33.2226 | | N = | 33.33 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 1.0000 | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | | $K_P$ = working loss product factor, dimensionless |
| Tank Diameter (ft) | 3.0000 | | | | | | for crude oils $K_P = 0.75$ |
| Working Loss Product Factor | 1.0000 | | $K_P$ = | 1.00 | | | for all other organic liquids, $K_P = 1$ |
| Total Losses (lb) | 2.2668 | | $L_T$ = | 2.2669 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8006 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 8006 Liquid | 1.45 | 0.82 | 2.27 |
| Carbon tetrachloride | 0.00 | 0.00 | 0.00 |
| Chloroform | | | |
| Water | 1.45 | 0.82 | 2.27 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 1.45101 | 0.81594 | 2.26695 |
| 0.00069 | 0.00039 | 0.00108 |
| 0.00009 | 0.00005 | 0.00014 |
| 1.45024 | 0.81550 | 2.26574 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-8007 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 5.00 |
| *Diameter (ft)* | 4.00 |
| *Volume (gal)* | 470 |
| *Turnovers* | 21.28 |
| *Net Throughput (gal/yr)* | 10,000 |
| *Is tank heated (y/n)* | N |
| *Is tank underground (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8007 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8007 Liquid* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0012 | - | - | 18.00 | - |
| Chlorobenzene | | | | | | 0.1260 | 0.0884 | 0.1767 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Methylene chloride | | | | | | 5.4129 | 4.2270 | 6.8607 | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloro (1,1,2) trifluoroethane | | | | | | 4.2021 | 3.2712 | 5.3366 | 187.3800 | 0.0000 | 0.0000 | 187.38 | Option 2: A=6.88, B=1099.9, C=227.5 |
| Trichloroethane (1,1,1) | | | | | | 1.5780 | 1.1909 | 2.0704 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethylene | | | | | | 0.7781 | 0.5664 | 1.0511 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9999 | 0.9996 | 18.00 | Option 1: VP50 = .3383936375<br>VP60 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | $MW_i$ (g/mol) | Detected Compounds: Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8007 Liquid* | All | 58.30 | - | - | 52.02 | 0.3384 | - | - | 18.0021 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | - | 18.0021 |
| Chlorobenzene | | | | | | 0.1260 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.978 | 1431.050 | 217.55 | 108-90-7 | 112.56 | 3380 | 0.000003 | 0.000000 | 0.000001 | 0.0000 |
| Methylene chloride | | | | | | 5.4129 | - | - | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.409 | 1325.900 | 252.60 | 75-09-2 | 84.93 | 2900 | 0.000003 | 0.000000 | 0.000001 | 0.0008 |
| Trichloro (1,1,2) trifluoroethane | | | | | | 4.2021 | - | - | 187.3800 | 0.0000 | 0.0000 | 187.38 | Option 2: A=6.88 B=1099.9 C=227.5 | 6.88 | 1099.900 | 227.50 | 76-13-1 | 187.38 | 2900 | 0.000003 | 0.000000 | 0.000000 | 0.0006 |
| Trichloroethane (1,1,1) | | | | | | 1.5780 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.643 | 2136.600 | 302.80 | 71-55-6 | 133.4 | 2200 | 0.000002 | 0.000000 | 0.000000 | 0.0002 |
| Trichloroethylene | | | | | | 0.7781 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.518 | 1018.600 | 192.70 | 79-01-6 | 131.39 | 3840 | 0.000004 | 0.000000 | 0.000001 | 0.0002 |
| Dichloroethane(1,1) | | | | | | 2.7921 | | | 98.9600 | 0.0000 | 0.0000 | 98.96 | | 6.985 | 1171.420 | 228.13 | 75-34-3 | 98.96 | 390 | 0.000000 | 0.000000 | 0.000000 | 0.0001 |
| Dichloroethene(1,1) | | | | | | 7.8099 | | | 96.9400 | 0.0000 | 0.0000 | 96.94 | | 6.972 | 1099.400 | 237.20 | 75-35-4 | 96.94 | 250 | 0.000000 | 0.000000 | 0.000000 | 0.0001 |
| Ethylene dichloride | | | | | | 0.9008 | | | 98.9500 | 0.0000 | 0.0000 | 98.95 | | 7.025 | 1272.300 | 222.90 | 107-06-2 | 98.95 | 270 | 0.000000 | 0.000000 | 0.000000 | 0.0000 |
| Dichloropropane(1,2) | | | | | | 0.5618 | | | 112.9800 | 0.0000 | 0.0000 | 112.98 | | 6.965 | 1296.400 | 221.00 | 78-87-5 | 112.98 | 25 | 0.000000 | 0.000000 | 0.000000 | 0.0000 |
| Methyl isobutyl ketone | | | | | | 0.1998 | | | 100.1600 | 0.0000 | 0.0000 | 100.16 | | 6.672 | 1168.400 | 191.90 | 108-10-1 | 100.16 | 57 | 0.000000 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 1.1140 | | | 78.1100 | 0.0000 | 0.0000 | 78.11 | | 6.905 | 1211.033 | 220.79 | 71-43-2 | 78.11 | 69 | 0.000000 | 0.000000 | 0.000000 | 0.0000 |
| Carbon Tetrachloride | | | | | | 1.3843 | | | 153.8400 | 0.0000 | 0.0000 | 153.84 | | 6.934 | 1242.430 | 230.00 | 56-23-5 | 153.84 | 930 | 0.000001 | 0.000000 | 0.000000 | 0.0001 |
| Chloroform | | | | | | 2.3280 | | | 119.3800 | 0.0000 | 0.0000 | 119.38 | | 6.493 | 929.440 | 196.03 | 67-66-3 | 119.38 | 520 | 0.000001 | 0.000000 | 0.000000 | 0.0001 |
| Ethylbenzene | | | | | | 0.1023 | | | 106.1700 | 0.0000 | 0.0000 | 106.17 | | 6.975 | 1424.255 | 213.21 | 100-41-4 | 106.17 | 48 | 0.000000 | 0.000000 | 0.000000 | 0.0000 |
| Xylenes (mixed isomers) | | | | | | 0.0851 | | | 106.1600 | 0.0000 | 0.0000 | 106.16 | | 7.009 | 1462.266 | 215.11 | 1330-20-7 | 106.16 | 276 | 0.000000 | 0.000000 | 0.000000 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1959 | | | 165.8300 | 0.0000 | 0.0000 | 165.83 | | 6.98 | 1386.920 | 217.53 | 127-18-4 | 165.83 | 52 | 0.000000 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.3131 | | | 92.1400 | 0.0000 | 0.0000 | 92.14 | | 6.954 | 1344.800 | 219.48 | 108-88-3 | 92.14 | 130 | 0.000000 | 0.000000 | 0.000000 | 0.0000 |
| Chloroethene | | | | | | ###### | | | 62.4980 | 0.0000 | 0.0000 | 62.50 | | 6.497 | 783.400 | 230.01 | 75-01-4 | 62.498 | 190 | 0.000000 | 0.000000 | 0.000000 | 0.0004 |
| Ethyl acetate | | | | | | 1.0780 | | | 88.1100 | 0.0000 | 0.0000 | 88.11 | | 7.101 | 1244.950 | 217.88 | 141-78-6 | 88.11 | 45 | 0.000000 | 0.000000 | 0.000000 | 0.0000 |
| o-Dichlorobenzene | | | | | | 0.0132 | | | 147.0100 | 0.0000 | 0.0000 | 147.01 | | 7.07 | 1649.550 | 213.32 | 95-50-1 | 147.01 | 11300 | 0.000011 | 0.000000 | 0.000001 | 0.0000 |
| m-Dichlorobenzene | | | | | | 0.0201 | | | 147.0000 | 0.0000 | 0.0000 | 147.00 | | 7.304 | 1782.400 | 230.01 | 541-73-1 | 147 | 390 | 0.000000 | 0.000000 | 0.000000 | 0.0000 |
| p-Dichlorobenzene | | | | | | 0.0168 | | | 147.0000 | 0.0000 | 0.0000 | 147.00 | | 6.998 | 1575.110 | 208.52 | 104-46-7 | 147 | 2720 | 0.000003 | 0.000000 | 0.000000 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 1.0000 | 0.9999 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | - | 18.00 | 999967118 | 0.999967 | 0.055554 | 0.999995 | 17.9995 |
| | | | | | | | | check: | | 1.0000 | 1.0000 | | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8007 - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 1.1500 | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 1.1501 | lbs | | |
| $V_V$ = Vapor Space Volume (cu ft) | 40.0203 | | $V_V$ = | 40.0203 | cu ft | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | $W_V$ = | 0.0011 | lb / cu ft | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | | $K_E$ = | 0.0744 | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9654 | | $K_S$ = | 0.9654 | | | |
| *Tank Vapor Space Volume* | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 40.0203 | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 40.0203 | cu ft | | |
| D = Tank Diameter (ft) | 4.0000 | | | | | | |
| $D_E$ = Effective Diameter (ft) | 5.0475 | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 5.0475 | ft | | |
| $H_{VO}$ = Vapor Space Outage (ft) | 2.0000 | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 2.0000 | ft | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | 5.0000 | | | | | | |
| *Vapor Density* | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0012 | | $M_V$ = | 18.0021 | lb/lb-mole | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | 517.9736 | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | 47.6792 | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | 10.7310 | | | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | 511.6892 | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | |
| Tank Paint Solar Absorptance (Shell) | 0.8900 | | | 0.89 | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | 1165.4120 | | | 1,165.412 | Btu/sqft d | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Vapor Space Expansion Factor* | | | | | | | As per sources listed on page 6-5 of TANKS user manual: |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0744 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | 40.7601 | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | 0.0000 | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | 0.0600 | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | 517.9736 | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | 507.7836 | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.7836 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | 528.1636 | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | 16.2750 | | delta $T_A$ = | 16.2750 | R | | |
| *Vented Vapor Saturation Factor* | | | | | | | |
| Vented Vapor Saturation Factor | 0.9654 | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9654 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Space Outage (ft) | 2.0000 | | | | | | |
| *Working Losses (lb)* | 1.4504 | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 1.4505 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0012 | | $M_V$ = | 18.0021 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput (gal/yr) | 10,000 | 1 bbl/yr = 42 US gal/yr | Q = | 238.10 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 21.28 | | N = | 21.28 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 1.0000 | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | | $K_P$ = working loss product factor, dimensionless |
| Tank Diameter (ft) | 4.0000 | | | | | | for crude oils $K_P = 0.75$ |
| $K_P$ = Working Loss Product Factor | 1.0000 | | $K_P$ = | 1.00 | | | for all other organic liquids, $K_P = 1$ |
| Total Losses (lb) | 2.6004 | | $L_T$ = | 2.6005 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8007 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 8007 Liquid | 1.45 | 1.15 | 2.60 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Trichloro (1,1,2) trifluoroethane | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Dichloroethane(1,1) | | | |
| Dichloroethene(1,1) | | | |
| Ethylene dichloride | | | |
| Dichloropropane(1,2) | | | |
| Methyl isobutyl ketone | | | |
| Benzene | | | |
| Carbon Tetrachloride | | | |
| Chloroform | | | |
| Ethylbenzene | | | |
| Xylenes (mixed isomers) | | | |
| Tetrachloroethylene | | | |
| Toluene | | | |
| Chloroethene | | | |
| Ethyl acetate | | | |
| o-Dichlorobenzene | | | |
| m-Dichlorobenzene | | | |
| p-Dichlorobenzene | | | |
| Water | 1.45 | 1.15 | 2.60 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 1.45046 | 1.15005 | 2.60051 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00007 | 0.00005 | 0.00012 |
| 0.00005 | 0.00004 | 0.00009 |
| 0.00001 | 0.00001 | 0.00003 |
| 0.00001 | 0.00001 | 0.00002 |
| 0.00000 | 0.00000 | 0.00001 |
| 0.00001 | 0.00001 | 0.00002 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00003 | 0.00002 | 0.00006 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 1.45025 | 1.14989 | 2.60014 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

| **Identification** | |
|---|---|
| *User Identification* | T-8008 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

| **Tank Dimensions** | |
|---|---|
| *Shell Length (ft)* | 7.60 |
| *Diameter (ft)* | 3.50 |
| *Volume (gal)* | 500 |
| *Turnovers* | 2.00 |
| *Net Throughput (gal/yr)* | 1,000 |
| *Is tank heated (y/n)* | N |
| *Is tank underground (y/n)* | N |

| **Paint Characteristics** | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

| **Breather Vent Settings** | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8008 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Water* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0000 | - | - | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8008 Liquid* | All | 58.30 | - | - | 52.02 | 0.3384 | - | - | 18.0057 | - | - | 18.00 | - |
| Chlorobenzene | | | | | | 0.0486 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 |
| Methylene chloride | | | | | | 2.7949 | - | - | 84.9400 | 0.0000 | 0.0002 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 |
| Tetrachloroethane(1,1,1,2) | | | | | | 0.0123 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 |
| Trichloroethane(1,1,2) | | | | | | 0.0900 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | |
| Trichloroethane (1,1,1) | | | | | | 0.7469 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 |
| Trichloroethylene | | | | | | 0.3299 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 |
| Dichloroethene(1,1) | | | | | | 4.2041 | | | 96.9400 | 0.0000 | 0.0000 | 96.94 | |
| Ethylene dichloride | | | | | | 0.4013 | | | 98.9500 | 0.0000 | 0.0000 | 98.95 | |
| Benzene | | | | | | 0.5086 | | | 78.1100 | 0.0000 | 0.0000 | 78.11 | |
| Chloroform | | | | | | 1.0916 | | | 119.3800 | 0.0000 | 0.0000 | 119.38 | |
| Ethylbenzene | | | | | | 0.0381 | | | 106.1700 | 0.0000 | 0.0000 | 106.17 | |
| Tetrachloroethylene | | | | | | 0.0777 | | | 165.8300 | 0.0000 | 0.0000 | 165.83 | |
| Toluene | | | | | | 0.1298 | | | 92.1400 | 0.0000 | 0.0000 | 92.14 | |
| Chloroethene | | | | | | 23.8531 | | | 62.4980 | 0.0000 | 0.0001 | 62.50 | |
| o-Dichlorobenzene | | | | | | 0.0042 | | | 147.0100 | 0.0000 | 0.0000 | 147.01 | |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9999 | 0.9996 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8008 - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 1.3441 | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 1.3441 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 46.5736 | | $V_V$ = | 46.5736 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | | $K_E$ = | 0.0744 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9696 | | $K_S$ = | 0.9696 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 46.5736 | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 46.5736 | cu ft | | | |
| D = Tank Diameter (ft) | 3.5000 | | | | | | | |
| $D_E$ = Effective Diameter (ft) | 5.8211 | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 5.8211 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | 1.7500 | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 1.7500 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | 7.6000 | | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0000 | | $M_V$ = | 18.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | 517.9736 | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | 47.6792 | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | 10.7310 | | | | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | 511.6892 | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | 0.8900 | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | 1165.4120 | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

As per sources listed on page 6-5 of TANKS user manual:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0744 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | 40.7601 | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | 0.0000 | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | 0.0600 | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | 517.9736 | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | 507.7836 | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.7836 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | 528.1636 | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | 16.2750 | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | |
|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9696 | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9696 | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | |
| Vapor Space Outage (ft) | 1.7500 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Working Losses (lb)* | 0.1450 | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 0.1450 | lbs | |
| $M_V$ = Vapor Molecular Weight | 18.0000 | | $M_V$ = | 18.0057 | lb/lb-mole | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput (gal/yr) | 1,000 | 1 bbl/yr = 42 US gal/yr | Q = | 23.81 | bbl/yr | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 2.00 | | N = | 2.00 | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 1.0000 | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | $K_P$ = working loss product factor, dimensionless |
| Tank Diameter (ft) | 3.5000 | | | | | for crude oils $K_P = 0.75$ |
| $K_P$ = Working Loss Product Factor | 1.0000 | | $K_P$ = | 1.00 | | for all other organic liquids, $K_P = 1$ |
| Total Losses (lb) | 1.4891 | | $L_T$ = | 1.4891 | lbs | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8008 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Water | 0.15 | 1.34 | 1.49 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 0.14504 | 1.34410 | 1.48913 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00003 | 0.00032 | 0.00036 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00004 | 0.00004 |
| 0.00000 | 0.00002 | 0.00003 |
| 0.00000 | 0.00003 | 0.00003 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00001 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00001 | 0.00001 |
| 0.00000 | 0.00001 | 0.00001 |
| 0.00001 | 0.00011 | 0.00013 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.14498 | 1.34355 | 1.48853 |

Chlorobenzene
Methylene chloride
Tetrachloroethane(1,1,1,2)
Trichloroethane(1,1,2)
Trichloroethane (1,1,1)
Trichloroethylene
Dichloroethene(1,1)
Ethylene dichloride
Benzene
Chloroform
Ethylbenzene
Tetrachloroethylene
Toluene
Chloroethene
o-Dichlorobenzene
Water

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-8009 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank; Projected Volume |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 5.90 |
| *Diameter (ft)* | 4.10 |
| *Volume (gal)* | 525 |
| *Turnovers* | 952.38 |
| *Net Throughput (gal/yr)* | 500,000 |
| *Is tank heated (y/n)* | N |
| *Is tank underground (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8009 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 8009 Liquid* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0019 | - | - | 18.00 | - |
| Acetone | | | | | | 2.8026 | 2.1379 | 3.6292 | 58.0800 | 0 | 0 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Carbon tetrachloride | | | | | | 1.3843 | 1.0493 | 1.8035 | 153.8400 | 0 | 0 | 153.84 | Option 2: A=6.934, B=1242.43, C=230 |
| Chlorobenzene | | | | | | 0.1260 | 0.0884 | 0.1767 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 2.3281 | 1.7585 | 3.0372 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Methylene chloride | | | | | | 5.4129 | 4.2270 | 6.8607 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethane (1,1,2) | | | | | | 0.2315 | 0.1630 | 0.3232 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.7781 | 0.5664 | 1.0511 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9999 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_U = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | Detected Compounds | | | | | | | | |
| Tank 8009 Liquid | All | 58.30 | - | - | 52.02 | 0.3384 | - | - | 18.0048 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | - | - | - | 18.0048 |
| Acetone | | | | | | 2.8026 | - | - | 58.0800 | 0.0000 | 0.0000 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.117 | 1210.595 | 229.66 | 67-64-1 | | | 58.08 | 1000 | 0.000001 | 0.000000 | 0.000000 | 0.0001 |
| Carbon tetrachloride | | | | | | 1.3843 | - | - | 153.8400 | 0.0000 | 0.0001 | 153.84 | Option 2: A=6.934 B=1242.43 C=230 | 6.934 | 1242.430 | 230.00 | 56-23-5 | X | X | 153.84 | 13000 | 0.000013 | 0.000000 | 0.000002 | 0.0010 |
| Chlorobenzene | | | | | | 0.1260 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.978 | 1431.050 | 217.55 | 108-90-7 | X | X | 112.6 | 2920 | 2.92E-06 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 2.3280 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.493 | 929.440 | 196.03 | 67-66-3 | X | X | 119.39 | 4100 | 0.0000041 | 0.000000 | 0.000001 | 0.0005 |
| Methylene chloride | | | | | | 5.4129 | - | - | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.409 | 1325.900 | 252.60 | 75-09-2 | | X | 84.94 | 8000 | 0.000008 | 0.000000 | 0.000002 | 0.0023 |
| Trichloroethane (1,1,2) | | | | | | 0.2315 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.951 | 1314.410 | 209.20 | 79-00-5 | X | X | 133.4 | 1800 | 0.0000018 | 0.000000 | 0.000000 | 0.0000 |
| Trichloroethylene | | | | | | 0.7781 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.518 | 1018.600 | 192.70 | 79-01-6 | X | X | 131.4 | 8480 | 8.48E-06 | 0.000000 | 0.000001 | 0.0004 |
| Tetrachloroethane(1,1,1,2) | | | | | | 0.1248 | | | 167.8480 | 0.0000 | 0.0000 | 167.85 | | 6.898 | 1365.880 | 209.74 | 630-20-6 | | | 167.85 | 230 | 2.3E-07 | 0.000000 | 0.000000 | 0.0000 |
| Trichloroethane(1,1,1) | | | | | | 1.5780 | | | 133.4000 | 0.0000 | 0.0000 | 133.40 | | 8.643 | 2136.600 | 302.80 | 71-55-6 | | | 133.4 | 590 | 5.9E-07 | 0.000000 | 0.000000 | 0.0000 |
| Tetrachloroethane(1,1,2,2) | | | | | | 0.0401 | | | 167.8480 | 0.0000 | 0.0000 | 167.85 | | 6.631 | 1228.100 | 179.90 | 79-34-5 | | | 167.85 | 520 | 5.2E-07 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethene(1,1) | | | | | | 7.8099 | | | 96.9400 | 0.0000 | 0.0000 | 96.94 | | 6.972 | 1099.400 | 237.20 | 75-35-4 | | | 96.94 | 66 | 6.6E-08 | 0.000000 | 0.000000 | 0.0000 |
| Ethylene dichloride | | | | | | 0.9008 | | | 98.9500 | 0.0000 | 0.0000 | 98.95 | | 7.025 | 1272.300 | 222.90 | 107-06-2 | | | 98.95 | 1200 | 0.0000012 | 0.000000 | 0.000000 | 0.0001 |
| Benzene | | | | | | 1.1140 | | | 78.1100 | 0.0000 | 0.0000 | 78.11 | | 6.905 | 1211.033 | 220.79 | 71-43-2 | | | 78.11 | 120 | 1.2E-07 | 0.000000 | 0.000000 | 0.0000 |
| Dibromomethane | | | | | | 22.1637 | | | 187.8600 | 0.0000 | 0.0000 | 187.86 | | 6.96 | 986.590 | 238.33 | 74-95-3 | | | 187.86 | 470 | 4.7E-07 | 0.000000 | 0.000000 | 0.0006 |
| Ethylbenzene | | | | | | 0.1023 | | | 106.1700 | 0.0000 | 0.0000 | 106.17 | | 6.975 | 1424.255 | 213.21 | 100-41-4 | | | 106.17 | 200 | 0.0000002 | 0.000000 | 0.000000 | 0.0000 |
| Ethylene dibromide | | | | | | 0.1225 | | | 187.8600 | 0.0000 | 0.0000 | 187.86 | | 6.721 | 1280.820 | 201.75 | 106-93-4 | | | 187.86 | 1500 | 0.0000015 | 0.000000 | 0.000000 | 0.0000 |
| Xylenes (mixed isomers) | | | | | | 0.0851 | | | 106.1600 | 0.0000 | 0.0000 | 106.16 | | 7.009 | 1462.266 | 215.11 | 1330-20-7 | | | 106.16 | 160 | 1.6E-07 | 0.000000 | 0.000000 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1959 | | | 165.8300 | 0.0000 | 0.0000 | 165.83 | | 6.98 | 1386.920 | 217.53 | 127-18-4 | | | 165.83 | 730 | 7.3E-07 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.3131 | | | 92.1400 | 0.0000 | 0.0000 | 92.14 | | 6.954 | 1344.800 | 219.48 | 108-88-3 | | | 92.14 | 1130 | 1.13E-06 | 0.000000 | 0.000000 | 0.0000 |
| Chloroethene | | | | | | 38.1072 | | | 62.4980 | 0.0000 | 0.0000 | 62.50 | | 6.497 | 783.400 | 230.01 | 75-01-4 | | | 62.498 | 180 | 1.8E-07 | 0.000000 | 0.000000 | 0.0004 |
| Trichloro(1,1,2)trifluoroethane | | | | | | 4.2021 | | | 187.3760 | 0.0000 | 0.0000 | 187.38 | | 6.88 | 1099.900 | 227.50 | 76-13-1 | | | 187.38 | 1800 | 0.0000018 | 0.000000 | 0.000000 | 0.0004 |
| o-Dichlorobenzene | | | | | | 0.0132 | | | 147.0100 | 0.0000 | 0.0000 | 147.01 | | 7.07 | 1649.550 | 213.32 | 95-50-1 | | | 147.01 | 4550 | 4.55E-06 | 0.000000 | 0.000001 | 0.0000 |
| p-Dichlorobenzene | | | | | | 0.0168 | | | 147.0000 | 0.0000 | 0.0000 | 147.00 | | 6.998 | 1575.110 | 208.52 | 104-46-7 | | | 147 | 1100 | 0.0000011 | 0.000000 | 0.000000 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9999 | 0.9997 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | | | | 18.00 | 999946154 | 0.9999462 | 0.055553 | 0.999992 | 17.9990 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8009 - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | **AP-42 EQUATIONS** | | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 1.4246 | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 1.4246 | lbs | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 49.6147 | | $V_V$ = | 49.6147 | cu ft | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | $W_V$ = | 0.0011 | lb / cu ft | | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | | $K_E$ = | 0.0744 | | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9645 | | $K_S$ = | 0.9645 | | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 49.6147 | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 49.6147 | cu ft | | | | |
| D = Tank Diameter (ft) | 4.1000 | | | | | | | | |
| $D_E$ = Effective Diameter (ft) | 5.5512 | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 5.5512 | ft | | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | 2.0500 | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 2.0500 | ft | | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | 5.9000 | | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | $W_V = M_V\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0019 | | $M_V$ = | 18.0048 | lb/lb-mole | | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | 517.9736 | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | 47.6792 | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | 10.7310 | | | | | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | 511.6892 | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | | |
| Tank Paint Solar Absorptance (Shell) | 0.8900 | | | 0.89 | | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | 1165.4120 | | | 1,165.412 | Btu/sqft d | | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0744 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | 40.7601 | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | 0.0000 | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | 0.0600 | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | 517.9736 | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | 507.7836 | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.7836 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | 528.1636 | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | 16.2750 | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | |
|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9645 | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9645 | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | |
| Vapor Space Outage (ft) | 2.0500 | | | | | |
| *Working Losses (lb)* | 14.3714 | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 14.3742 | lbs | |
| $M_V$ = Vapor Molecular Weight | 18.0019 | | $M_V$ = | 18.0048 | lb/lb-mole | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | |
| Q = Annual Net Throughput (gal/yr) | 500,000 | 1 bbl/yr = 42 US gal/yr | Q = | 11,904.76 | bbl/yr | |
| Annual Turnovers | 952.38 | | N = | 952.38 | | |
| $K_N$ = Turnover Factor | 0.1982 | $K_N = (180 + N)/6N$ | $K_N$ = | 0.1982 | | |
| Tank Diameter (ft) | 4.1000 | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | $K_P$ = | 1.00 | | |
| Total Losses (lb) | 15.7960 | | $L_T$ = | 15.7988 | lbs | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

for all other organic liquids, $K_P = 1$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8009 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 8009 Liquid | 14.37 | 1.42 | 15.80 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane(1,1,1,2) | | | |
| Trichloroethane(1,1,1) | | | |
| Tetrachloroethane(1,1,2,2) | | | |
| Dichloroethene(1,1) | | | |
| Ethylene dichloride | | | |
| Benzene | | | |
| Dibromomethane | | | |
| Ethylbenzene | | | |
| Ethylene dibromide | | | |
| Xylenes (mixed isomers) | | | |
| Tetrachloroethylene | | | |
| Toluene | | | |
| Chloroethene | | | |
| Trichloro(1,1,2)trifluoroethane | | | |
| o-Dichlorobenzene | | | |
| p-Dichlorobenzene | | | |
| Water | 14.37 | 1.42 | 15.79 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 14.37418 | 1.42458 | 15.79876 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00041 | 0.00004 | 0.00045 |
| 0.00184 | 0.00018 | 0.00202 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00028 | 0.00003 | 0.00031 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00004 | 0.00000 | 0.00004 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00005 | 0.00000 | 0.00005 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00044 | 0.00004 | 0.00049 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00029 | 0.00003 | 0.00032 |
| 0.00032 | 0.00003 | 0.00035 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 14.36953 | 1.42412 | 15.79365 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-8010 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Projected Volume |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 6.46 |
| *Diameter (ft)* | 5.33 |
| *Volume (gal)* | 1,000 |
| *Turnovers* | 500.00 |
| *Net Throughput (gal/yr)* | 500,000 |
| *Is tank heated (y/n)* | N |
| *Is tank underground (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8010 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Water* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0000 | - | - | 18.00 | Option 1: VP50 = .3383936375<br>VP60 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds CAS Number | VOC | HAP | $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tank 8010 Liquid | All | 58.30 | - | - | 52.02 | 0.3384 | - | - | 18.0000 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | - | - | - | 18.0000 |
| Carbon tetrachloride | | | | | | 0.6584 | - | - | 153.8400 | 0.0000 | 0.0000 | 153.84 | | 6.934 | 1242.430 | 230.00 | 56-23-5 | X | X | 153.84 | 1.3 | 1.3E-09 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.0916 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | | 6.493 | 929.440 | 196.03 | 67-66-3 | X | X | 119.39 | 13.8 | 1.38E-08 | 0.000000 | 0.000000 | 0.0000 |
| Trichloroethane (1,1,2) | | | | | | 0.0900 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | | 6.951 | 1314.410 | 209.20 | 79-00-5 | X | X | 133.4 | 0.69 | 6.9E-10 | 0.000000 | 0.000000 | 0.0000 |
| Trichloroethylene | | | | | | 0.3299 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | | 6.518 | 1018.600 | 192.70 | 79-01-6 | X | X | 131.4 | 49 | 4.9E-08 | 0.000000 | 0.000000 | 0.0000 |
| Tetrachloroethane(1,1,1,2) | | | | | | 0.0470 | | | 167.8480 | 0.0000 | 0.0000 | 167.85 | | 6.898 | 1365.880 | 209.74 | 630-20-6 | | | 167.85 | 1.3 | 1.3E-09 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethene(1,1) | | | | | | 4.2041 | | | 96.9400 | 0.0000 | 0.0000 | 96.94 | | 6.972 | 1099.400 | 237.20 | 75-35-4 | | | 96.94 | 0.61 | 6.1E-10 | 0.000000 | 0.000000 | 0.0000 |
| Ethylene dichloride | | | | | | 0.4013 | | | 98.9500 | 0.0000 | 0.0000 | 98.95 | | 7.025 | 1272.300 | 222.90 | 107-06-2 | | | 98.95 | 0.72 | 7.2E-10 | 0.000000 | 0.000000 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.0777 | | | 165.8300 | 0.0000 | 0.0000 | 165.83 | | 6.98 | 1386.920 | 217.53 | 127-18-4 | | | 165.83 | 1.1 | 1.1E-09 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.1298 | | | 92.1400 | 0.0000 | 0.0000 | 92.14 | | 6.954 | 1344.800 | 219.48 | 108-88-3 | | | 92.14 | 11.9 | 1.19E-08 | 0.000000 | 0.000000 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 1.0000 | 1.0000 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | | | | 18.00 | 999999919.6 | 0.9999999 | 0.055556 | 1.000000 | 18.0000 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8010 - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | **AP-42 EQUATIONS** | | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 2.6080 | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 2.6080 | lbs | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 91.8073 | | $V_V$ = | 91.8073 | cu ft | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | $W_V$ = | 0.0011 | lb / cu ft | | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | | $K_E$ = | 0.0744 | | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9544 | | $K_S$ = | 0.9544 | | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 91.8073 | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 91.8073 | cu ft | | | | |
| D = Tank Diameter (ft) | 5.3300 | | | | | | | | |
| $D_E$ = Effective Diameter (ft) | 6.6229 | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 6.6229 | ft | | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | 2.6650 | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 2.6650 | ft | | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | 6.4600 | | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | $W_V = M_V\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0000 | | $M_V$ = | 18.0000 | lb/lb-mole | | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | 517.9736 | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | 47.6792 | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | 10.7310 | | | | | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | 511.6892 | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | | |
| Tank Paint Solar Absorptance (Shell) | 0.8900 | | | 0.89 | | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | 1165.4120 | | | 1,165.412 | Btu/sqft d | | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0744 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | 40.7601 | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | 0.0000 | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | 0.0600 | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | 0.3384 | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | 517.9736 | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | 507.7836 | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.7836 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | 528.1636 | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | 16.2750 | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | |
|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9544 | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9544 | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | |
| Vapor Space Outage (ft) | 2.6650 | | | | | |
| *Working Losses (lb)* | 16.4363 | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 16.4363 | lbs | |
| $M_V$ = Vapor Molecular Weight | 18.0000 | | $M_V$ = | 18.0000 | lb/lb-mole | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3384 | | | | | |
| Q = Annual Net Throughput (gal/yr) | 500,000 | 1 bbl/yr = 42 US gal/yr | Q = | 11,904.76 | bbl/yr | |
| Annual Turnovers | 500.00 | | N = | 500.00 | | |
| $K_N$ = Turnover Factor | 0.2267 | $K_N = (180 + N)/6N$ | $K_N$ = | 0.2267 | | |
| Tank Diameter (ft) | 5.3300 | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | $K_P$ = | 1.00 | | |
| Total Losses (lb) | 19.0442 | | $L_T$ = | 19.0443 | lbs | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

for all other organic liquids, $K_P = 1$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8010 - Horizontal Tank**
**Buffalo, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 8010 Liquid | | | |
| Carbon tetrachloride | | | |
| Chloroform | | | |
| Trichloroethane (1,1,2) | | | |
| Trichloroethylene | | | |
| Tetrachloroethane(1,1,1,2) | | | |
| Dichloroethene(1,1) | | | |
| Ethylene dichloride | | | |
| Tetrachloroethylene | | | |
| Toluene | | | |
| Water | 16.44 | 2.61 | 19.04 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 16.43626 | 2.60804 | 19.04430 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 16.43626 | 2.60804 | 19.04430 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-8001 |
| City: | Buffalo |
| State: | New York |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Horizontal Tank |
| Description: | Cone Bottom |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 13.00 |
| Diameter (ft): | 8.00 |
| Volume (gallons): | 5,000.00 |
| Turnovers: | 200.00 |
| Net Throughput(gal/yr): | 1,000,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Red/Primer |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-8001 - Horizontal Tank**
**Buffalo, New York**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tank 8001 Liquid | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0025 | | | 18.00 | |
| Benzene | | | | | | 1.1140 | 0.8320 | 1.4713 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Methylene chloride | | | | | | 5.4129 | 4.2270 | 6.8607 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloro(1,1,2)trifluoroethane | | | | | | 4.2021 | 3.2712 | 5.3366 | 187.3800 | 0.0000 | 0.0000 | 187.38 | Option 2: A=6.88, B=1099.9, C=227.5 |
| Trichloroethane (1,1,1) | | | | | | 1.5780 | 1.1909 | 2.0704 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethylene | | | | | | 0.7781 | 0.5664 | 1.0511 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 7.8064 | 6.1950 | 9.7374 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9998 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-8001 - Horizontal Tank**
**Buffalo, New York**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 11.5611 |
| Vapor Space Volume (cu ft): | 416.2110 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0744 |
| Vented Vapor Saturation Factor: | 0.9331 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 416.2110 |
| Tank Diameter (ft): | 8.0000 |
| Effective Diameter (ft): | 11.5102 |
| Vapor Space Outage (ft): | 4.0000 |
| Tank Shell Length (ft): | 13.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0025 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 517.9736 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 511.6892 |
| Tank Paint Solar Absorptance (Shell): | 0.8900 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0744 |
| Daily Vapor Temperature Range (deg. R): | 40.7601 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg R): | 517.9736 |
| Daily Min. Liquid Surface Temp. (deg R): | 507.7836 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.1636 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9331 |
| Vapor Pressure at Daily Average Liquid: | |
| Surface Temperature (psia): | 0.3384 |
| Vapor Space Outage (ft): | 4.0000 |
| Working Losses (lb): | 45.9324 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0025 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Annual Net Throughput (gal/yr.): | 1,000,000.0000 |
| Annual Turnovers: | 200.0000 |
| Turnover Factor: | 0.3167 |
| Tank Diameter (ft): | 8.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 57.4934 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8001 - Horizontal Tank**
**Buffalo, New York**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Tank 8001 Liquid | 45.93 | 11.56 | 57.49 |
| Trichloro(1,1,2)trifluoroethane | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Water | 45.92 | 11.56 | 57.48 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-8002 |
| City: | Buffalo |
| State: | New York |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Horizontal Tank |
| Description: | Horizontal Tank |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 5.00 |
| Diameter (ft): | 4.00 |
| Volume (gallons): | 470.11 |
| Turnovers: | 2,127.18 |
| Net Throughput(gal/yr): | 1,000,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Red/Primer |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-8002 - Horizontal Tank**
**Buffalo, New York**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tank 8002 Liquid | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0025 | | | 18.00 | |
| Benzene | | | | | | 1.1140 | 0.8320 | 1.4713 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Methylene chloride | | | | | | 5.4129 | 4.2270 | 6.8607 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloro(1,1,2)trifluoroethane | | | | | | 4.2021 | 3.2712 | 5.3366 | 187.3800 | 0.0000 | 0.0000 | 187.38 | Option 2: A=6.88, B=1099.9, C=227.5 |
| Trichloroethane (1,1,1) | | | | | | 1.5780 | 1.1909 | 2.0704 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethylene | | | | | | 0.7781 | 0.5664 | 1.0511 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 7.8064 | 6.1950 | 9.7374 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9998 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8002 - Horizontal Tank**
**Buffalo, New York**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 1.1501 |
| Vapor Space Volume (cu ft): | 40.0203 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0744 |
| Vented Vapor Saturation Factor: | 0.9654 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 40.0203 |
| Tank Diameter (ft): | 4.0000 |
| Effective Diameter (ft): | 5.0475 |
| Vapor Space Outage (ft): | 2.0000 |
| Tank Shell Length (ft): | 5.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0025 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 517.9736 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 511.6892 |
| Tank Paint Solar Absorptance (Shell): | 0.8900 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0744 |
| Daily Vapor Temperature Range (deg. R): | 40.7601 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg R): | 517.9736 |
| Daily Min. Liquid Surface Temp. (deg R): | 507.7836 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.1636 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9654 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3384 |
| Vapor Space Outage (ft): | 2.0000 |
| Working Losses (lb): | 26.2206 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0025 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Annual Net Throughput (gal/yr.): | 1,000,000.0000 |
| Annual Turnovers: | 2,127.1844 |
| Turnover Factor: | 0.1808 |
| Tank Diameter (ft): | 4.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 27.3707 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8002 - Horizontal Tank**
**Buffalo, New York**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Tank 8002 Liquid | 26.22 | 1.15 | 27.37 |
| Trichloro(1,1,2)trifluoroethane | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Water | 26.22 | 1.15 | 27.37 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-8005 |
| City: | Buffalo |
| State: | New York |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Horizontal Tank |
| Description: | Horizontal Tank |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 6.25 |
| Diameter (ft): | 3.00 |
| Volume (gallons): | 300.00 |
| Turnovers: | 33.22 |
| Net Throughput(gal/yr): | 10,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Red/Primer |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-8005 - Horizontal Tank**
**Buffalo, New York**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-8005 | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0003 | | | 18.00 | |
| Trichloroethylene | | | | | | 0.7781 | 0.5664 | 1.0511 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 1.0000 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8005 - Horizontal Tank**
**Buffalo, New York**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 0.8156 |
| Vapor Space Volume (cu ft): | 28.1393 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0744 |
| Vented Vapor Saturation Factor: | 0.9738 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 28.1393 |
| Tank Diameter (ft): | 3.0000 |
| Effective Diameter (ft): | 4.8873 |
| Vapor Space Outage (ft): | 1.5000 |
| Tank Shell Length (ft): | 6.2500 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0003 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 517.9736 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 511.6892 |
| Tank Paint Solar Absorptance (Shell): | 0.8900 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0744 |
| Daily Vapor Temperature Range (deg. R): | 40.7601 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg R): | 517.9736 |
| Daily Min. Liquid Surface Temp. (deg R): | 507.7836 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.1636 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9738 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3384 |
| Vapor Space Outage (ft): | 1.5000 |
| Working Losses (lb): | 1.4503 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0003 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Annual Net Throughput (gal/yr.): | 10,000.0000 |
| Annual Turnovers: | 33.2226 |
| Turnover Factor: | 1.0000 |
| Tank Diameter (ft): | 3.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 2.2659 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8005 - Horizontal Tank**
**Buffalo, New York**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| T-8005 | 1.45 | 0.82 | 2.27 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Water | 1.45 | 0.82 | 2.27 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-8006 |
| City: | Buffalo |
| State: | New York |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Horizontal Tank |
| Description: | Horizontal Tank |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 6.25 |
| Diameter (ft): | 3.00 |
| Volume (gallons): | 300.00 |
| Turnovers: | 33.22 |
| Net Throughput(gal/yr): | 10,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Red/Primer |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8006 - Horizontal Tank**
**Buffalo, New York**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-8006 | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0066 | | | 18.00 | |
| Carbon tetrachloride | | | | | | 1.3843 | 1.0493 | 1.8035 | 153.8400 | 0.0001 | 0.0004 | 153.84 | Option 2: A=6.934, B=1242.43, C=230 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9999 | 0.9996 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8006 - Horizontal Tank**
**Buffalo, New York**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 0.8160 |
| Vapor Space Volume (cu ft): | 28.1393 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0744 |
| Vented Vapor Saturation Factor: | 0.9738 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 28.1393 |
| Tank Diameter (ft): | 3.0000 |
| Effective Diameter (ft): | 4.8873 |
| Vapor Space Outage (ft): | 1.5000 |
| Tank Shell Length (ft): | 6.2500 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0066 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 517.9736 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 511.6892 |
| Tank Paint Solar Absorptance (Shell): | 0.8900 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0744 |
| Daily Vapor Temperature Range (deg. R): | 40.7601 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg R): | 517.9736 |
| Daily Min. Liquid Surface Temp. (deg R): | 507.7836 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.1636 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9738 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3384 |
| Vapor Space Outage (ft): | 1.5000 |
| Working Losses (lb): | 1.4508 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0066 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Annual Net Throughput (gal/yr.): | 10,000.0000 |
| Annual Turnovers: | 33.2226 |
| Turnover Factor: | 1.0000 |
| Tank Diameter (ft): | 3.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 2.2668 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8006 - Horizontal Tank**
**Buffalo, New York**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| T-8006 | 1.45 | 0.82 | 2.27 |
| Carbon tetrachloride | 0.00 | 0.00 | 0.00 |
| Water | 1.45 | 0.82 | 2.27 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-8007 |
| City: | Buffalo |
| State: | New York |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Horizontal Tank |
| Description: | Horizontal Tank |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 5.00 |
| Diameter (ft): | 4.00 |
| Volume (gallons): | 470.02 |
| Turnovers: | 21.28 |
| Net Throughput(gal/yr): | 10,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Red/Primer |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-8007 - Horizontal Tank**
**Buffalo, New York**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tank 80007 Liquid | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0012 | | | 18.00 | |
| Chlorobenzene | | | | | | 0.1260 | 0.0884 | 0.1767 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Methylene chloride | | | | | | 5.4129 | 4.2270 | 6.8607 | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloro(1,1,2)trifluoroethane | | | | | | 4.2021 | 3.2712 | 5.3366 | 187.3800 | 0.0000 | 0.0000 | 187.38 | Option 2: A=6.88, B=1099.9, C=227.5 |
| Trichloroethane (1,1,1) | | | | | | 1.5780 | 1.1909 | 2.0704 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethylene | | | | | | 0.7781 | 0.5664 | 1.0511 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9999 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8007 - Horizontal Tank**
**Buffalo, New York**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 1.1500 |
| Vapor Space Volume (cu ft): | 40.0203 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0744 |
| Vented Vapor Saturation Factor: | 0.9654 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 40.0203 |
| Tank Diameter (ft): | 4.0000 |
| Effective Diameter (ft): | 5.0475 |
| Vapor Space Outage (ft): | 2.0000 |
| Tank Shell Length (ft): | 5.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0012 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 517.9736 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 511.6892 |
| Tank Paint Solar Absorptance (Shell): | 0.8900 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0744 |
| Daily Vapor Temperature Range (deg. R): | 40.7601 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg R): | 517.9736 |
| Daily Min. Liquid Surface Temp. (deg R): | 507.7836 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.1636 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9654 |
| Vapor Pressure at Daily Average Liquid: | |
| Surface Temperature (psia): | 0.3384 |
| Vapor Space Outage (ft): | 2.0000 |
| Working Losses (lb): | 1.4504 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0012 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Annual Net Throughput (gal/yr.): | 10,000.0000 |
| Annual Turnovers: | 21.2759 |
| Turnover Factor: | 1.0000 |
| Tank Diameter (ft): | 4.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 2.6004 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8007 - Horizontal Tank**
**Buffalo, New York**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Tank 80007 Liquid | 1.45 | 1.15 | 2.60 |
| Trichloro(1,1,2)trifluoroethane | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Water | 1.45 | 1.15 | 2.60 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-8008 |
| City: | Buffalo |
| State: | New York |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Horizontal Tank |
| Description: | Horizontal Tank |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 7.60 |
| Diameter (ft): | 3.50 |
| Volume (gallons): | 500.00 |
| Turnovers: | 2.00 |
| Net Throughput(gal/yr): | 1,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Red/Primer |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8008 - Horizontal Tank**
**Buffalo, New York**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0000 | | | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8008 - Horizontal Tank**
**Buffalo, New York**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 1.3441 |
| Vapor Space Volume (cu ft): | 46.5736 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0744 |
| Vented Vapor Saturation Factor: | 0.9696 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 46.5736 |
| Tank Diameter (ft): | 3.5000 |
| Effective Diameter (ft): | 5.8211 |
| Vapor Space Outage (ft): | 1.7500 |
| Tank Shell Length (ft): | 7.6000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 517.9736 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 511.6892 |
| Tank Paint Solar Absorptance (Shell): | 0.8900 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0744 |
| Daily Vapor Temperature Range (deg. R): | 40.7601 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg R): | 517.9736 |
| Daily Min. Liquid Surface Temp. (deg R): | 507.7836 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.1636 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9696 |
| Vapor Pressure at Daily Average Liquid: | |
| Surface Temperature (psia): | 0.3384 |
| Vapor Space Outage (ft): | 1.7500 |
| Working Losses (lb): | 0.1450 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Annual Net Throughput (gal/yr.): | 1,000.0000 |
| Annual Turnovers: | 2.0000 |
| Turnover Factor: | 1.0000 |
| Tank Diameter (ft): | 3.5000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 1.4891 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8008 - Horizontal Tank**
**Buffalo, New York**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Water | 0.15 | 1.34 | 1.49 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-8009 |
| City: | Buffalo |
| State: | New York |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Horizontal Tank |
| Description: | Horizontal Tank; Projected Volume |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 5.90 |
| Diameter (ft): | 4.10 |
| Volume (gallons): | 525.00 |
| Turnovers: | 952.38 |
| Net Throughput(gal/yr): | 500,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Red/Primer |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-8009 - Horizontal Tank**
**Buffalo, New York**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tank 8009 Liquid | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0019 | | | 18.00 | |
| Acetone | | | | | | 2.8026 | 2.1379 | 3.6292 | 58.0800 | 0.0000 | 0.0000 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Carbon tetrachloride | | | | | | 1.3843 | 1.0493 | 1.8035 | 153.8400 | 0.0000 | 0.0000 | 153.84 | Option 2: A=6.934, B=1242.43, C=230 |
| Chlorobenzene | | | | | | 0.1260 | 0.0884 | 0.1767 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 2.3281 | 1.7585 | 3.0372 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Methylene chloride | | | | | | 5.4129 | 4.2270 | 6.8607 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethane (1,1,2) | | | | | | 0.2315 | 0.1630 | 0.3232 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.7781 | 0.5664 | 1.0511 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 1.0000 | 0.9999 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8009 - Horizontal Tank**
**Buffalo, New York**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 1.4246 |
| Vapor Space Volume (cu ft): | 49.6147 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0744 |
| Vented Vapor Saturation Factor: | 0.9645 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 49.6147 |
| Tank Diameter (ft): | 4.1000 |
| Effective Diameter (ft): | 5.5512 |
| Vapor Space Outage (ft): | 2.0500 |
| Tank Shell Length (ft): | 5.9000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0019 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 517.9736 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 511.6892 |
| Tank Paint Solar Absorptance (Shell): | 0.8900 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0744 |
| Daily Vapor Temperature Range (deg. R): | 40.7601 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg R): | 517.9736 |
| Daily Min. Liquid Surface Temp. (deg R): | 507.7836 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.1636 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9645 |
| Vapor Pressure at Daily Average Liquid: | |
| Surface Temperature (psia): | 0.3384 |
| Vapor Space Outage (ft): | 2.0500 |
| Working Losses (lb): | 14.3714 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0019 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Annual Net Throughput (gal/yr.): | 500,000.0000 |
| Annual Turnovers: | 952.3810 |
| Turnover Factor: | 0.1982 |
| Tank Diameter (ft): | 4.1000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 15.7960 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8009 - Horizontal Tank**
**Buffalo, New York**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Tank 8009 Liquid | 14.37 | 1.42 | 15.80 |
| Acetone | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Carbon tetrachloride | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Water | 14.37 | 1.42 | 15.79 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-8010 |
| City: | Buffalo |
| State: | New York |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Horizontal Tank |
| Description: | Projected Volume |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 6.46 |
| Diameter (ft): | 5.33 |
| Volume (gallons): | 1,000.00 |
| Turnovers: | 500.00 |
| Net Throughput(gal/yr): | 500,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Red/Primer |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-8010 - Horizontal Tank**
**Buffalo, New York**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3384 | 0.3384 | 0.3384 | 18.0000 | | | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-8010 - Horizontal Tank**
**Buffalo, New York**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 2.6080 |
| Vapor Space Volume (cu ft): | 91.8073 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0744 |
| Vented Vapor Saturation Factor: | 0.9544 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 91.8073 |
| Tank Diameter (ft): | 5.3300 |
| Effective Diameter (ft): | 6.6229 |
| Vapor Space Outage (ft): | 2.6650 |
| Tank Shell Length (ft): | 6.4600 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 517.9736 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 511.6892 |
| Tank Paint Solar Absorptance (Shell): | 0.8900 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0744 |
| Daily Vapor Temperature Range (deg. R): | 40.7601 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3384 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3384 |
| Daily Avg. Liquid Surface Temp. (deg R): | 517.9736 |
| Daily Min. Liquid Surface Temp. (deg R): | 507.7836 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.1636 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9544 |
| Vapor Pressure at Daily Average Liquid: | |
| Surface Temperature (psia): | 0.3384 |
| Vapor Space Outage (ft): | 2.6650 |
| Working Losses (lb): | 16.4363 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3384 |
| Annual Net Throughput (gal/yr.): | 500,000.0000 |
| Annual Turnovers: | 500.0000 |
| Turnover Factor: | 0.2267 |
| Tank Diameter (ft): | 5.3300 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 19.0442 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-8010 - Horizontal Tank**
**Buffalo, New York**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Water | 16.44 | 2.61 | 19.04 |

# Attachment 10
# Sampling Results for Groundwater Storage Tanks

1550 Balmer Road
Model City, NY 14107
716-286-1550 Phone
716-286-0326 Fax

23 April 2013

Jill Banaszak
Environmental Monitoring
1550 Balmer Road
Model City, NY 14107

RE: T8000's
Work Order(s): 1304101

CERTIFICATES

NYSDOH LAB ID No.: 11383
U.S. EPA LAB CODE: NY01252

**CWM Chemical Services, LLC.** **Reported:** **04/23/13 10:30**

Client: Environmental Monitoring

Work Order(s): 1304101

**ANALYTICAL REPORT FOR SAMPLES**

| LabSample ID | Client Sample ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| 1304101-01 | T8005 | Aqueous | 04/22/13 10:15 | 04/22/13 11:21 |
| 1304101-02 | T8006 | Aqueous | 04/22/13 10:25 | 04/22/13 11:21 |
| 1304101-03 | T8007 | Aqueous | 04/22/13 10:58 | 04/22/13 11:21 |
| 1304101-04 | T8010 | Aqueous | 04/22/13 10:45 | 04/22/13 11:21 |

*All Quality Control associated with these samples met EPA or laboratory specifications unless noted.*

*The enclosed analytical results are representative of the sample as received by the laboratory. CWM Chemical Services Laboratory makes no representations or certifications as to the methods of sample collection, sample identification, or transportation handling procedures used prior to our receipt of samples. This report is intended for the sole use and benefit of Waste Management and it's companies. No representation concerning significance of the reported data is made to any person or entity. To the best of my knowledge, the information contained in this report is accurate and complete. All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.*

*According to Sample Collection Requirements for Non-Potable Water located in the ELAP Certification Manual, pH analysis is required within 15 minutes of sample collection. Analysis is generally not completed within 15 minutes, but as soon as possible after laboratory receipt.*

Approved By: _____.

Title: QA/QC Coordinator

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/22/13 10:15 |
| Work Order: | 1304101 | Project #: | CWM | Received: | 04/22/13 11:21 |
| Lab Sample ID: | 1304101-01RE1 | Client Sample ID: | T8005 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| Chloromethane | ND | | 1000 | ug/L | 04/22/13 | LD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LD | " |
| Bromomethane | ND | | 1000 | " | " | LD | " |
| Chloroethane | ND | | 1000 | " | " | LD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LD | " |
| Diethyl ether | ND | | 1000 | " | " | LD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1000 | " | " | LD | " |
| Acetone | ND | | 1000 | " | " | LD | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | LD | " |
| Methylene chloride | ND | | 1000 | " | " | LD | " |
| Carbon disulfide | ND | | 1000 | " | " | LD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LD | " |
| Vinyl acetate | ND | | 1000 | " | " | LD | " |
| 2-Butanone | ND | | 1000 | " | " | LD | " |
| Ethyl acetate | ND | | 1000 | " | " | LD | " |
| Chloroform | ND | | 1000 | " | " | LD | " |
| 1,1,1-Trichloroethane | ND | | 1000 | " | " | LD | " |
| Carbon tetrachloride | ND | | 1000 | " | " | LD | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | LD | " |
| Benzene | ND | | 1000 | " | " | LD | " |
| **Trichloroethene** | **7010** | | 1000 | " | " | LD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LD | " |
| 2-Chloroethylvinyl ether | ND | | 1000 | " | " | LD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LD | " |
| Toluene | ND | | 1000 | " | " | LD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LD | " |
| 1,1,2-Trichloroethane | ND | | 1000 | " | " | LD | " |
| 2-Hexanone | ND | | 1000 | " | " | LD | " |
| Tetrachloroethene | ND | | 1000 | " | " | LD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LD | " |
| Chlorobenzene | ND | | 1000 | " | " | LD | " |
| Ethylbenzene | ND | | 1000 | " | " | LD | " |
| Xylenes, total | ND | | 3000 | " | " | LD | " |
| Styrene | ND | | 1000 | " | " | LD | " |
| Bromoform | ND | | 1000 | " | " | LD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | LD | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | LD | " |
| 1,4-Dichlorobenzene | ND | | 1000 | " | " | LD | " |
| 1,2-Dichlorobenzene | ND | | 1000 | " | " | LD | " |
| *Surrogate: 1,2-Dichloroethane-d4* | *107 %* | | *85-120* | | *"* | LD | *"* |
| *Surrogate: Toluene-d8* | *105 %* | | *85-115* | | *"* | LD | *"* |
| *Surrogate: 4-Bromofluorobenzene* | *98.3 %* | | *85-115* | | *"* | LD | *"* |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/22/13 10:25 |
| Work Order: | 1304101 | Project #: | CWM | Received: | 04/22/13 11:21 |
| Lab Sample ID: | 1304101-02 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| Chloromethane | ND | | 10000 | ug/L | 04/22/13 | LD | EPA 8260C |
| Vinyl chloride | ND | | 10000 | " | " | LD | " |
| Bromomethane | ND | | 10000 | " | " | LD | " |
| Chloroethane | ND | | 10000 | " | " | LD | " |
| Trichlorofluoromethane | ND | | 10000 | " | " | LD | " |
| Diethyl ether | ND | | 10000 | " | " | LD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 10000 | " | " | LD | " |
| Acetone | ND | | 10000 | " | " | LD | " |
| 1,1-Dichloroethene | ND | | 10000 | " | " | LD | " |
| Methylene chloride | ND | | 10000 | " | " | LD | " |
| Carbon disulfide | ND | | 10000 | " | " | LD | " |
| trans-1,2-Dichloroethene | ND | | 10000 | " | " | LD | " |
| 1,1-Dichloroethane | ND | | 10000 | " | " | LD | " |
| Vinyl acetate | ND | | 10000 | " | " | LD | " |
| 2-Butanone | ND | | 10000 | " | " | LD | " |
| Ethyl acetate | ND | | 10000 | " | " | LD | " |
| Chloroform | ND | | 10000 | " | " | LD | " |
| 1,1,1-Trichloroethane | ND | | 10000 | " | " | LD | " |
| **Carbon tetrachloride** | **102000** | | 10000 | " | " | LD | " |
| 1,2-Dichloroethane | ND | | 10000 | " | " | LD | " |
| Benzene | ND | | 10000 | " | " | LD | " |
| Trichloroethene | ND | | 10000 | " | " | LD | " |
| 1,2-Dichloropropane | ND | | 10000 | " | " | LD | " |
| Bromodichloromethane | ND | | 10000 | " | " | LD | " |
| 2-Chloroethylvinyl ether | ND | | 10000 | " | " | LD | " |
| 4-Methyl-2-pentanone | ND | | 10000 | " | " | LD | " |
| cis-1,3-Dichloropropene | ND | | 10000 | " | " | LD | " |
| Toluene | ND | | 10000 | " | " | LD | " |
| trans-1,3-Dichloropropene | ND | | 10000 | " | " | LD | " |
| 1,1,2-Trichloroethane | ND | | 10000 | " | " | LD | " |
| 2-Hexanone | ND | | 10000 | " | " | LD | " |
| Tetrachloroethene | ND | | 10000 | " | " | LD | " |
| Dibromochloromethane | ND | | 10000 | " | " | LD | " |
| Chlorobenzene | ND | | 10000 | " | " | LD | " |
| Ethylbenzene | ND | | 10000 | " | " | LD | " |
| Xylenes, total | ND | | 30000 | " | " | LD | " |
| Styrene | ND | | 10000 | " | " | LD | " |
| Bromoform | ND | | 10000 | " | " | LD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 10000 | " | " | LD | " |
| 1,3-Dichlorobenzene | ND | | 10000 | " | " | LD | " |
| 1,4-Dichlorobenzene | ND | | 10000 | " | " | LD | " |
| 1,2-Dichlorobenzene | ND | | 10000 | " | " | LD | " |
| *Surrogate: 1,2-Dichloroethane-d4* | *111 %* | | *85-120* | | " | LD | " |
| *Surrogate: Toluene-d8* | *108 %* | | *85-115* | | " | LD | " |
| *Surrogate: 4-Bromofluorobenzene* | *102 %* | | *85-115* | | " | LD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/22/13 10:58 |
| Work Order: | 1304101 | Project #: | CWM | Received: | 04/22/13 11:21 |
| Lab Sample ID: | 1304101-03RE1 | Client Sample ID: | T8007 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| Chloromethane | ND | | 1000 | ug/L | 04/22/13 | LD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LD | " |
| Bromomethane | ND | | 1000 | " | " | LD | " |
| Chloroethane | ND | | 1000 | " | " | LD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LD | " |
| Diethyl ether | ND | | 1000 | " | " | LD | " |
| **1,1,2-Trichloro-1,2,2-trifluoroethane** | **1080** | | 1000 | " | " | LD | " |
| Acetone | ND | | 1000 | " | " | LD | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | LD | " |
| **Methylene chloride** | **2890** | | 1000 | " | " | LD | " |
| Carbon disulfide | ND | | 1000 | " | " | LD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LD | " |
| Vinyl acetate | ND | | 1000 | " | " | LD | " |
| 2-Butanone | ND | | 1000 | " | " | LD | " |
| Ethyl acetate | ND | | 1000 | " | " | LD | " |
| Chloroform | ND | | 1000 | " | " | LD | " |
| **1,1,1-Trichloroethane** | **1740** | | 1000 | " | " | LD | " |
| Carbon tetrachloride | ND | | 1000 | " | " | LD | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | LD | " |
| Benzene | ND | | 1000 | " | " | LD | " |
| **Trichloroethene** | **3840** | | 1000 | " | " | LD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LD | " |
| 2-Chloroethylvinyl ether | ND | | 1000 | " | " | LD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LD | " |
| Toluene | ND | | 1000 | " | " | LD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LD | " |
| 1,1,2-Trichloroethane | ND | | 1000 | " | " | LD | " |
| 2-Hexanone | ND | | 1000 | " | " | LD | " |
| Tetrachloroethene | ND | | 1000 | " | " | LD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LD | " |
| **Chlorobenzene** | **2980** | | 1000 | " | " | LD | " |
| Ethylbenzene | ND | | 1000 | " | " | LD | " |
| Xylenes, total | ND | | 3000 | " | " | LD | " |
| Styrene | ND | | 1000 | " | " | LD | " |
| Bromoform | ND | | 1000 | " | " | LD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | LD | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | LD | " |
| **1,4-Dichlorobenzene** | **3140** | | 1000 | " | " | LD | " |
| **1,2-Dichlorobenzene** | **12900** | | 1000 | " | " | LD | " |
| *Surrogate: 1,2-Dichloroethane-d4* | *107 %* | | *85-120* | | *"* | LD | *"* |
| *Surrogate: Toluene-d8* | *105 %* | | *85-115* | | *"* | LD | *"* |
| *Surrogate: 4-Bromofluorobenzene* | *97.5 %* | | *85-115* | | *"* | LD | *"* |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/22/13 10:45 |
| Work Order: | 1304101 | Project #: | CWM | Received: | 04/22/13 11:21 |
| Lab Sample ID: | 1304101-04RE1 | Client Sample ID: | T8010 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| Chloromethane | ND | | 100 | ug/L | 04/22/13 | LD | EPA 8260C |
| Vinyl chloride | ND | | 100 | " | " | LD | " |
| Bromomethane | ND | | 100 | " | " | LD | " |
| Chloroethane | ND | | 100 | " | " | LD | " |
| Trichlorofluoromethane | ND | | 100 | " | " | LD | " |
| Diethyl ether | ND | | 100 | " | " | LD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 100 | " | " | LD | " |
| Acetone | ND | | 100 | " | " | LD | " |
| 1,1-Dichloroethene | ND | | 100 | " | " | LD | " |
| Methylene chloride | ND | | 100 | " | " | LD | " |
| Carbon disulfide | ND | | 100 | " | " | LD | " |
| trans-1,2-Dichloroethene | ND | | 100 | " | " | LD | " |
| 1,1-Dichloroethane | ND | | 100 | " | " | LD | " |
| Vinyl acetate | ND | | 100 | " | " | LD | " |
| 2-Butanone | ND | | 100 | " | " | LD | " |
| Ethyl acetate | ND | | 100 | " | " | LD | " |
| Chloroform | ND | | 100 | " | " | LD | " |
| 1,1,1-Trichloroethane | ND | | 100 | " | " | LD | " |
| Carbon tetrachloride | ND | | 100 | " | " | LD | " |
| 1,2-Dichloroethane | ND | | 100 | " | " | LD | " |
| Benzene | ND | | 100 | " | " | LD | " |
| Trichloroethene | ND | | 100 | " | " | LD | " |
| 1,2-Dichloropropane | ND | | 100 | " | " | LD | " |
| Bromodichloromethane | ND | | 100 | " | " | LD | " |
| 2-Chloroethylvinyl ether | ND | | 100 | " | " | LD | " |
| 4-Methyl-2-pentanone | ND | | 100 | " | " | LD | " |
| cis-1,3-Dichloropropene | ND | | 100 | " | " | LD | " |
| Toluene | ND | | 100 | " | " | LD | " |
| trans-1,3-Dichloropropene | ND | | 100 | " | " | LD | " |
| 1,1,2-Trichloroethane | ND | | 100 | " | " | LD | " |
| 2-Hexanone | ND | | 100 | " | " | LD | " |
| Tetrachloroethene | ND | | 100 | " | " | LD | " |
| Dibromochloromethane | ND | | 100 | " | " | LD | " |
| Chlorobenzene | ND | | 100 | " | " | LD | " |
| Ethylbenzene | ND | | 100 | " | " | LD | " |
| Xylenes, total | ND | | 300 | " | " | LD | " |
| Styrene | ND | | 100 | " | " | LD | " |
| Bromoform | ND | | 100 | " | " | LD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 100 | " | " | LD | " |
| 1,3-Dichlorobenzene | ND | | 100 | " | " | LD | " |
| 1,4-Dichlorobenzene | ND | | 100 | " | " | LD | " |
| 1,2-Dichlorobenzene | ND | | 100 | " | " | LD | " |
| *Surrogate: 1,2-Dichloroethane-d4* | *106 %* | | *85-120* | | *"* | LD | *"* |
| *Surrogate: Toluene-d8* | *103 %* | | *85-115* | | *"* | LD | *"* |
| *Surrogate: 4-Bromofluorobenzene* | *96.5 %* | | *85-115* | | *"* | LD | *"* |

## Notes and Definitions

| | |
|---|---|
| ND | Analyte NOT DETECTED at or above the reporting limit |
| dry | Sample results reported on a dry weight basis |

T-8004

**January 2012 - rev. 0**

Base Wastewater Sampling (GW Collection System T-8001 111025037CWM.xls, T80( 1208026-01

| Parameter | Units | Analytical Method | SLF3 System T-8004 10/20/2011 | SLF3 System T-8004 08/08/2012 | T-8004 |
|---|---|---|---|---|---|
| Mercury, Total | ng/L | 1631 | 6.9 | <25 | |
| | | | | | |
| Arsenic, dissolved | mg/L | 200.7F | <0.005 | | |
| Mercury, dissolved | mg/L | 1631 | | | |
| Zinc, dissolved | mg/L | 200.7F | 0.267 | | |
| Phenolic, Total | mg/L | 420.4, 420.1 | | | |
| **Volatile Organic Compounds - Purgeables (10)** | | | | | |
| Chloromethane | µg/L | 8260C | <2500 | <2500 | <2500 |
| Vinyl Chloride | µg/L | 8260C | <2500 | <2500 | <2500 |
| Bromomethane | µg/L | 8260C | <2500 | <2500 | <2500 |
| Chloroethane | µg/L | 8260C | <2500 | <2500 | <2500 |
| Trichlorofluorometha | µg/L | 8260C | <2500 | <2500 | <2500 |
| Diethyl ether | µg/L | 8260C | <2500 | <2500 | <2500 |
| 1,1,2-Trichloro-1,2,2-t | µg/L | 8260C | <2500 | <2500 | <2500 |
| Acetone | µg/L | 8260C | <2500 | <2500 | <2500 |
| 1,1-Dichloroethene | µg/L | 8260C | <2500 | <2500 | <2500 |
| Methylene chloride | µg/L | 8260C | 13300 | 5450 | 3430 |
| Carbon disulfide | µg/L | 8260C | <2500 | <2500 | <2500 |
| trans-1,2-Dichlorethe | µg/L | 8260C | <2500 | <2500 | <2500 |
| 1,1-Dichloroethane | µg/L | 8260C | <2500 | <2500 | <2500 |
| Vinyl acetate | µg/L | 8260C | <2500 | <2500 | <2500 |
| 2-Butanone | µg/L | 8260C | <2500 | <2500 | <2500 |
| Ethyl acetate | µg/L | 8260C | <2500 | <2500 | <2500 |
| Chloroform | µg/L | 8260C | <2500 | <2500 | <2500 |
| 1,1,1-Trichloroethane | µg/L | 8260C | 23800 | 14300 | 16400 |
| Carbon tetrachloride | µg/L | 8260C | <2500 | <2500 | <2500 |
| 1,2-Dichloroethane | µg/L | 8260C | <2500 | <2500 | <2500 |
| Benzene | µg/L | 8260C | <2500 | <2500 | <2500 |
| Trichloroethene | µg/L | 8260C | 7280 | 4260 | 3480 |
| 1,2-Dichlropropane | µg/L | 8260C | <2500 | <2500 | <2500 |
| Bromodichlorometha | µg/L | 8260C | <2500 | <2500 | <2500 |
| 2-Chloroethylvinyl eth | µg/L | 8260C | <2500 | <2500 | <2500 |
| 4-Methyl-2-pentanon | µg/L | 8260C | <2500 | <2500 | <2500 |
| cis-1,3-Dichloroprope | µg/L | 8260C | <2500 | <2500 | <2500 |
| Toluene | µg/L | 8260C | 5460 | 4270 | 3950 |
| trans-1,3-Dichloropro | µg/L | 8260C | <2500 | <2500 | <2500 |
| 1,1,2-Trichloroethane | µg/L | 8260C | <2500 | <2500 | <2500 |
| 2-Hexanone | µg/L | 8260C | <2500 | <2500 | <2500 |
| Tetrachloroethene | µg/L | 8260C | <2500 | <2500 | <2500 |
| Dibromochlorometha | µg/L | 8260C | <2500 | <2500 | <2500 |
| Chlorobenzene | µg/L | 8260C | <2500 | <2500 | <2500 |
| Ethylbenezene | µg/L | 8260C | <2500 | <2500 | <2500 |
| Xylenes, total | µg/L | 8260C | 9550 | 8820 | <7500 |
| Styrene | µg/L | 8260C | <2500 | <2500 | <2500 |
| Bromoform | µg/L | 8260C | <2500 | <2500 | <2500 |
| 1,1,2,2-Tetrachloroeth | µg/L | 8260C | <2500 | <2500 | <2500 |
| 1,3-Dichlorobenzene | µg/L | 8260C | <2500 | <2500 | <2500 |
| 1,4-Dichlorobenzene | µg/L | 8260C | <2500 | <2500 | <2500 |
| 1,2-Dichlorobenzene | µg/L | 8260C | <2500 | <2500 | <2500 |

1242 5630 476 — mg/L

**Client Sample ID: EW12**
**Date Collected: 09/29/14 10:00**
**Date Received: 09/29/14 13:05**

**Lab Sample ID: 480-68230-7**
**Matrix: Ground Water**

## Method: 8260C - Volatile Organic Compounds by GC/MS

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **1,1,1-Trichloroethane** | **12000** | | 5000 | 820 | ug/L | | | 10/09/14 19:05 | 1 |
| **1,1,2,2-Tetrachloroethane** | **7300** | | 5000 | 210 | ug/L | | | 10/09/14 19:05 | 1 |
| **1,1,2-Trichloroethane** | **880** | **J** | 5000 | 230 | ug/L | | | 10/09/14 19:05 | 1 |
| 1,1-Dichloroethane | ND | | 5000 | 380 | ug/L | | | 10/09/14 19:05 | 1 |
| **1,1-Dichloroethene** | **1600** | **J** | 5000 | 290 | ug/L | | | 10/09/14 19:05 | 1 |
| **1,2-Dichlorobenzene** | **4300** | **J** | 5000 | 790 | ug/L | | | 10/09/14 19:05 | 1 |
| **1,2-Dichloroethane** | **400** | **J** | 5000 | 210 | ug/L | | | 10/09/14 19:05 | 1 |
| 1,2-Dichloropropane | ND | | 5000 | 720 | ug/L | | | 10/09/14 19:05 | 1 |
| **Benzene** | **600** | **J** | 5000 | 410 | ug/L | | | 10/09/14 19:05 | 1 |
| Bromoform | ND | | 5000 | 260 | ug/L | | | 10/09/14 19:05 | 1 |
| Bromomethane | ND | | 5000 | 690 | ug/L | | | 10/09/14 19:05 | 1 |
| Carbon tetrachloride | ND | | 5000 | 270 | ug/L | | | 10/09/14 19:05 | 1 |
| **Chlorobenzene** | **2500** | **J** | 5000 | 750 | ug/L | | | 10/09/14 19:05 | 1 |
| Dibromochloromethane | ND | | 5000 | 320 | ug/L | | | 10/09/14 19:05 | 1 |
| Chloroethane | ND | | 5000 | 320 | ug/L | | | 10/09/14 19:05 | 1 |
| **Chloroform** | **1100** | **J** | 5000 | 340 | ug/L | | | 10/09/14 19:05 | 1 |
| Chloromethane | ND | | 5000 | 350 | ug/L | | | 10/09/14 19:05 | 1 |
| Bromodichloromethane | ND | | 5000 | 390 | ug/L | | | 10/09/14 19:05 | 1 |
| **Ethylbenzene** | **2400** | **J** | 5000 | 740 | ug/L | | | 10/09/14 19:05 | 1 |
| **Methylene Chloride** | **29000** | | 5000 | 440 | ug/L | | | 10/09/14 19:05 | 1 |
| **Tetrachloroethene** | **37000** | | 5000 | 360 | ug/L | | | 10/09/14 19:05 | 1 |
| **Toluene** | **10000** | | 5000 | 510 | ug/L | | | 10/09/14 19:05 | 1 |
| trans-1,2-Dichloroethene | ND | | 5000 | 900 | ug/L | | | 10/09/14 19:05 | 1 |
| trans-1,3-Dichloropropene | ND | | 5000 | 370 | ug/L | | | 10/09/14 19:05 | 1 |
| **Trichloroethene** | **18000** | | 5000 | 460 | ug/L | | | 10/09/14 19:05 | 1 |
| **Vinyl chloride** | **1200** | **J** | 5000 | 900 | ug/L | | | 10/09/14 19:05 | 1 |
| cis-1,3-Dichloropropene | ND | | 5000 | 360 | ug/L | | | 10/09/14 19:05 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *105* | | *66 - 137* | | *10/09/14 19:05* | *1* |
| *4-Bromofluorobenzene (Surr)* | *99* | | *73 - 120* | | *10/09/14 19:05* | *1* |
| *Toluene-d8 (Surr)* | *98* | | *71 - 126* | | *10/09/14 19:05* | *1* |

## Method: 8270D - Semivolatile Organic Compounds (GC/MS)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **1,2,4-Trichlorobenzene** | **470** | **J** | 10000 | 440 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 1,3-Dichlorobenzene | ND | | 10000 | 480 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 1,4-Dichlorobenzene | ND | | 10000 | 460 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2,4,5-Trichlorophenol | ND | | 5000 | 480 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2,4,6-Trichlorophenol | ND | | 5000 | 610 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2,4-Dichlorophenol | ND | | 5000 | 510 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2,4-Dimethylphenol | ND | | 5000 | 500 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2,4-Dinitrophenol | ND | | 10000 | 2200 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2,4-Dinitrotoluene | ND | | 5000 | 450 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2,6-Dinitrotoluene | ND | | 5000 | 400 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2-Chloronaphthalene | ND | | 5000 | 460 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2-Chlorophenol | ND | | 5000 | 530 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2-Methylnaphthalene | ND | | 5000 | 600 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2-Methylphenol | ND | | 5000 | 400 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 2-Nitroaniline | ND | | 10000 | 420 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GW EXT SYS - Even

TestAmerica Job ID: 480-68230-1

**Client Sample ID: EW12**
**Date Collected: 09/29/14 10:00**
**Date Received: 09/29/14 13:05**

**Lab Sample ID: 480-68230-7**
**Matrix: Ground Water**

**Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2-Nitrophenol | ND | | 5000 | 480 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 3,3'-Dichlorobenzidine | ND | | 5000 | 400 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 3-Nitroaniline | ND | * | 10000 | 480 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 4,6-Dinitro-2-methylphenol | ND | | 10000 | 2200 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 4-Bromophenyl phenyl ether | ND | | 5000 | 450 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 4-Chloro-3-methylphenol | ND | | 5000 | 450 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 4-Chloroaniline | ND | * | 5000 | 590 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 4-Chlorophenyl phenyl ether | ND | | 5000 | 350 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 4-Methylphenol | ND | | 10000 | 360 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 4-Nitroaniline | ND | * | 10000 | 250 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| 4-Nitrophenol | ND | | 10000 | 1500 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Acenaphthene | ND | | 5000 | 410 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Acenaphthylene | ND | | 5000 | 380 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Anthracene | ND | | 5000 | 280 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Benzo[a]anthracene | ND | | 5000 | 360 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Benzo[a]pyrene | ND | | 5000 | 470 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Benzo[b]fluoranthene | ND | | 5000 | 340 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Benzo[g,h,i]perylene | ND | | 5000 | 350 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Benzo[k]fluoranthene | ND | | 5000 | 730 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Benzoic acid | ND | * | 150000 | 100000 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Benzyl alcohol | ND | | 20000 | 440 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Bis(2-chloroethoxy)methane | ND | | 5000 | 350 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Bis(2-chloroethyl)ether | ND | | 5000 | 400 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Bis(2-ethylhexyl) phthalate | ND | | 5000 | 1800 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Butyl benzyl phthalate | ND | | 5000 | 420 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Chrysene | ND | | 5000 | 330 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Dibenz(a,h)anthracene | ND | | 5000 | 420 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Dibenzofuran | ND | | 10000 | 510 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| **Diethyl phthalate** | **240** | **J** | 5000 | 220 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Dimethyl phthalate | ND | | 5000 | 360 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Di-n-butyl phthalate | ND | | 5000 | 310 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Di-n-octyl phthalate | ND | | 5000 | 470 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Fluoranthene | ND | | 5000 | 400 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Fluorene | ND | | 5000 | 360 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Hexachlorobenzene | ND | | 5000 | 510 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Hexachlorobutadiene | ND | | 5000 | 680 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Hexachlorocyclopentadiene | ND | | 5000 | 590 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Hexachloroethane | ND | | 5000 | 590 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Indeno[1,2,3-cd]pyrene | ND | | 5000 | 470 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Isophorone | ND | | 5000 | 430 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Naphthalene | ND | | 5000 | 760 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Nitrobenzene | ND | | 5000 | 290 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| N-Nitrosodimethylamine | ND | | 10000 | 2200 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| N-Nitrosodi-n-propylamine | ND | | 5000 | 540 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| N-Nitrosodiphenylamine | ND | | 5000 | 510 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Pentachlorophenol | ND | | 10000 | 2200 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| **Phenanthrene** | **500** | **J B** | 5000 | 440 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Phenol | ND | | 5000 | 390 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |
| Pyrene | ND | | 5000 | 340 | ug/L | | 10/02/14 15:39 | 10/18/14 17:05 | 1 |

## Client Sample ID: EW12
**Date Collected: 09/29/14 10:00**
**Date Received: 09/29/14 13:05**

## Lab Sample ID: 480-68230-7
**Matrix: Ground Water**

| Surrogate | %Recovery | Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| *2,4,6-Tribromophenol (Surr)* | *107* | | *52 - 132* | *10/02/14 15:39* | *10/18/14 17:05* | *1* |
| *2,4,6-Tribromophenol (Surr)* | *85* | | *52 - 132* | *10/02/14 15:39* | *10/23/14 13:19* | *1* |
| *2-Fluorobiphenyl* | *85* | | *48 - 120* | *10/02/14 15:39* | *10/18/14 17:05* | *1* |
| *2-Fluorobiphenyl* | *78* | | *48 - 120* | *10/02/14 15:39* | *10/23/14 13:19* | *1* |
| *2-Fluorophenol (Surr)* | *88* | | *20 - 120* | *10/02/14 15:39* | *10/18/14 17:05* | *1* |
| *2-Fluorophenol (Surr)* | *80* | | *20 - 120* | *10/02/14 15:39* | *10/23/14 13:19* | *1* |
| *Nitrobenzene-d5 (Surr)* | *83* | | *46 - 120* | *10/02/14 15:39* | *10/18/14 17:05* | *1* |
| *Nitrobenzene-d5 (Surr)* | *78* | | *46 - 120* | *10/02/14 15:39* | *10/23/14 13:19* | *1* |
| *Phenol-d5 (Surr)* | *54* | | *16 - 120* | *10/02/14 15:39* | *10/18/14 17:05* | *1* |
| *Phenol-d5 (Surr)* | *51* | | *16 - 120* | *10/02/14 15:39* | *10/23/14 13:19* | *1* |
| *p-Terphenyl-d14 (Surr)* | *103* | | *67 - 150* | *10/02/14 15:39* | *10/18/14 17:05* | *1* |
| *p-Terphenyl-d14 (Surr)* | *93* | | *67 - 150* | *10/02/14 15:39* | *10/23/14 13:19* | *1* |

### Method: 8081B - Organochlorine Pesticides (GC)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 4,4'-DDD | ND | | 50 | 9.2 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **4,4'-DDE** | **17** | **J** | 50 | 12 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **4,4'-DDT** | **69** | **B** | 50 | 11 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| Alachlor | ND | | 50 | 7.9 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **Aldrin** | **43** | **J** | 50 | 8.1 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **alpha-BHC** | **77** | **B** | 50 | 7.7 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| alpha-Chlordane | ND | | 50 | 15 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **beta-BHC** | **31** | **J B** | 50 | 25 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| Chlordane (technical) | ND | | 500 | 290 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **delta-BHC** | **13** | **J B** | 50 | 10 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| Dieldrin | ND | | 50 | 9.8 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **Endosulfan I** | **20** | **J** | 50 | 11 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| Endosulfan II | ND | | 50 | 12 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| Endosulfan sulfate | ND | | 50 | 16 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| Endrin | ND | | 50 | 14 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **Endrin aldehyde** | **23** | **J B** | 50 | 16 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **gamma-BHC (Lindane)** | **32** | **J B** | 50 | 8.0 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **gamma-Chlordane** | **31** | **J B** | 50 | 11 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **Heptachlor** | **130** | | 50 | 8.5 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| **Heptachlor epoxide** | **63** | | 50 | 7.4 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |
| Toxaphene | ND | | 500 | 120 | ug/L | | 10/07/14 14:56 | 10/08/14 16:45 | 1 |

| Surrogate | %Recovery | Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| *DCB Decachlorobiphenyl* | *31* | | *20 - 120* | *10/07/14 14:56* | *10/08/14 16:45* | *1* |
| *Tetrachloro-m-xylene* | *75* | | *36 - 120* | *10/07/14 14:56* | *10/08/14 16:45* | *1* |

### Method: 8081B - Organochlorine Pesticides (GC) - RE

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 4,4'-DDD | ND | H | 50 | 9.2 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| 4,4'-DDE | ND | H | 50 | 12 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| 4,4'-DDT | ND | H | 50 | 11 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| Alachlor | ND | H | 50 | 7.9 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| Aldrin | ND | H | 50 | 8.1 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| **alpha-BHC** | **45** | **J H B** | 50 | 7.7 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| alpha-Chlordane | ND | H | 50 | 15 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| beta-BHC | ND | H | 50 | 25 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |

## Client Sample ID: EW12

**Date Collected: 09/29/14 10:00**
**Date Received: 09/29/14 13:05**

## Lab Sample ID: 480-68230-7

**Matrix: Ground Water**

### Method: 8081B - Organochlorine Pesticides (GC) - RE (Continued)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Chlordane (technical) | ND | H | 500 | 290 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| **delta-BHC** | **57** | **H** | 50 | 10 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| Dieldrin | ND | H | 50 | 9.8 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| Endosulfan I | ND | H | 50 | 11 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| Endosulfan II | ND | H | 50 | 12 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| Endosulfan sulfate | ND | H | 50 | 16 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| Endrin | ND | H | 50 | 14 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| **Endrin aldehyde** | **28** | **J H** | 50 | 16 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| **gamma-BHC (Lindane)** | **57** | **H** | 50 | 8.0 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| gamma-Chlordane | ND | H | 50 | 11 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| Heptachlor | ND | H | 50 | 8.5 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| Heptachlor epoxide | ND | H | 50 | 7.4 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |
| Toxaphene | ND | H | 500 | 120 | ug/L | | 10/17/14 13:20 | 10/18/14 11:37 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *DCB Decachlorobiphenyl* | *75* | | *20 - 120* | *10/17/14 13:20* | *10/18/14 11:37* | *1* |
| *Tetrachloro-m-xylene* | *89* | | *36 - 120* | *10/17/14 13:20* | *10/18/14 11:37* | *1* |

### Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| PCB-1016 | ND | | 500 | 180 | ug/L | | 10/11/14 08:22 | 10/13/14 10:56 | 1 |
| PCB-1221 | ND | | 500 | 180 | ug/L | | 10/11/14 08:22 | 10/13/14 10:56 | 1 |
| PCB-1232 | ND | | 500 | 180 | ug/L | | 10/11/14 08:22 | 10/13/14 10:56 | 1 |
| **PCB-1242** | **2500** | | 500 | 180 | ug/L | | 10/11/14 08:22 | 10/13/14 10:56 | 1 |
| PCB-1248 | ND | | 500 | 180 | ug/L | | 10/11/14 08:22 | 10/13/14 10:56 | 1 |
| PCB-1254 | ND | | 500 | 250 | ug/L | | 10/11/14 08:22 | 10/13/14 10:56 | 1 |
| PCB-1260 | ND | | 500 | 250 | ug/L | | 10/11/14 08:22 | 10/13/14 10:56 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *Tetrachloro-m-xylene* | *88* | | *23 - 127* | *10/11/14 08:22* | *10/13/14 10:56* | *1* |
| *DCB Decachlorobiphenyl* | *73* | | *19 - 126* | *10/11/14 08:22* | *10/13/14 10:56* | *1* |

### Method: 6010C - Metals (ICP)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Silver | ND | | 6.0 | 1.7 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| Arsenic | ND | | 15.0 | 5.6 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| Beryllium | ND | | 2.0 | 0.30 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| Cadmium | ND | | 2.0 | 0.50 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| Chromium | ND | | 4.0 | 1.0 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| Copper | ND | | 10.0 | 1.6 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| Nickel | ND | | 10.0 | 1.3 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| Lead | ND | | 10.0 | 3.0 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| Antimony | ND | | 20.0 | 6.8 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| Selenium | ND | | 25.0 | 8.7 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| Thallium | ND | | 20.0 | 10.2 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |
| **Zinc** | **4.7** | **J** | 10.0 | 1.5 | mg/L | | 10/02/14 08:10 | 10/03/14 18:10 | 1000 |

### Method: 7470A - Mercury (CVAA)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Mercury | ND | | 0.20 | 0.12 | mg/L | | 10/03/14 07:40 | 10/03/14 10:52 | 1000 |

1550 Balmer Road
Model City, NY 14107
716-286-1550 Phone
716-286-0326 Fax

28 October 2014

Jill Banaszak
Environmental Monitoring
1550 Balmer Road
Model City, NY 14107

RE: T8000's
Work Order(s): 1410076

CERTIFICATES

NYSDOH LAB ID No.: 11383
U.S. EPA LAB CODE: NY01252

**CWM Chemical Services, LLC.** **Reported:** **10/28/14 09:58**

Client: Environmental Monitoring

Work Order(s): 1410076

**ANALYTICAL REPORT FOR SAMPLES**

| LabSample ID | Client Sample ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| 1410076-01 | T8005 | Aqueous | 10/24/14 10:15 | 10/24/14 10:39 |
| 1410076-02 | T8007 | Aqueous | 10/24/14 10:10 | 10/24/14 10:39 |
| 1410076-03 | T8009 | Aqueous | 10/24/14 10:25 | 10/24/14 10:39 |
| 1410076-04 | T8010 | Aqueous | 10/24/14 10:20 | 10/24/14 10:39 |

*All Quality Control associated with these samples met EPA or laboratory specifications unless noted.*

*The enclosed analytical results are representative of the sample as received by the laboratory. CWM Chemical Services Laboratory makes no representations or certifications as to the methods of sample collection, sample identification, or transportation handling procedures used prior to our receipt of samples. This report is intended for the sole use and benefit of Waste Management and it's companies. No representation concerning significance of the reported data is made to any person or entity. To the best of my knowledge, the information contained in this report is accurate and complete. All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.*

*According to Sample Collection Requirements for Non-Potable Water located in the ELAP Certification Manual, pH analysis is required within 15 minutes of sample collection. Analysis is generally not completed within 15 minutes, but as soon as possible after laboratory receipt.*

Approved By: _____.

Title: QA/QC Coordinator

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/24/14 10:15 |
| Work Order: | 1410076 | Project #: | CWM | Received: | 10/24/14 10:39 |
| Lab Sample ID: | 1410076-01RE1 | Client Sample ID: | T8005 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 50.0 | ug/L | 10/27/14 13:42 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 50.0 | " | " | LAD | " |
| Bromomethane | ND | | 50.0 | " | " | LAD | " |
| Chloroethane | ND | | 50.0 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 50.0 | " | " | LAD | " |
| Diethyl ether | ND | | 50.0 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 50.0 | " | " | LAD | " |
| Acetone | ND | | 50.0 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 50.0 | " | " | LAD | " |
| Methylene chloride | ND | | 50.0 | " | " | LAD | " |
| Carbon disulfide | ND | | 50.0 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 50.0 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 50.0 | " | " | LAD | " |
| Vinyl acetate | ND | | 50.0 | " | " | LAD | " |
| 2-Butanone | ND | | 50.0 | " | " | LAD | " |
| Ethyl acetate | ND | | 50.0 | " | " | LAD | " |
| Chloroform | ND | | 50.0 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 50.0 | " | " | LAD | " |
| Carbon tetrachloride | ND | | 50.0 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 50.0 | " | " | LAD | " |
| Benzene | ND | | 50.0 | " | " | LAD | " |
| **Trichloroethene** | **552** | | 50.0 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 50.0 | " | " | LAD | " |
| Bromodichloromethane | ND | | 50.0 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 50.0 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 50.0 | " | " | LAD | " |
| Toluene | ND | | 50.0 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 50.0 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 50.0 | " | " | LAD | " |
| 2-Hexanone | ND | | 50.0 | " | " | LAD | " |
| Tetrachloroethene | ND | | 50.0 | " | " | LAD | " |
| Dibromochloromethane | ND | | 50.0 | " | " | LAD | " |
| Chlorobenzene | ND | | 50.0 | " | " | LAD | " |
| Ethylbenzene | ND | | 50.0 | " | " | LAD | " |
| Xylenes (Total) | ND | | 150 | " | " | LAD | " |
| Styrene | ND | | 50.0 | " | " | LAD | " |
| Bromoform | ND | | 50.0 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 50.0 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 50.0 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 50.0 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 10/28/14 09:58**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/24/14 10:15 |
| Work Order: | 1410076 | Project #: | CWM | Received: | 10/24/14 10:39 |
| Lab Sample ID: | 1410076-01RE1 | Client Sample ID: | T8005 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 50.0 | ug/L | 10/27/14 13:42 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *99.0 %* | | *80-127* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *97.2 %* | | *82-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *94.1 %* | | *79-115* | | " | LAD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/24/14 10:10 |
| Work Order: | 1410076 | Project #: | CWM | Received: | 10/24/14 10:39 |
| Lab Sample ID: | 1410076-02 | Client Sample ID: | T8007 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 1000 | ug/L | 10/24/14 19:15 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LAD | " |
| Bromomethane | ND | | 1000 | " | " | LAD | " |
| Chloroethane | ND | | 1000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LAD | " |
| Diethyl ether | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1000 | " | " | LAD | " |
| Acetone | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| **Methylene chloride** | **2620** | | 1000 | " | " | LAD | " |
| Carbon disulfide | ND | | 1000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Vinyl acetate | ND | | 1000 | " | " | LAD | " |
| 2-Butanone | ND | | 1000 | " | " | LAD | " |
| Ethyl acetate | ND | | 1000 | " | " | LAD | " |
| Chloroform | ND | | 1000 | " | " | LAD | " |
| **1,1,1-Trichloroethane** | **1380** | | 1000 | " | " | LAD | " |
| Carbon tetrachloride | ND | | 1000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Benzene | ND | | 1000 | " | " | LAD | " |
| **Trichloroethene** | **2510** | | 1000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| Toluene | ND | | 1000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 1000 | " | " | LAD | " |
| 2-Hexanone | ND | | 1000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 1000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LAD | " |
| **Chlorobenzene** | **1900** | | 1000 | " | " | LAD | " |
| Ethylbenzene | ND | | 1000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 3000 | " | " | LAD | " |
| Styrene | ND | | 1000 | " | " | LAD | " |
| Bromoform | ND | | 1000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |
| **1,4-Dichlorobenzene** | **1810** | | 1000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 10/28/14 09:58**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/24/14 10:10 |
| Work Order: | 1410076 | Project #: | CWM | Received: | 10/24/14 10:39 |
| Lab Sample ID: | 1410076-02 | Client Sample ID: | T8007 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **1,2-Dichlorobenzene** | **7580** | | 1000 | ug/L | 10/24/14 19:15 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *98.2 %* | | *80-127* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *97.7 %* | | *82-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *93.1 %* | | *79-115* | | " | LAD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/24/14 10:25 |
| Work Order: | 1410076 | Project #: | CWM | Received: | 10/24/14 10:39 |
| Lab Sample ID: | 1410076-03RE1 | Client Sample ID: | T8009 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 1000 | ug/L | 10/27/14 14:13 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LAD | " |
| Bromomethane | ND | | 1000 | " | " | LAD | " |
| Chloroethane | ND | | 1000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LAD | " |
| Diethyl ether | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1000 | " | " | LAD | " |
| Acetone | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| **Methylene chloride** | **4130** | | 1000 | " | " | LAD | " |
| Carbon disulfide | ND | | 1000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Vinyl acetate | ND | | 1000 | " | " | LAD | " |
| 2-Butanone | ND | | 1000 | " | " | LAD | " |
| Ethyl acetate | ND | | 1000 | " | " | LAD | " |
| **Chloroform** | **2250** | | 1000 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 1000 | " | " | LAD | " |
| **Carbon tetrachloride** | **3030** | | 1000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Benzene | ND | | 1000 | " | " | LAD | " |
| **Trichloroethene** | **3130** | | 1000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| Toluene | ND | | 1000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 1000 | " | " | LAD | " |
| 2-Hexanone | ND | | 1000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 1000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LAD | " |
| **Chlorobenzene** | **1660** | | 1000 | " | " | LAD | " |
| Ethylbenzene | ND | | 1000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 3000 | " | " | LAD | " |
| Styrene | ND | | 1000 | " | " | LAD | " |
| Bromoform | ND | | 1000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 10/28/14 09:58**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/24/14 10:25 |
| Work Order: | 1410076 | Project #: | CWM | Received: | 10/24/14 10:39 |
| Lab Sample ID: | 1410076-03RE1 | Client Sample ID: | T8009 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **1,2-Dichlorobenzene** | **2530** | | 1000 | ug/L | 10/27/14 14:13 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *98.3 %* | | *80-127* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *98.7 %* | | *82-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *93.1 %* | | *79-115* | | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 10/28/14 09:58**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/24/14 10:20 |
| Work Order: | 1410076 | Project #: | CWM | Received: | 10/24/14 10:39 |
| Lab Sample ID: | 1410076-04 | Client Sample ID: | T8010 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 50.0 | ug/L | 10/24/14 20:18 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 50.0 | " | " | LAD | " |
| Bromomethane | ND | | 50.0 | " | " | LAD | " |
| Chloroethane | ND | | 50.0 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 50.0 | " | " | LAD | " |
| Diethyl ether | ND | | 50.0 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 50.0 | " | " | LAD | " |
| Acetone | ND | | 50.0 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 50.0 | " | " | LAD | " |
| Methylene chloride | ND | | 50.0 | " | " | LAD | " |
| Carbon disulfide | ND | | 50.0 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 50.0 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 50.0 | " | " | LAD | " |
| Vinyl acetate | ND | | 50.0 | " | " | LAD | " |
| 2-Butanone | ND | | 50.0 | " | " | LAD | " |
| Ethyl acetate | ND | | 50.0 | " | " | LAD | " |
| Chloroform | ND | | 50.0 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 50.0 | " | " | LAD | " |
| Carbon tetrachloride | ND | | 50.0 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 50.0 | " | " | LAD | " |
| Benzene | ND | | 50.0 | " | " | LAD | " |
| Trichloroethene | ND | | 50.0 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 50.0 | " | " | LAD | " |
| Bromodichloromethane | ND | | 50.0 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 50.0 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 50.0 | " | " | LAD | " |
| Toluene | ND | | 50.0 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 50.0 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 50.0 | " | " | LAD | " |
| 2-Hexanone | ND | | 50.0 | " | " | LAD | " |
| Tetrachloroethene | ND | | 50.0 | " | " | LAD | " |
| Dibromochloromethane | ND | | 50.0 | " | " | LAD | " |
| Chlorobenzene | ND | | 50.0 | " | " | LAD | " |
| Ethylbenzene | ND | | 50.0 | " | " | LAD | " |
| Xylenes (Total) | ND | | 150 | " | " | LAD | " |
| Styrene | ND | | 50.0 | " | " | LAD | " |
| Bromoform | ND | | 50.0 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 50.0 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 50.0 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 50.0 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 10/28/14 09:58**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/24/14 10:20 |
| Work Order: | 1410076 | Project #: | CWM | Received: | 10/24/14 10:39 |
| Lab Sample ID: | 1410076-04 | Client Sample ID: | T8010 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 50.0 | ug/L | 10/24/14 20:18 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *94.7 %* | | *80-127* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *98.1 %* | | *82-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *93.4 %* | | *79-115* | | " | LAD | " |

## Notes and Definitions

| | |
|---|---|
| ND | Analyte NOT DETECTED at or above the reporting limit |
| dry | Sample results reported on a dry weight basis |
| ** | Method is not covered under the laboratory's ELAP certifications. |
| *** | For each PCB fuel sample prepared by method 3580A, the chromatogram is reviewed for large, unexpected peaks. Unless otherwise noted, no such peaks were found. |

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Model City, NY 14107
716-286-1550 Phone
716-286-0326 Fax

28 October 2014

Jill Banaszak
Environmental Monitoring
1550 Balmer Road
Model City, NY 14107

RE: T8000's
Work Order(s): 1410077

CERTIFICATES

NYSDOH LAB ID No.: 11383
U.S. EPA LAB CODE: NY01252

**CWM Chemical Services, LLC.** **Reported:** **10/28/14 09:48**

Client: Environmental Monitoring

Work Order(s): 1410077

**ANALYTICAL REPORT FOR SAMPLES**

| LabSample ID | Client Sample ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| 1410077-01 | T8006 | Aqueous | 10/24/14 12:45 | 10/24/14 12:50 |

*All Quality Control associated with these samples met EPA or laboratory specifications unless noted.*

*The enclosed analytical results are representative of the sample as received by the laboratory. CWM Chemical Services Laboratory makes no representations or certifications as to the methods of sample collection, sample identification, or transportation handling procedures used prior to our receipt of samples. This report is intended for the sole use and benefit of Waste Management and it's companies. No representation concerning significance of the reported data is made to any person or entity. To the best of my knowledge, the information contained in this report is accurate and complete. All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.*

*According to Sample Collection Requirements for Non-Potable Water located in the ELAP Certification Manual, pH analysis is required within 15 minutes of sample collection. Analysis is generally not completed within 15 minutes, but as soon as possible after laboratory receipt.*

Approved By: 

Title: QA/QC Coordinator

**CWM Chemical Services, LLC.** **Reported: 10/28/14 09:48**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/24/14 12:45 |
| Work Order: | 1410077 | Project #: | CWM | Received: | 10/24/14 12:50 |
| Lab Sample ID: | 1410077-01 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 10000 | ug/L | 10/24/14 16:04 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 10000 | " | " | LAD | " |
| Bromomethane | ND | | 10000 | " | " | LAD | " |
| Chloroethane | ND | | 10000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 10000 | " | " | LAD | " |
| Diethyl ether | ND | | 10000 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 10000 | " | " | LAD | " |
| Acetone | ND | | 10000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 10000 | " | " | LAD | " |
| Methylene chloride | ND | | 10000 | " | " | LAD | " |
| Carbon disulfide | ND | | 10000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 10000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 10000 | " | " | LAD | " |
| Vinyl acetate | ND | | 10000 | " | " | LAD | " |
| 2-Butanone | ND | | 10000 | " | " | LAD | " |
| Ethyl acetate | ND | | 10000 | " | " | LAD | " |
| Chloroform | ND | | 10000 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 10000 | " | " | LAD | " |
| **Carbon tetrachloride** | **68100** | | 10000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 10000 | " | " | LAD | " |
| Benzene | ND | | 10000 | " | " | LAD | " |
| Trichloroethene | ND | | 10000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 10000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 10000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 10000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 10000 | " | " | LAD | " |
| Toluene | ND | | 10000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 10000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 10000 | " | " | LAD | " |
| 2-Hexanone | ND | | 10000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 10000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 10000 | " | " | LAD | " |
| Chlorobenzene | ND | | 10000 | " | " | LAD | " |
| Ethylbenzene | ND | | 10000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 30000 | " | " | LAD | " |
| Styrene | ND | | 10000 | " | " | LAD | " |
| Bromoform | ND | | 10000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 10000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 10000 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 10000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 10/28/14 09:48**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/24/14 12:45 |
| Work Order: | 1410077 | Project #: | CWM | Received: | 10/24/14 12:50 |
| Lab Sample ID: | 1410077-01 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 10000 | ug/L | 10/24/14 16:04 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *98.5 %* | | *80-127* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *98.1 %* | | *82-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *95.2 %* | | *79-115* | | " | LAD | " |

## Notes and Definitions

| | |
|---|---|
| ND | Analyte NOT DETECTED at or above the reporting limit |
| dry | Sample results reported on a dry weight basis |
| ** | Method is not covered under the laboratory's ELAP certifications. |
| *** | For each PCB fuel sample prepared by method 3580A, the chromatogram is reviewed for large, unexpected peaks. Unless otherwise noted, no such peaks were found. |

1550 Balmer Road
Model City, NY 14107
716-286-1550 Phone
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26 October 2015

Jill Banaszak
Environmental Monitoring
1550 Balmer Road
Model City, NY 14107

RE: T8000's
Work Order(s): 1510048

CERTIFICATES

NYSDOH LAB ID No.: 11383
U.S. EPA LAB CODE: NY01252

**CWM Chemical Services, LLC.** **Reported:** **10/26/15 09:17**

Client: Environmental Monitoring

Work Order(s): 1510048

**ANALYTICAL REPORT FOR SAMPLES**

| LabSample ID | Client Sample ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| 1510048-01 | T8005 | Aqueous | 10/19/15 12:43 | 10/19/15 13:38 |
| 1510048-02 | T8006 | Aqueous | 10/19/15 12:15 | 10/19/15 13:38 |
| 1510048-03 | T8007 | Aqueous | 10/19/15 13:01 | 10/19/15 13:38 |
| 1510048-04 | T8009 | Aqueous | 10/19/15 11:42 | 10/19/15 13:38 |
| 1510048-05 | T8010 | Aqueous | 10/19/15 11:31 | 10/19/15 13:38 |

*All Quality Control associated with these samples met EPA or laboratory specifications unless noted.*

*The enclosed analytical results are representative of the sample as received by the laboratory. CWM Chemical Services Laboratory makes no representations or certifications as to the methods of sample collection, sample identification, or transportation handling procedures used prior to our receipt of samples. This report is intended for the sole use and benefit of Waste Management and it's companies. No representation concerning significance of the reported data is made to any person or entity. To the best of my knowledge, the information contained in this report is accurate and complete. All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.*

*According to Sample Collection Requirements for Non-Potable Water located in the ELAP Certification Manual, pH analysis is required within 15 minutes of sample collection. Analysis is generally not completed within 15 minutes, but as soon as possible after laboratory receipt.*

Approved By: _____.

Title: QA/QC Coordinator

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 12:43 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-01 | Client Sample ID: | T8005 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | *Prepared: 10/20/15 06:34* | | | *Batch: D15J083* | |
| Chloromethane | ND | | 1000 | ug/L | 10/20/15 12:17 | JLG | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | JLG | " |
| Bromomethane | ND | | 1000 | " | " | JLG | " |
| Chloroethane | ND | | 1000 | " | " | JLG | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | JLG | " |
| Diethyl ether | ND | | 1000 | " | " | JLG | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1000 | " | " | JLG | " |
| Acetone | ND | | 1000 | " | " | JLG | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | JLG | " |
| Methylene chloride | ND | | 1000 | " | " | JLG | " |
| Carbon disulfide | ND | | 1000 | " | " | JLG | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | JLG | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | JLG | " |
| Vinyl acetate | ND | | 1000 | " | " | JLG | " |
| 2-Butanone | ND | | 1000 | " | " | JLG | " |
| Ethyl acetate | ND | | 1000 | " | " | JLG | " |
| Chloroform | ND | | 1000 | " | " | JLG | " |
| 1,1,1-Trichloroethane | ND | | 1000 | " | " | JLG | " |
| Carbon tetrachloride | ND | | 1000 | " | " | JLG | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | JLG | " |
| Benzene | ND | | 1000 | " | " | JLG | " |
| **Trichloroethene** | **6510** | | 1000 | " | " | JLG | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | JLG | " |
| Bromodichloromethane | ND | | 1000 | " | " | JLG | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | JLG | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | JLG | " |
| Toluene | ND | | 1000 | " | " | JLG | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | JLG | " |
| 1,1,2-Trichloroethane | ND | | 1000 | " | " | JLG | " |
| 2-Hexanone | ND | | 1000 | " | " | JLG | " |
| Tetrachloroethene | ND | | 1000 | " | " | JLG | " |
| Dibromochloromethane | ND | | 1000 | " | " | JLG | " |
| Chlorobenzene | ND | | 1000 | " | " | JLG | " |
| Ethylbenzene | ND | | 1000 | " | " | JLG | " |
| Xylenes (Total) | ND | | 3000 | " | " | JLG | " |
| Styrene | ND | | 1000 | " | " | JLG | " |
| Bromoform | ND | | 1000 | " | " | JLG | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | JLG | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | JLG | " |
| 1,4-Dichlorobenzene | ND | | 1000 | " | " | JLG | " |

**CWM Chemical Services, LLC.** **Reported: 10/26/15 09:17**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 12:43 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-01 | Client Sample ID: | T8005 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 1000 | ug/L | 10/20/15 12:17 | JLG | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *102 %* | | *85-115* | | " | JLG | " |
| *Surrogate: Toluene-d8* | *100 %* | | *85-115* | | " | JLG | " |
| *Surrogate: 4-Bromofluorobenzene* | *98.6 %* | | *85-115* | | " | JLG | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 12:15 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-02 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | *Prepared: 10/20/15 06:34* | | | *Batch: D15J083* | |
| Chloromethane | ND | | 10000 | ug/L | 10/20/15 12:47 | JLG | EPA 8260C |
| Vinyl chloride | ND | | 10000 | " | " | JLG | " |
| Bromomethane | ND | | 10000 | " | " | JLG | " |
| Chloroethane | ND | | 10000 | " | " | JLG | " |
| Trichlorofluoromethane | ND | | 10000 | " | " | JLG | " |
| Diethyl ether | ND | | 10000 | " | " | JLG | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 10000 | " | " | JLG | " |
| Acetone | ND | | 10000 | " | " | JLG | " |
| 1,1-Dichloroethene | ND | | 10000 | " | " | JLG | " |
| Methylene chloride | ND | | 10000 | " | " | JLG | " |
| Carbon disulfide | ND | | 10000 | " | " | JLG | " |
| trans-1,2-Dichloroethene | ND | | 10000 | " | " | JLG | " |
| 1,1-Dichloroethane | ND | | 10000 | " | " | JLG | " |
| Vinyl acetate | ND | | 10000 | " | " | JLG | " |
| 2-Butanone | ND | | 10000 | " | " | JLG | " |
| Ethyl acetate | ND | | 10000 | " | " | JLG | " |
| Chloroform | ND | | 10000 | " | " | JLG | " |
| 1,1,1-Trichloroethane | ND | | 10000 | " | " | JLG | " |
| **Carbon tetrachloride** | **60600** | | 10000 | " | " | JLG | " |
| 1,2-Dichloroethane | ND | | 10000 | " | " | JLG | " |
| Benzene | ND | | 10000 | " | " | JLG | " |
| Trichloroethene | ND | | 10000 | " | " | JLG | " |
| 1,2-Dichloropropane | ND | | 10000 | " | " | JLG | " |
| Bromodichloromethane | ND | | 10000 | " | " | JLG | " |
| 4-Methyl-2-pentanone | ND | | 10000 | " | " | JLG | " |
| cis-1,3-Dichloropropene | ND | | 10000 | " | " | JLG | " |
| Toluene | ND | | 10000 | " | " | JLG | " |
| trans-1,3-Dichloropropene | ND | | 10000 | " | " | JLG | " |
| 1,1,2-Trichloroethane | ND | | 10000 | " | " | JLG | " |
| 2-Hexanone | ND | | 10000 | " | " | JLG | " |
| Tetrachloroethene | ND | | 10000 | " | " | JLG | " |
| Dibromochloromethane | ND | | 10000 | " | " | JLG | " |
| Chlorobenzene | ND | | 10000 | " | " | JLG | " |
| Ethylbenzene | ND | | 10000 | " | " | JLG | " |
| Xylenes (Total) | ND | | 30000 | " | " | JLG | " |
| Styrene | ND | | 10000 | " | " | JLG | " |
| Bromoform | ND | | 10000 | " | " | JLG | " |
| 1,1,2,2-Tetrachloroethane | ND | | 10000 | " | " | JLG | " |
| 1,3-Dichlorobenzene | ND | | 10000 | " | " | JLG | " |
| 1,4-Dichlorobenzene | ND | | 10000 | " | " | JLG | " |

**CWM Chemical Services, LLC.** **Reported: 10/26/15 09:17**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 12:15 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-02 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 10000 | ug/L | 10/20/15 12:47 | JLG | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *103 %* | | *85-115* | | " | JLG | " |
| *Surrogate: Toluene-d8* | *101 %* | | *85-115* | | " | JLG | " |
| *Surrogate: 4-Bromofluorobenzene* | *101 %* | | *85-115* | | " | JLG | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 13:01 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-03 | Client Sample ID: | T8007 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | *Prepared: 10/20/15 06:34* | | | *Batch: D15J083* | |
| Chloromethane | ND | | 1000 | ug/L | 10/20/15 13:18 | JLG | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | JLG | " |
| Bromomethane | ND | | 1000 | " | " | JLG | " |
| Chloroethane | ND | | 1000 | " | " | JLG | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | JLG | " |
| Diethyl ether | ND | | 1000 | " | " | JLG | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1000 | " | " | JLG | " |
| Acetone | ND | | 1000 | " | " | JLG | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | JLG | " |
| **Methylene chloride** | **2240** | | 1000 | " | " | JLG | " |
| Carbon disulfide | ND | | 1000 | " | " | JLG | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | JLG | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | JLG | " |
| Vinyl acetate | ND | | 1000 | " | " | JLG | " |
| 2-Butanone | ND | | 1000 | " | " | JLG | " |
| Ethyl acetate | ND | | 1000 | " | " | JLG | " |
| Chloroform | ND | | 1000 | " | " | JLG | " |
| **1,1,1-Trichloroethane** | **1260** | | 1000 | " | " | JLG | " |
| Carbon tetrachloride | ND | | 1000 | " | " | JLG | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | JLG | " |
| Benzene | ND | | 1000 | " | " | JLG | " |
| **Trichloroethene** | **2430** | | 1000 | " | " | JLG | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | JLG | " |
| Bromodichloromethane | ND | | 1000 | " | " | JLG | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | JLG | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | JLG | " |
| Toluene | ND | | 1000 | " | " | JLG | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | JLG | " |
| 1,1,2-Trichloroethane | ND | | 1000 | " | " | JLG | " |
| 2-Hexanone | ND | | 1000 | " | " | JLG | " |
| Tetrachloroethene | ND | | 1000 | " | " | JLG | " |
| Dibromochloromethane | ND | | 1000 | " | " | JLG | " |
| **Chlorobenzene** | **2010** | | 1000 | " | " | JLG | " |
| Ethylbenzene | ND | | 1000 | " | " | JLG | " |
| Xylenes (Total) | ND | | 3000 | " | " | JLG | " |
| Styrene | ND | | 1000 | " | " | JLG | " |
| Bromoform | ND | | 1000 | " | " | JLG | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | JLG | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | JLG | " |
| **1,4-Dichlorobenzene** | **2100** | | 1000 | " | " | JLG | " |

**CWM Chemical Services, LLC.** **Reported: 10/26/15 09:17**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 13:01 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-03 | Client Sample ID: | T8007 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **1,2-Dichlorobenzene** | **9320** | | 1000 | ug/L | 10/20/15 13:18 | JLG | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *99.9 %* | | *85-115* | | " | JLG | " |
| *Surrogate: Toluene-d8* | *100 %* | | *85-115* | | " | JLG | " |
| *Surrogate: 4-Bromofluorobenzene* | *97.2 %* | | *85-115* | | " | JLG | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 11:42 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-04 | Client Sample ID: | T8009 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | *Prepared: 10/20/15 06:34* | | | *Batch: D15J083* | |
| Chloromethane | ND | | 1000 | ug/L | 10/20/15 13:47 | JLG | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | JLG | " |
| Bromomethane | ND | | 1000 | " | " | JLG | " |
| Chloroethane | ND | | 1000 | " | " | JLG | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | JLG | " |
| Diethyl ether | ND | | 1000 | " | " | JLG | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1000 | " | " | JLG | " |
| Acetone | ND | | 1000 | " | " | JLG | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | JLG | " |
| **Methylene chloride** | **8000** | | 1000 | " | " | JLG | " |
| Carbon disulfide | ND | | 1000 | " | " | JLG | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | JLG | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | JLG | " |
| Vinyl acetate | ND | | 1000 | " | " | JLG | " |
| 2-Butanone | ND | | 1000 | " | " | JLG | " |
| Ethyl acetate | ND | | 1000 | " | " | JLG | " |
| **Chloroform** | **2600** | | 1000 | " | " | JLG | " |
| 1,1,1-Trichloroethane | ND | | 1000 | " | " | JLG | " |
| **Carbon tetrachloride** | **2800** | | 1000 | " | " | JLG | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | JLG | " |
| Benzene | ND | | 1000 | " | " | JLG | " |
| **Trichloroethene** | **4120** | | 1000 | " | " | JLG | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | JLG | " |
| Bromodichloromethane | ND | | 1000 | " | " | JLG | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | JLG | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | JLG | " |
| Toluene | ND | | 1000 | " | " | JLG | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | JLG | " |
| **1,1,2-Trichloroethane** | **1100** | | 1000 | " | " | JLG | " |
| 2-Hexanone | ND | | 1000 | " | " | JLG | " |
| Tetrachloroethene | ND | | 1000 | " | " | JLG | " |
| Dibromochloromethane | ND | | 1000 | " | " | JLG | " |
| **Chlorobenzene** | **1900** | | 1000 | " | " | JLG | " |
| Ethylbenzene | ND | | 1000 | " | " | JLG | " |
| Xylenes (Total) | ND | | 3000 | " | " | JLG | " |
| Styrene | ND | | 1000 | " | " | JLG | " |
| Bromoform | ND | | 1000 | " | " | JLG | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | JLG | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | JLG | " |
| 1,4-Dichlorobenzene | ND | | 1000 | " | " | JLG | " |

**CWM Chemical Services, LLC.** **Reported: 10/26/15 09:17**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 11:42 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-04 | Client Sample ID: | T8009 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **1,2-Dichlorobenzene** | **2170** | | 1000 | ug/L | 10/20/15 13:47 | JLG | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *103 %* | | *85-115* | | " | JLG | " |
| *Surrogate: Toluene-d8* | *101 %* | | *85-115* | | " | JLG | " |
| *Surrogate: 4-Bromofluorobenzene* | *98.7 %* | | *85-115* | | " | JLG | " |

**CWM Chemical Services, LLC.** **Reported: 10/26/15 09:17**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 11:42 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-04RE1 | Client Sample ID: | T8009 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **PCBs** | | | | | | | |
| *Prep Method: EPA 3510C* | | | *Prepared: 10/23/15 06:12* | | | *Batch: D15J097* | |
| PCB 1016 | ND | | 2.00 | ug/L | 10/23/15 15:21 | JLG | EPA 8082A |
| PCB 1221 | ND | | 2.00 | " | " | JLG | " |
| PCB 1232 | ND | | 2.00 | " | " | JLG | " |
| **PCB 1242** | **21.4** | | 2.00 | " | " | JLG | " |
| PCB 1248 | ND | | 2.00 | " | " | JLG | " |
| **PCB 1254** | **8.56** | | 2.00 | " | " | JLG | " |
| **PCB 1260** | **3.28** | | 2.00 | " | " | JLG | " |
| PCB 1262 | ND | | 2.00 | " | " | JLG | " |
| PCB 1268 | ND | | 2.00 | " | " | JLG | " |
| *Surrogate: TCMX* | *101 %* | | *82-112* | | *"* | JLG | *"* |
| *Surrogate: DCB* | *62.1 %* | | *26-110* | | *"* | JLG | *"* |

**CWM Chemical Services, LLC.** **Reported: 10/26/15 09:17**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 11:31 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-05 | Client Sample ID: | T8010 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **PCBs** | | | | | | | |
| *Prep Method: EPA 3510C* | | | *Prepared: 10/23/15 06:12* | | | *Batch: D15J097* | |
| PCB 1016 | ND | | 1.00 | ug/L | 10/23/15 13:47 | JLG | EPA 8082A |
| PCB 1221 | ND | | 1.00 | " | " | JLG | " |
| PCB 1232 | ND | | 1.00 | " | " | JLG | " |
| PCB 1242 | ND | | 1.00 | " | " | JLG | " |
| PCB 1248 | ND | | 1.00 | " | " | JLG | " |
| PCB 1254 | ND | | 1.00 | " | " | JLG | " |
| PCB 1260 | ND | | 1.00 | " | " | JLG | " |
| PCB 1262 | ND | | 1.00 | " | " | JLG | " |
| PCB 1268 | ND | | 1.00 | " | " | JLG | " |
| *Surrogate: TCMX* | *106 %* | | *82-112* | | *"* | JLG | *"* |
| *Surrogate: DCB* | *89.4 %* | | *26-110* | | *"* | JLG | *"* |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 11:31 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-05RE1 | Client Sample ID: | T8010 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | *Prepared: 10/20/15 06:34* | | | *Batch: D15J093* | |
| Chloromethane | ND | | 10.0 | ug/L | 10/22/15 11:56 | JLG | EPA 8260C |
| Vinyl chloride | ND | | 10.0 | " | " | JLG | " |
| Bromomethane | ND | | 10.0 | " | " | JLG | " |
| Chloroethane | ND | | 10.0 | " | " | JLG | " |
| Trichlorofluoromethane | ND | | 10.0 | " | " | JLG | " |
| Diethyl ether | ND | | 10.0 | " | " | JLG | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 10.0 | " | " | JLG | " |
| Acetone | ND | | 10.0 | " | " | JLG | " |
| 1,1-Dichloroethene | ND | | 10.0 | " | " | JLG | " |
| Methylene chloride | ND | | 10.0 | " | " | JLG | " |
| Carbon disulfide | ND | | 10.0 | " | " | JLG | " |
| trans-1,2-Dichloroethene | ND | | 10.0 | " | " | JLG | " |
| 1,1-Dichloroethane | ND | | 10.0 | " | " | JLG | " |
| Vinyl acetate | ND | | 10.0 | " | " | JLG | " |
| 2-Butanone | ND | | 10.0 | " | " | JLG | " |
| Ethyl acetate | ND | | 10.0 | " | " | JLG | " |
| Chloroform | ND | | 10.0 | " | " | JLG | " |
| 1,1,1-Trichloroethane | ND | | 10.0 | " | " | JLG | " |
| Carbon tetrachloride | ND | | 10.0 | " | " | JLG | " |
| 1,2-Dichloroethane | ND | | 10.0 | " | " | JLG | " |
| Benzene | ND | | 10.0 | " | " | JLG | " |
| **Trichloroethene** | **18.8** | | 10.0 | " | " | JLG | " |
| 1,2-Dichloropropane | ND | | 10.0 | " | " | JLG | " |
| Bromodichloromethane | ND | | 10.0 | " | " | JLG | " |
| 4-Methyl-2-pentanone | ND | | 10.0 | " | " | JLG | " |
| cis-1,3-Dichloropropene | ND | | 10.0 | " | " | JLG | " |
| Toluene | ND | | 10.0 | " | " | JLG | " |
| trans-1,3-Dichloropropene | ND | | 10.0 | " | " | JLG | " |
| 1,1,2-Trichloroethane | ND | | 10.0 | " | " | JLG | " |
| 2-Hexanone | ND | | 10.0 | " | " | JLG | " |
| Tetrachloroethene | ND | | 10.0 | " | " | JLG | " |
| Dibromochloromethane | ND | | 10.0 | " | " | JLG | " |
| Chlorobenzene | ND | | 10.0 | " | " | JLG | " |
| Ethylbenzene | ND | | 10.0 | " | " | JLG | " |
| Xylenes (Total) | ND | | 30.0 | " | " | JLG | " |
| Styrene | ND | | 10.0 | " | " | JLG | " |
| Bromoform | ND | | 10.0 | " | " | JLG | " |
| 1,1,2,2-Tetrachloroethane | ND | | 10.0 | " | " | JLG | " |
| 1,3-Dichlorobenzene | ND | | 10.0 | " | " | JLG | " |
| 1,4-Dichlorobenzene | ND | | 10.0 | " | " | JLG | " |

**CWM Chemical Services, LLC.** **Reported: 10/26/15 09:17**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 10/19/15 11:31 |
| Work Order: | 1510048 | Project #: | CWM | Received: | 10/19/15 13:38 |
| Lab Sample ID: | 1510048-05RE1 | Client Sample ID: | T8010 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 10.0 | ug/L | 10/22/15 11:56 | JLG | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *100 %* | | *85-115* | | " | JLG | " |
| *Surrogate: Toluene-d8* | *99.8 %* | | *85-115* | | " | JLG | " |
| *Surrogate: 4-Bromofluorobenzene* | *97.0 %* | | *85-115* | | " | JLG | " |

## Notes and Definitions

| | |
|---|---|
| ND | Analyte NOT DETECTED at or above the reporting limit |
| dry | Sample results reported on a dry weight basis |
| ** | Method is not covered under the laboratory's ELAP certifications. |
| *** | For each PCB fuel sample prepared by method 3580A, the chromatogram is reviewed for large, unexpected peaks. Unless otherwise noted, no such peaks were found. |

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



# ANALYTICAL REPORT

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TestAmerica Job ID: 480-48350-1
Client Project/Site: Model City Landfill: GWES Tank Sampling

For:
CWM Chemical Services Inc
1550 Balmer Road
Model City, New York 14107

Attn: Jonathan Rizzo

Candace L. Fox

*Authorized for release by:*
*1/3/2014 2:07:58 PM*

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Sample Summary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 480-48350-5 | T8005 | Water | 10/18/13 10:30 | 10/21/13 09:00 |
| 480-48350-6 | T8006 | Water | 10/18/13 11:15 | 10/21/13 09:00 |
| 480-48350-7 | T8007 | Water | 10/18/13 10:22 | 10/21/13 09:00 |
| 480-48350-8 | T8009 | Water | 10/18/13 10:40 | 10/21/13 09:00 |
| 480-48350-9 | T8010 | Water | 10/18/13 10:50 | 10/21/13 09:00 |
| 480-48350-10 | TB | Water | 10/18/13 11:00 | 10/21/13 09:00 |

# Definitions/Glossary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

## Qualifiers

### GC/MS VOA

| Qualifier | Qualifier Description |
|---|---|
| * | LCS or LCSD exceeds the control limits |
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |
| E | Result exceeded calibration range. |
| H | Sample was prepped or analyzed beyond the specified holding time |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

## Job ID: 480-48350-1

### Laboratory: TestAmerica Buffalo

**Narrative**

**Job Narrative**
**480-48350-1**

**Comments**
2-chloroethylvinylether and vinyl chloride were analyzed using unpreserved vials per client request.

**Receipt**
The samples were received on 10/21/2013 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.6º C.

**GC/MS VOA**
Method(s) 8260C: The following volatiles samples were diluted due to foaming at the time of purging during the original sample analysis: P2S1S2S3PCS (480-48274-5 MS), P2S1S2S3PCS (480-48274-5 MSD), T8009 (480-48350-8). Elevated reporting limits (RLs) are provided.

Method(s) 8260C: The following sample was diluted to bring the concentration of target analytes within the calibration range: T8007 (480-48350-7), T8005 (480-48350-5), T8007 (480-48350-7), T8009 (480-48350-8), (480-48350-6 MS), (480-48350-6 MSD), T8006 (480-48350-6). Elevated reporting limits (RLs) are provided.

Method(s) 8260C: The Matrix Spike Blank recovery was above TestAmerica's statistically developed internal laboratory QC limits for Chloromethane. This analyte was not a requested spiking compound; therefore the recovery is being reported for advisory purposes only. All other quality control indicators, including the continuing calibration verification, were within method prescribed limits for this analyte.

Method(s) 8260C: The following volatile sample(s) was analyzed with headspace in the sample vial(s) due to multiple injections and/or limited volume: T8010 (480-48350-9).

Method(s) 8260C: The following sample(s) was reported using preserved volume: T8010 (480-48350-9). The unpreserved analyses yielded unusable results.

Method(s) 8260C: Only a preserved vial was received for the following sample(s): TB (480-48350-10).

Method(s) 8260C: The following sample required a further dilution for 1,2-dichlorobenzene. Because the request for several expanded analytes was made after holding time was expired the sample was not re-analyzed: T8007 (480-48350-7).

No other analytical or quality issues were noted.

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: T8005**
**Date Collected: 10/18/13 10:30**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-5**
**Matrix: Water**

**Method: 8260C - Volatile Organic Compounds by GC/MS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 80 | 28 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,1,1-Trichloroethane | ND | | 80 | 66 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,1,2,2-Tetrachloroethane | ND | | 80 | 17 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,1,2-Trichloroethane | ND | | 80 | 18 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,1-Dichloroethane | ND | | 80 | 30 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,1-Dichloroethene | ND | | 80 | 23 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,2,3-Trichloropropane | ND | | 80 | 71 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,2-Dibromo-3-Chloropropane | ND | | 80 | 31 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,2-Dichloroethane | ND | | 80 | 17 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,2-Dichloropropane | ND | | 80 | 58 | ug/L | | | 10/29/13 16:31 | 80 |
| 2-Butanone (MEK) | ND | | 800 | 110 | ug/L | | | 10/29/13 16:31 | 80 |
| 2-Hexanone | ND | | 400 | 99 | ug/L | | | 10/29/13 16:31 | 80 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 400 | 170 | ug/L | | | 10/29/13 16:31 | 80 |
| Acetone | ND | | 800 | 240 | ug/L | | | 10/29/13 16:31 | 80 |
| Acetonitrile | ND | | 3200 | 2100 | ug/L | | | 10/29/13 16:31 | 80 |
| Acrolein | ND | | 1600 | 1400 | ug/L | | | 10/29/13 16:31 | 80 |
| Acrylonitrile | ND | | 400 | 66 | ug/L | | | 10/29/13 16:31 | 80 |
| 3-Chloro-1-propene | ND | | 80 | 35 | ug/L | | | 10/29/13 16:31 | 80 |
| Benzene | ND | | 80 | 33 | ug/L | | | 10/29/13 16:31 | 80 |
| Dichlorobromomethane | ND | | 80 | 31 | ug/L | | | 10/29/13 16:31 | 80 |
| Bromoform | ND | | 80 | 21 | ug/L | | | 10/29/13 16:31 | 80 |
| Bromomethane | ND | | 80 | 55 | ug/L | | | 10/29/13 16:31 | 80 |
| Carbon disulfide | ND | | 80 | 15 | ug/L | | | 10/29/13 16:31 | 80 |
| Carbon tetrachloride | ND | | 80 | 22 | ug/L | | | 10/29/13 16:31 | 80 |
| Chlorobenzene | ND | | 80 | 60 | ug/L | | | 10/29/13 16:31 | 80 |
| Chlorodibromomethane | ND | | 80 | 26 | ug/L | | | 10/29/13 16:31 | 80 |
| Chloroethane | ND | | 80 | 26 | ug/L | | | 10/29/13 16:31 | 80 |
| Chloroform | ND | | 80 | 27 | ug/L | | | 10/29/13 16:31 | 80 |
| Chloromethane | ND | | 80 | 28 | ug/L | | | 10/29/13 16:31 | 80 |
| 2-Chloro-1,3-butadiene | ND | | 80 | 39 | ug/L | | | 10/29/13 16:31 | 80 |
| cis-1,3-Dichloropropene | ND | | 80 | 29 | ug/L | | | 10/29/13 16:31 | 80 |
| Dibromomethane | ND | | 80 | 33 | ug/L | | | 10/29/13 16:31 | 80 |
| Dichlorodifluoromethane | ND | | 80 | 54 | ug/L | | | 10/29/13 16:31 | 80 |
| Ethyl methacrylate | ND | | 80 | 47 | ug/L | | | 10/29/13 16:31 | 80 |
| Ethylbenzene | ND | | 80 | 59 | ug/L | | | 10/29/13 16:31 | 80 |
| Ethylene Dibromide | ND | | 80 | 58 | ug/L | | | 10/29/13 16:31 | 80 |
| Iodomethane | ND | | 80 | 24 | ug/L | | | 10/29/13 16:31 | 80 |
| Methacrylonitrile | ND | | 400 | 55 | ug/L | | | 10/29/13 16:31 | 80 |
| Methyl methacrylate | ND | | 80 | 49 | ug/L | | | 10/29/13 16:31 | 80 |
| Methylene Chloride | ND | | 80 | 35 | ug/L | | | 10/29/13 16:31 | 80 |
| m-Xylene & p-Xylene | ND | | 160 | 53 | ug/L | | | 10/29/13 16:31 | 80 |
| o-Xylene | ND | | 80 | 61 | ug/L | | | 10/29/13 16:31 | 80 |
| Propionitrile | ND | | 800 | 460 | ug/L | | | 10/29/13 16:31 | 80 |
| Styrene | ND | | 80 | 58 | ug/L | | | 10/29/13 16:31 | 80 |
| Tetrachloroethene | ND | | 80 | 29 | ug/L | | | 10/29/13 16:31 | 80 |
| Toluene | ND | | 80 | 41 | ug/L | | | 10/29/13 16:31 | 80 |
| **Vinyl chloride** | **6.7** | | 1.0 | 0.90 | ug/L | | | 10/25/13 18:06 | 1 |
| trans-1,2-Dichloroethene | ND | | 80 | 72 | ug/L | | | 10/29/13 16:31 | 80 |
| trans-1,3-Dichloropropene | ND | | 80 | 30 | ug/L | | | 10/29/13 16:31 | 80 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: T8005**
**Date Collected: 10/18/13 10:30**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-5**
**Matrix: Water**

**Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| trans-1,4-Dichloro-2-butene | ND | | 400 | 170 | ug/L | | | 10/29/13 16:31 | 80 |
| **Trichloroethene** | **5500** | | 80 | 37 | ug/L | | | 10/29/13 16:31 | 80 |
| Trichlorofluoromethane | ND | | 80 | 70 | ug/L | | | 10/29/13 16:31 | 80 |
| Vinyl acetate | ND | | 400 | 68 | ug/L | | | 10/29/13 16:31 | 80 |
| 2-Chloroethyl vinyl ether | ND | | 5.0 | 0.96 | ug/L | | | 10/25/13 18:06 | 1 |
| Diethyl ether | ND | | 80 | 58 | ug/L | | | 10/29/13 16:31 | 80 |
| Ethyl acetate | ND | | 80 | 53 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 80 | 25 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,3-Dichlorobenzene | ND | | 80 | 62 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,2-Dichlorobenzene | ND | | 80 | 63 | ug/L | | | 10/29/13 16:31 | 80 |
| 1,4-Dichlorobenzene | ND | | 80 | 67 | ug/L | | | 10/29/13 16:31 | 80 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *100* | | *66 - 137* | | *10/29/13 16:31* | *80* |
| *4-Bromofluorobenzene (Surr)* | *99* | | *73 - 120* | | *10/29/13 16:31* | *80* |
| *Toluene-d8 (Surr)* | *103* | | *71 - 126* | | *10/25/13 18:06* | *1* |
| *1,2-Dichloroethane-d4 (Surr)* | *104* | | *66 - 137* | | *10/25/13 18:06* | *1* |
| *4-Bromofluorobenzene (Surr)* | *99* | | *73 - 120* | | *10/25/13 18:06* | *1* |
| *Toluene-d8 (Surr)* | *100* | | *71 - 126* | | *10/29/13 16:31* | *80* |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: T8006**
**Date Collected: 10/18/13 11:15**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-6**
**Matrix: Water**

**Method: 8260C - Volatile Organic Compounds by GC/MS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 1000 | 350 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,1,1-Trichloroethane | ND | | 1000 | 820 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | 210 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,1,2-Trichloroethane | ND | | 1000 | 230 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,1-Dichloroethane | ND | | 1000 | 380 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,1-Dichloroethene | ND | | 1000 | 290 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,2,3-Trichloropropane | ND | | 1000 | 890 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,2-Dibromo-3-Chloropropane | ND | | 1000 | 390 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,2-Dichloroethane | ND | | 1000 | 210 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,2-Dichloropropane | ND | | 1000 | 720 | ug/L | | | 10/30/13 10:23 | 1000 |
| 2-Butanone (MEK) | ND | | 10000 | 1300 | ug/L | | | 10/30/13 10:23 | 1000 |
| 2-Hexanone | ND | | 5000 | 1200 | ug/L | | | 10/30/13 10:23 | 1000 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 5000 | 2100 | ug/L | | | 10/30/13 10:23 | 1000 |
| Acetone | ND | | 10000 | 3000 | ug/L | | | 10/30/13 10:23 | 1000 |
| Acetonitrile | ND | | 40000 | 26000 | ug/L | | | 10/30/13 10:23 | 1000 |
| Acrolein | ND | | 20000 | 18000 | ug/L | | | 10/30/13 10:23 | 1000 |
| Acrylonitrile | ND | | 5000 | 830 | ug/L | | | 10/30/13 10:23 | 1000 |
| 3-Chloro-1-propene | ND | | 1000 | 440 | ug/L | | | 10/30/13 10:23 | 1000 |
| Benzene | ND | | 1000 | 410 | ug/L | | | 10/30/13 10:23 | 1000 |
| Dichlorobromomethane | ND | | 1000 | 390 | ug/L | | | 10/30/13 10:23 | 1000 |
| Bromoform | ND | | 1000 | 260 | ug/L | | | 10/30/13 10:23 | 1000 |
| Bromomethane | ND | | 1000 | 690 | ug/L | | | 10/30/13 10:23 | 1000 |
| Carbon disulfide | ND | | 1000 | 190 | ug/L | | | 10/30/13 10:23 | 1000 |
| **Carbon tetrachloride** | **67000** | | 1000 | 270 | ug/L | | | 10/30/13 10:23 | 1000 |
| Chlorobenzene | ND | | 1000 | 750 | ug/L | | | 10/30/13 10:23 | 1000 |
| Chlorodibromomethane | ND | | 1000 | 320 | ug/L | | | 10/30/13 10:23 | 1000 |
| Chloroethane | ND | | 1000 | 320 | ug/L | | | 10/30/13 10:23 | 1000 |
| **Chloroform** | **8500** | | 1000 | 340 | ug/L | | | 10/30/13 10:23 | 1000 |
| Chloromethane | ND | * | 1000 | 350 | ug/L | | | 10/30/13 10:23 | 1000 |
| 2-Chloro-1,3-butadiene | ND | | 1000 | 490 | ug/L | | | 10/30/13 10:23 | 1000 |
| cis-1,3-Dichloropropene | ND | | 1000 | 360 | ug/L | | | 10/30/13 10:23 | 1000 |
| Dibromomethane | ND | | 1000 | 410 | ug/L | | | 10/30/13 10:23 | 1000 |
| Dichlorodifluoromethane | ND | | 1000 | 680 | ug/L | | | 10/30/13 10:23 | 1000 |
| Ethyl methacrylate | ND | | 1000 | 590 | ug/L | | | 10/30/13 10:23 | 1000 |
| Ethylbenzene | ND | | 1000 | 740 | ug/L | | | 10/30/13 10:23 | 1000 |
| Ethylene Dibromide | ND | | 1000 | 730 | ug/L | | | 10/30/13 10:23 | 1000 |
| Iodomethane | ND | | 1000 | 300 | ug/L | | | 10/30/13 10:23 | 1000 |
| Methacrylonitrile | ND | | 5000 | 690 | ug/L | | | 10/30/13 10:23 | 1000 |
| Methyl methacrylate | ND | | 1000 | 610 | ug/L | | | 10/30/13 10:23 | 1000 |
| Methylene Chloride | ND | | 1000 | 440 | ug/L | | | 10/30/13 10:23 | 1000 |
| m-Xylene & p-Xylene | ND | | 2000 | 660 | ug/L | | | 10/30/13 10:23 | 1000 |
| o-Xylene | ND | | 1000 | 760 | ug/L | | | 10/30/13 10:23 | 1000 |
| Propionitrile | ND | | 10000 | 5800 | ug/L | | | 10/30/13 10:23 | 1000 |
| Styrene | ND | | 1000 | 730 | ug/L | | | 10/30/13 10:23 | 1000 |
| Tetrachloroethene | ND | | 1000 | 360 | ug/L | | | 10/30/13 10:23 | 1000 |
| Toluene | ND | | 1000 | 510 | ug/L | | | 10/30/13 10:23 | 1000 |
| Vinyl chloride | ND | | 1.0 | 0.90 | ug/L | | | 10/25/13 18:28 | 1 |
| trans-1,2-Dichloroethene | ND | | 1000 | 900 | ug/L | | | 10/30/13 10:23 | 1000 |
| trans-1,3-Dichloropropene | ND | | 1000 | 370 | ug/L | | | 10/30/13 10:23 | 1000 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: T8006**
**Date Collected: 10/18/13 11:15**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-6**
**Matrix: Water**

**Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| trans-1,4-Dichloro-2-butene | ND | | 5000 | 2100 | ug/L | | | 10/30/13 10:23 | 1000 |
| Trichloroethene | ND | | 1000 | 460 | ug/L | | | 10/30/13 10:23 | 1000 |
| Trichlorofluoromethane | ND | | 1000 | 880 | ug/L | | | 10/30/13 10:23 | 1000 |
| Vinyl acetate | ND | | 5000 | 850 | ug/L | | | 10/30/13 10:23 | 1000 |
| 2-Chloroethyl vinyl ether | ND | | 5.0 | 0.96 | ug/L | | | 10/25/13 18:28 | 1 |
| Diethyl ether | ND | | 1000 | 720 | ug/L | | | 10/30/13 10:23 | 1000 |
| Ethyl acetate | ND | | 1000 | 660 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1000 | 310 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,3-Dichlorobenzene | ND | | 1000 | 780 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,2-Dichlorobenzene | ND | | 1000 | 790 | ug/L | | | 10/30/13 10:23 | 1000 |
| 1,4-Dichlorobenzene | ND | | 1000 | 840 | ug/L | | | 10/30/13 10:23 | 1000 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *101* | | *66 - 137* | | *10/29/13 16:52* | *200* |
| *1,2-Dichloroethane-d4 (Surr)* | *105* | | *66 - 137* | | *10/30/13 10:23* | *1000* |
| *4-Bromofluorobenzene (Surr)* | *98* | | *73 - 120* | | *10/29/13 16:52* | *200* |
| *4-Bromofluorobenzene (Surr)* | *99* | | *73 - 120* | | *10/30/13 10:23* | *1000* |
| *Toluene-d8 (Surr)* | *103* | | *71 - 126* | | *10/25/13 18:28* | *1* |
| *1,2-Dichloroethane-d4 (Surr)* | *107* | | *66 - 137* | | *10/25/13 18:28* | *1* |
| *4-Bromofluorobenzene (Surr)* | *98* | | *73 - 120* | | *10/25/13 18:28* | *1* |
| *Toluene-d8 (Surr)* | *100* | | *71 - 126* | | *10/29/13 16:52* | *200* |
| *Toluene-d8 (Surr)* | *94* | | *71 - 126* | | *10/30/13 10:23* | *1000* |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: T8007**
**Date Collected: 10/18/13 10:22**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-7**
**Matrix: Water**

## Method: 8260C - Volatile Organic Compounds by GC/MS

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 20 | 7.0 | ug/L | | | 10/25/13 18:50 | 20 |
| 1,1,2,2-Tetrachloroethane | ND | | 20 | 4.2 | ug/L | | | 10/25/13 18:50 | 20 |
| 1,1,2-Trichloroethane | ND | | 20 | 4.6 | ug/L | | | 10/25/13 18:50 | 20 |
| **1,1-Dichloroethane** | **390** | | 20 | 7.6 | ug/L | | | 10/25/13 18:50 | 20 |
| **1,1-Dichloroethene** | **250** | | 20 | 5.8 | ug/L | | | 10/25/13 18:50 | 20 |
| 1,2,3-Trichloropropane | ND | | 20 | 18 | ug/L | | | 10/25/13 18:50 | 20 |
| 1,2-Dibromo-3-Chloropropane | ND | | 20 | 7.8 | ug/L | | | 10/25/13 18:50 | 20 |
| **1,2-Dichloroethane** | **270** | | 20 | 4.2 | ug/L | | | 10/25/13 18:50 | 20 |
| **1,2-Dichloropropane** | **25** | | 20 | 14 | ug/L | | | 10/25/13 18:50 | 20 |
| 2-Butanone (MEK) | ND | | 200 | 26 | ug/L | | | 10/25/13 18:50 | 20 |
| 2-Hexanone | ND | | 100 | 25 | ug/L | | | 10/25/13 18:50 | 20 |
| **4-Methyl-2-pentanone (MIBK)** | **57** | **J** | 100 | 42 | ug/L | | | 10/25/13 18:50 | 20 |
| Acetone | ND | | 200 | 60 | ug/L | | | 10/25/13 18:50 | 20 |
| Acetonitrile | ND | | 800 | 520 | ug/L | | | 10/25/13 18:50 | 20 |
| Acrolein | ND | | 400 | 360 | ug/L | | | 10/25/13 18:50 | 20 |
| Acrylonitrile | ND | | 100 | 17 | ug/L | | | 10/25/13 18:50 | 20 |
| 3-Chloro-1-propene | ND | | 20 | 8.8 | ug/L | | | 10/25/13 18:50 | 20 |
| **Benzene** | **69** | | 20 | 8.2 | ug/L | | | 10/25/13 18:50 | 20 |
| Dichlorobromomethane | ND | | 20 | 7.8 | ug/L | | | 10/25/13 18:50 | 20 |
| Bromoform | ND | | 20 | 5.2 | ug/L | | | 10/25/13 18:50 | 20 |
| Bromomethane | ND | | 20 | 14 | ug/L | | | 10/25/13 18:50 | 20 |
| Carbon disulfide | ND | | 20 | 3.8 | ug/L | | | 10/25/13 18:50 | 20 |
| **Carbon tetrachloride** | **930** | | 20 | 5.4 | ug/L | | | 10/25/13 18:50 | 20 |
| Chlorodibromomethane | ND | | 20 | 6.4 | ug/L | | | 10/25/13 18:50 | 20 |
| Chloroethane | ND | | 20 | 6.4 | ug/L | | | 10/25/13 18:50 | 20 |
| **Chloroform** | **520** | | 20 | 6.8 | ug/L | | | 10/25/13 18:50 | 20 |
| Chloromethane | ND | | 20 | 7.0 | ug/L | | | 10/25/13 18:50 | 20 |
| 2-Chloro-1,3-butadiene | ND | | 20 | 9.8 | ug/L | | | 10/25/13 18:50 | 20 |
| cis-1,3-Dichloropropene | ND | | 20 | 7.2 | ug/L | | | 10/25/13 18:50 | 20 |
| **Dibromomethane** | **19** | **J** | 20 | 8.2 | ug/L | | | 10/25/13 18:50 | 20 |
| Dichlorodifluoromethane | ND | | 20 | 14 | ug/L | | | 10/25/13 18:50 | 20 |
| Ethyl methacrylate | ND | | 20 | 12 | ug/L | | | 10/25/13 18:50 | 20 |
| **Ethylbenzene** | **48** | | 20 | 15 | ug/L | | | 10/25/13 18:50 | 20 |
| Ethylene Dibromide | ND | | 20 | 15 | ug/L | | | 10/25/13 18:50 | 20 |
| Iodomethane | ND | | 20 | 6.0 | ug/L | | | 10/25/13 18:50 | 20 |
| Methacrylonitrile | ND | | 100 | 14 | ug/L | | | 10/25/13 18:50 | 20 |
| Methyl methacrylate | ND | | 20 | 12 | ug/L | | | 10/25/13 18:50 | 20 |
| **m-Xylene & p-Xylene** | **96** | | 40 | 13 | ug/L | | | 10/25/13 18:50 | 20 |
| **o-Xylene** | **180** | | 20 | 15 | ug/L | | | 10/25/13 18:50 | 20 |
| Propionitrile | ND | | 200 | 120 | ug/L | | | 10/25/13 18:50 | 20 |
| Styrene | ND | | 20 | 15 | ug/L | | | 10/25/13 18:50 | 20 |
| **Tetrachloroethene** | **52** | | 20 | 7.2 | ug/L | | | 10/25/13 18:50 | 20 |
| **Toluene** | **130** | | 20 | 10 | ug/L | | | 10/25/13 18:50 | 20 |
| **Vinyl chloride** | **190** | **H** | 100 | 90 | ug/L | | | 11/05/13 00:27 | 100 |
| trans-1,2-Dichloroethene | ND | | 20 | 18 | ug/L | | | 10/25/13 18:50 | 20 |
| trans-1,3-Dichloropropene | ND | | 20 | 7.4 | ug/L | | | 10/25/13 18:50 | 20 |
| trans-1,4-Dichloro-2-butene | ND | | 100 | 42 | ug/L | | | 10/25/13 18:50 | 20 |
| Trichlorofluoromethane | ND | | 20 | 18 | ug/L | | | 10/25/13 18:50 | 20 |
| Vinyl acetate | ND | | 100 | 17 | ug/L | | | 10/25/13 18:50 | 20 |

**Client Sample ID: T8007**
**Date Collected: 10/18/13 10:22**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-7**
**Matrix: Water**

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 2-Chloroethyl vinyl ether | ND | H | 500 | 96 | ug/L | | | 11/05/13 00:27 | 100 |
| Diethyl ether | ND | | 20 | 14 | ug/L | | | 10/25/13 18:50 | 20 |
| **Ethyl acetate** | **45** | | 20 | 13 | ug/L | | | 10/25/13 18:50 | 20 |
| **1,1,2-Trichloro-1,2,2-trifluoroethane** | **1100** | | 20 | 6.2 | ug/L | | | 10/25/13 18:50 | 20 |
| **1,3-Dichlorobenzene** | **390** | | 20 | 16 | ug/L | | | 10/25/13 18:50 | 20 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *103* | | *66 - 137* | | *10/25/13 18:50* | *20* |
| *4-Bromofluorobenzene (Surr)* | *101* | | *73 - 120* | | *10/25/13 18:50* | *20* |
| *Toluene-d8 (Surr)* | *104* | | *71 - 126* | | *11/05/13 00:27* | *100* |
| *1,2-Dichloroethane-d4 (Surr)* | *110* | | *66 - 137* | | *11/05/13 00:27* | *100* |
| *4-Bromofluorobenzene (Surr)* | *102* | | *73 - 120* | | *11/05/13 00:27* | *100* |
| *Toluene-d8 (Surr)* | *100* | | *71 - 126* | | *10/25/13 18:50* | *20* |

## Method: 8260C - Volatile Organic Compounds by GC/MS - DL

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **1,1,1-Trichloroethane** | **2200** | | 100 | 82 | ug/L | | | 10/29/13 17:14 | 100 |
| **Chlorobenzene** | **2200** | | 100 | 75 | ug/L | | | 10/29/13 17:14 | 100 |
| **Methylene Chloride** | **2900** | | 100 | 44 | ug/L | | | 10/29/13 17:14 | 100 |
| **Trichloroethene** | **3300** | | 100 | 46 | ug/L | | | 10/29/13 17:14 | 100 |
| **1,2-Dichlorobenzene** | **11000** | **E** | 100 | 79 | ug/L | | | 10/29/13 17:14 | 100 |
| **1,4-Dichlorobenzene** | **2400** | | 100 | 84 | ug/L | | | 10/29/13 17:14 | 100 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *100* | | *66 - 137* | | *10/29/13 17:14* | *100* |
| *4-Bromofluorobenzene (Surr)* | *100* | | *73 - 120* | | *10/29/13 17:14* | *100* |
| *Toluene-d8 (Surr)* | *100* | | *71 - 126* | | *10/29/13 17:14* | *100* |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: T8009**
**Date Collected: 10/18/13 10:40**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-8**
**Matrix: Water**

## Method: 8260C - Volatile Organic Compounds by GC/MS

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **1,1,1,2-Tetrachloroethane** | **230** | | 200 | 70 | ug/L | | | 10/29/13 17:36 | 200 |
| **1,1,1-Trichloroethane** | **590** | | 200 | 160 | ug/L | | | 10/29/13 17:36 | 200 |
| **1,1,2,2-Tetrachloroethane** | **520** | | 200 | 42 | ug/L | | | 10/29/13 17:36 | 200 |
| **1,1,2-Trichloroethane** | **1800** | | 200 | 46 | ug/L | | | 10/29/13 17:36 | 200 |
| 1,1-Dichloroethane | ND | | 200 | 76 | ug/L | | | 10/29/13 17:36 | 200 |
| **1,1-Dichloroethene** | **66** | **J** | 200 | 58 | ug/L | | | 10/29/13 17:36 | 200 |
| 1,2,3-Trichloropropane | ND | | 200 | 180 | ug/L | | | 10/29/13 17:36 | 200 |
| 1,2-Dibromo-3-Chloropropane | ND | | 200 | 78 | ug/L | | | 10/29/13 17:36 | 200 |
| **1,2-Dichloroethane** | **1200** | | 200 | 42 | ug/L | | | 10/29/13 17:36 | 200 |
| 1,2-Dichloropropane | ND | | 200 | 140 | ug/L | | | 10/29/13 17:36 | 200 |
| 2-Butanone (MEK) | ND | | 2000 | 260 | ug/L | | | 10/29/13 17:36 | 200 |
| 2-Hexanone | ND | | 1000 | 250 | ug/L | | | 10/29/13 17:36 | 200 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 1000 | 420 | ug/L | | | 10/29/13 17:36 | 200 |
| Acetone | ND | | 2000 | 600 | ug/L | | | 10/29/13 17:36 | 200 |
| Acetonitrile | ND | | 8000 | 5200 | ug/L | | | 10/29/13 17:36 | 200 |
| Acrolein | ND | | 4000 | 3600 | ug/L | | | 10/29/13 17:36 | 200 |
| Acrylonitrile | ND | | 1000 | 170 | ug/L | | | 10/29/13 17:36 | 200 |
| 3-Chloro-1-propene | ND | | 200 | 88 | ug/L | | | 10/29/13 17:36 | 200 |
| **Benzene** | **120** | **J** | 200 | 82 | ug/L | | | 10/29/13 17:36 | 200 |
| Dichlorobromomethane | ND | | 200 | 78 | ug/L | | | 10/29/13 17:36 | 200 |
| Bromoform | ND | | 200 | 52 | ug/L | | | 10/29/13 17:36 | 200 |
| Bromomethane | ND | | 200 | 140 | ug/L | | | 10/29/13 17:36 | 200 |
| Carbon disulfide | ND | | 200 | 38 | ug/L | | | 10/29/13 17:36 | 200 |
| **Carbon tetrachloride** | **13000** | | 200 | 54 | ug/L | | | 10/29/13 17:36 | 200 |
| **Chlorobenzene** | **2600** | | 200 | 150 | ug/L | | | 10/29/13 17:36 | 200 |
| Chlorodibromomethane | ND | | 200 | 64 | ug/L | | | 10/29/13 17:36 | 200 |
| Chloroethane | ND | | 200 | 64 | ug/L | | | 10/29/13 17:36 | 200 |
| **Chloroform** | **4100** | | 200 | 68 | ug/L | | | 10/29/13 17:36 | 200 |
| Chloromethane | ND | | 200 | 70 | ug/L | | | 10/29/13 17:36 | 200 |
| 2-Chloro-1,3-butadiene | ND | | 200 | 98 | ug/L | | | 10/29/13 17:36 | 200 |
| cis-1,3-Dichloropropene | ND | | 200 | 72 | ug/L | | | 10/29/13 17:36 | 200 |
| **Dibromomethane** | **470** | | 200 | 82 | ug/L | | | 10/29/13 17:36 | 200 |
| Dichlorodifluoromethane | ND | | 200 | 140 | ug/L | | | 10/29/13 17:36 | 200 |
| Ethyl methacrylate | ND | | 200 | 120 | ug/L | | | 10/29/13 17:36 | 200 |
| **Ethylbenzene** | **200** | | 200 | 150 | ug/L | | | 10/29/13 17:36 | 200 |
| **Ethylene Dibromide** | **1500** | | 200 | 150 | ug/L | | | 10/29/13 17:36 | 200 |
| Iodomethane | ND | | 200 | 60 | ug/L | | | 10/29/13 17:36 | 200 |
| Methacrylonitrile | ND | | 1000 | 140 | ug/L | | | 10/29/13 17:36 | 200 |
| Methyl methacrylate | ND | | 200 | 120 | ug/L | | | 10/29/13 17:36 | 200 |
| **Methylene Chloride** | **5900** | | 200 | 88 | ug/L | | | 10/29/13 17:36 | 200 |
| **m-Xylene & p-Xylene** | **160** | **J** | 400 | 130 | ug/L | | | 10/29/13 17:36 | 200 |
| o-Xylene | ND | | 200 | 150 | ug/L | | | 10/29/13 17:36 | 200 |
| Propionitrile | ND | | 2000 | 1200 | ug/L | | | 10/29/13 17:36 | 200 |
| Styrene | ND | | 200 | 150 | ug/L | | | 10/29/13 17:36 | 200 |
| **Tetrachloroethene** | **730** | | 200 | 72 | ug/L | | | 10/29/13 17:36 | 200 |
| **Toluene** | **1000** | | 200 | 100 | ug/L | | | 10/29/13 17:36 | 200 |
| **Vinyl chloride** | **180** | | 20 | 18 | ug/L | | | 10/25/13 19:12 | 20 |
| trans-1,2-Dichloroethene | ND | | 200 | 180 | ug/L | | | 10/29/13 17:36 | 200 |
| trans-1,3-Dichloropropene | ND | | 200 | 74 | ug/L | | | 10/29/13 17:36 | 200 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: T8009**
**Date Collected: 10/18/13 10:40**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-8**
**Matrix: Water**

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| trans-1,4-Dichloro-2-butene | ND | | 1000 | 420 | ug/L | | | 10/29/13 17:36 | 200 |
| **Trichloroethene** | **6900** | | 200 | 92 | ug/L | | | 10/29/13 17:36 | 200 |
| Trichlorofluoromethane | ND | | 200 | 180 | ug/L | | | 10/29/13 17:36 | 200 |
| Vinyl acetate | ND | | 1000 | 170 | ug/L | | | 10/29/13 17:36 | 200 |
| 2-Chloroethyl vinyl ether | ND | | 100 | 19 | ug/L | | | 10/25/13 19:12 | 20 |
| Diethyl ether | ND | | 200 | 140 | ug/L | | | 10/29/13 17:36 | 200 |
| Ethyl acetate | ND | | 200 | 130 | ug/L | | | 10/29/13 17:36 | 200 |
| **1,1,2-Trichloro-1,2,2-trifluoroethane** | **1800** | | 200 | 62 | ug/L | | | 10/29/13 17:36 | 200 |
| 1,3-Dichlorobenzene | ND | | 200 | 160 | ug/L | | | 10/29/13 17:36 | 200 |
| **1,2-Dichlorobenzene** | **4300** | | 200 | 160 | ug/L | | | 10/29/13 17:36 | 200 |
| **1,4-Dichlorobenzene** | **1100** | | 200 | 170 | ug/L | | | 10/29/13 17:36 | 200 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *103* | | *66 - 137* | | *10/29/13 17:36* | *200* |
| *4-Bromofluorobenzene (Surr)* | *98* | | *73 - 120* | | *10/29/13 17:36* | *200* |
| *Toluene-d8 (Surr)* | *101* | | *71 - 126* | | *10/25/13 19:12* | *20* |
| *1,2-Dichloroethane-d4 (Surr)* | *104* | | *66 - 137* | | *10/25/13 19:12* | *20* |
| *4-Bromofluorobenzene (Surr)* | *101* | | *73 - 120* | | *10/25/13 19:12* | *20* |
| *Toluene-d8 (Surr)* | *100* | | *71 - 126* | | *10/29/13 17:36* | *200* |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: T8010**
**Date Collected: 10/18/13 10:50**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-9**
**Matrix: Water**

## Method: 8260C - Volatile Organic Compounds by GC/MS

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 1.0 | 0.35 | ug/L | | | 10/29/13 17:58 | 1 |
| 1,1,1-Trichloroethane | ND | | 1.0 | 0.82 | ug/L | | | 10/29/13 17:58 | 1 |
| **1,1,2,2-Tetrachloroethane** | **1.3** | | 1.0 | 0.21 | ug/L | | | 10/29/13 17:58 | 1 |
| **1,1,2-Trichloroethane** | **0.69** | **J** | 1.0 | 0.23 | ug/L | | | 10/29/13 17:58 | 1 |
| 1,1-Dichloroethane | ND | | 1.0 | 0.38 | ug/L | | | 10/29/13 17:58 | 1 |
| **1,1-Dichloroethene** | **0.61** | **J** | 1.0 | 0.29 | ug/L | | | 10/29/13 17:58 | 1 |
| 1,2,3-Trichloropropane | ND | | 1.0 | 0.89 | ug/L | | | 10/29/13 17:58 | 1 |
| 1,2-Dibromo-3-Chloropropane | ND | | 1.0 | 0.39 | ug/L | | | 10/29/13 17:58 | 1 |
| **1,2-Dichloroethane** | **0.72** | **J** | 1.0 | 0.21 | ug/L | | | 10/29/13 17:58 | 1 |
| 1,2-Dichloropropane | ND | | 1.0 | 0.72 | ug/L | | | 10/29/13 17:58 | 1 |
| 2-Butanone (MEK) | ND | | 10 | 1.3 | ug/L | | | 10/29/13 17:58 | 1 |
| 2-Hexanone | ND | | 5.0 | 1.2 | ug/L | | | 10/29/13 17:58 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 5.0 | 2.1 | ug/L | | | 10/29/13 17:58 | 1 |
| Acetone | ND | | 10 | 3.0 | ug/L | | | 10/29/13 17:58 | 1 |
| Acetonitrile | ND | | 40 | 26 | ug/L | | | 10/29/13 17:58 | 1 |
| Acrolein | ND | | 20 | 18 | ug/L | | | 10/29/13 17:58 | 1 |
| Acrylonitrile | ND | | 5.0 | 0.83 | ug/L | | | 10/29/13 17:58 | 1 |
| 3-Chloro-1-propene | ND | | 1.0 | 0.44 | ug/L | | | 10/29/13 17:58 | 1 |
| Benzene | ND | | 1.0 | 0.41 | ug/L | | | 10/29/13 17:58 | 1 |
| Dichlorobromomethane | ND | | 1.0 | 0.39 | ug/L | | | 10/29/13 17:58 | 1 |
| Bromoform | ND | | 1.0 | 0.26 | ug/L | | | 10/29/13 17:58 | 1 |
| Bromomethane | ND | | 1.0 | 0.69 | ug/L | | | 10/29/13 17:58 | 1 |
| Carbon disulfide | ND | | 1.0 | 0.19 | ug/L | | | 10/29/13 17:58 | 1 |
| **Carbon tetrachloride** | **1.3** | | 1.0 | 0.27 | ug/L | | | 10/29/13 17:58 | 1 |
| Chlorobenzene | ND | | 1.0 | 0.75 | ug/L | | | 10/29/13 17:58 | 1 |
| Chlorodibromomethane | ND | | 1.0 | 0.32 | ug/L | | | 10/29/13 17:58 | 1 |
| Chloroethane | ND | | 1.0 | 0.32 | ug/L | | | 10/29/13 17:58 | 1 |
| **Chloroform** | **11** | | 1.0 | 0.34 | ug/L | | | 10/29/13 17:58 | 1 |
| Chloromethane | ND | | 1.0 | 0.35 | ug/L | | | 10/29/13 17:58 | 1 |
| 2-Chloro-1,3-butadiene | ND | | 1.0 | 0.49 | ug/L | | | 10/29/13 17:58 | 1 |
| cis-1,3-Dichloropropene | ND | | 1.0 | 0.36 | ug/L | | | 10/29/13 17:58 | 1 |
| Dibromomethane | ND | | 1.0 | 0.41 | ug/L | | | 10/29/13 17:58 | 1 |
| Dichlorodifluoromethane | ND | | 1.0 | 0.68 | ug/L | | | 10/29/13 17:58 | 1 |
| Ethyl methacrylate | ND | | 1.0 | 0.59 | ug/L | | | 10/29/13 17:58 | 1 |
| Ethylbenzene | ND | | 1.0 | 0.74 | ug/L | | | 10/29/13 17:58 | 1 |
| Ethylene Dibromide | ND | | 1.0 | 0.73 | ug/L | | | 10/29/13 17:58 | 1 |
| Iodomethane | ND | | 1.0 | 0.30 | ug/L | | | 10/29/13 17:58 | 1 |
| Methacrylonitrile | ND | | 5.0 | 0.69 | ug/L | | | 10/29/13 17:58 | 1 |
| Methyl methacrylate | ND | | 1.0 | 0.61 | ug/L | | | 10/29/13 17:58 | 1 |
| Methylene Chloride | ND | | 1.0 | 0.44 | ug/L | | | 10/29/13 17:58 | 1 |
| m-Xylene & p-Xylene | ND | | 2.0 | 0.66 | ug/L | | | 10/29/13 17:58 | 1 |
| o-Xylene | ND | | 1.0 | 0.76 | ug/L | | | 10/29/13 17:58 | 1 |
| Propionitrile | ND | | 10 | 5.8 | ug/L | | | 10/29/13 17:58 | 1 |
| Styrene | ND | | 1.0 | 0.73 | ug/L | | | 10/29/13 17:58 | 1 |
| **Tetrachloroethene** | **1.1** | | 1.0 | 0.36 | ug/L | | | 10/29/13 17:58 | 1 |
| Toluene | ND | | 1.0 | 0.51 | ug/L | | | 10/29/13 17:58 | 1 |
| Vinyl chloride | ND | | 1.0 | 0.90 | ug/L | | | 10/29/13 17:58 | 1 |
| trans-1,2-Dichloroethene | ND | | 1.0 | 0.90 | ug/L | | | 10/29/13 17:58 | 1 |
| trans-1,3-Dichloropropene | ND | | 1.0 | 0.37 | ug/L | | | 10/29/13 17:58 | 1 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: T8010**
**Date Collected: 10/18/13 10:50**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-9**
**Matrix: Water**

**Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| trans-1,4-Dichloro-2-butene | ND | | 5.0 | 2.1 | ug/L | | | 10/29/13 17:58 | 1 |
| **Trichloroethene** | **49** | | 1.0 | 0.46 | ug/L | | | 10/29/13 17:58 | 1 |
| Trichlorofluoromethane | ND | | 1.0 | 0.88 | ug/L | | | 10/29/13 17:58 | 1 |
| Vinyl acetate | ND | | 5.0 | 0.85 | ug/L | | | 10/29/13 17:58 | 1 |
| 2-Chloroethyl vinyl ether | ND | | 5.0 | 0.96 | ug/L | | | 10/29/13 17:58 | 1 |
| Diethyl ether | ND | | 1.0 | 0.72 | ug/L | | | 10/29/13 17:58 | 1 |
| Ethyl acetate | ND | | 1.0 | 0.66 | ug/L | | | 10/29/13 17:58 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1.0 | 0.31 | ug/L | | | 10/29/13 17:58 | 1 |
| 1,3-Dichlorobenzene | ND | | 1.0 | 0.78 | ug/L | | | 10/29/13 17:58 | 1 |
| 1,2-Dichlorobenzene | ND | | 1.0 | 0.79 | ug/L | | | 10/29/13 17:58 | 1 |
| 1,4-Dichlorobenzene | ND | | 1.0 | 0.84 | ug/L | | | 10/29/13 17:58 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *101* | | *66 - 137* | | *10/29/13 17:58* | *1* |
| *4-Bromofluorobenzene (Surr)* | *98* | | *73 - 120* | | *10/29/13 17:58* | *1* |
| *Toluene-d8 (Surr)* | *101* | | *71 - 126* | | *10/29/13 17:58* | *1* |
| *1,2-Dichloroethane-d4 (Surr)* | *101* | | *66 - 137* | | *10/29/13 17:58* | *1* |
| *4-Bromofluorobenzene (Surr)* | *98* | | *73 - 120* | | *10/29/13 17:58* | *1* |
| *Toluene-d8 (Surr)* | *101* | | *71 - 126* | | *10/29/13 17:58* | *1* |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: TB**
**Date Collected: 10/18/13 11:00**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-10**
**Matrix: Water**

**Method: 8260C - Volatile Organic Compounds by GC/MS**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 1.0 | 0.35 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,1,1-Trichloroethane | ND | | 1.0 | 0.82 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | 1.0 | 0.21 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,1,2-Trichloroethane | ND | | 1.0 | 0.23 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,1-Dichloroethane | ND | | 1.0 | 0.38 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,1-Dichloroethene | ND | | 1.0 | 0.29 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,2,3-Trichloropropane | ND | | 1.0 | 0.89 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,2-Dibromo-3-Chloropropane | ND | | 1.0 | 0.39 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,2-Dichloroethane | ND | | 1.0 | 0.21 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,2-Dichloropropane | ND | | 1.0 | 0.72 | ug/L | | | 10/29/13 18:20 | 1 |
| 2-Butanone (MEK) | ND | | 10 | 1.3 | ug/L | | | 10/29/13 18:20 | 1 |
| 2-Hexanone | ND | | 5.0 | 1.2 | ug/L | | | 10/29/13 18:20 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 5.0 | 2.1 | ug/L | | | 10/29/13 18:20 | 1 |
| Acetone | ND | | 10 | 3.0 | ug/L | | | 10/29/13 18:20 | 1 |
| Acetonitrile | ND | | 40 | 26 | ug/L | | | 10/29/13 18:20 | 1 |
| Acrolein | ND | | 20 | 18 | ug/L | | | 10/29/13 18:20 | 1 |
| Acrylonitrile | ND | | 5.0 | 0.83 | ug/L | | | 10/29/13 18:20 | 1 |
| 3-Chloro-1-propene | ND | | 1.0 | 0.44 | ug/L | | | 10/29/13 18:20 | 1 |
| Benzene | ND | | 1.0 | 0.41 | ug/L | | | 10/29/13 18:20 | 1 |
| Dichlorobromomethane | ND | | 1.0 | 0.39 | ug/L | | | 10/29/13 18:20 | 1 |
| Bromoform | ND | | 1.0 | 0.26 | ug/L | | | 10/29/13 18:20 | 1 |
| Bromomethane | ND | | 1.0 | 0.69 | ug/L | | | 10/29/13 18:20 | 1 |
| Carbon disulfide | ND | | 1.0 | 0.19 | ug/L | | | 10/29/13 18:20 | 1 |
| Carbon tetrachloride | ND | | 1.0 | 0.27 | ug/L | | | 10/29/13 18:20 | 1 |
| Chlorobenzene | ND | | 1.0 | 0.75 | ug/L | | | 10/29/13 18:20 | 1 |
| Chlorodibromomethane | ND | | 1.0 | 0.32 | ug/L | | | 10/29/13 18:20 | 1 |
| Chloroethane | ND | | 1.0 | 0.32 | ug/L | | | 10/29/13 18:20 | 1 |
| Chloroform | ND | | 1.0 | 0.34 | ug/L | | | 10/29/13 18:20 | 1 |
| Chloromethane | ND | | 1.0 | 0.35 | ug/L | | | 10/29/13 18:20 | 1 |
| 2-Chloro-1,3-butadiene | ND | | 1.0 | 0.49 | ug/L | | | 10/29/13 18:20 | 1 |
| cis-1,3-Dichloropropene | ND | | 1.0 | 0.36 | ug/L | | | 10/29/13 18:20 | 1 |
| Dibromomethane | ND | | 1.0 | 0.41 | ug/L | | | 10/29/13 18:20 | 1 |
| Dichlorodifluoromethane | ND | | 1.0 | 0.68 | ug/L | | | 10/29/13 18:20 | 1 |
| Ethyl methacrylate | ND | | 1.0 | 0.59 | ug/L | | | 10/29/13 18:20 | 1 |
| Ethylbenzene | ND | | 1.0 | 0.74 | ug/L | | | 10/29/13 18:20 | 1 |
| Ethylene Dibromide | ND | | 1.0 | 0.73 | ug/L | | | 10/29/13 18:20 | 1 |
| Iodomethane | ND | | 1.0 | 0.30 | ug/L | | | 10/29/13 18:20 | 1 |
| Methacrylonitrile | ND | | 5.0 | 0.69 | ug/L | | | 10/29/13 18:20 | 1 |
| Methyl methacrylate | ND | | 1.0 | 0.61 | ug/L | | | 10/29/13 18:20 | 1 |
| Methylene Chloride | ND | | 1.0 | 0.44 | ug/L | | | 10/29/13 18:20 | 1 |
| m-Xylene & p-Xylene | ND | | 2.0 | 0.66 | ug/L | | | 10/29/13 18:20 | 1 |
| o-Xylene | ND | | 1.0 | 0.76 | ug/L | | | 10/29/13 18:20 | 1 |
| Propionitrile | ND | | 10 | 5.8 | ug/L | | | 10/29/13 18:20 | 1 |
| Styrene | ND | | 1.0 | 0.73 | ug/L | | | 10/29/13 18:20 | 1 |
| Tetrachloroethene | ND | | 1.0 | 0.36 | ug/L | | | 10/29/13 18:20 | 1 |
| Toluene | ND | | 1.0 | 0.51 | ug/L | | | 10/29/13 18:20 | 1 |
| trans-1,2-Dichloroethene | ND | | 1.0 | 0.90 | ug/L | | | 10/29/13 18:20 | 1 |
| trans-1,3-Dichloropropene | ND | | 1.0 | 0.37 | ug/L | | | 10/29/13 18:20 | 1 |
| trans-1,4-Dichloro-2-butene | ND | | 5.0 | 2.1 | ug/L | | | 10/29/13 18:20 | 1 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: TB**
**Date Collected: 10/18/13 11:00**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-10**
**Matrix: Water**

**Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Trichloroethene | ND | | 1.0 | 0.46 | ug/L | | | 10/29/13 18:20 | 1 |
| Trichlorofluoromethane | ND | | 1.0 | 0.88 | ug/L | | | 10/29/13 18:20 | 1 |
| Vinyl acetate | ND | | 5.0 | 0.85 | ug/L | | | 10/29/13 18:20 | 1 |
| 2-Chloroethyl vinyl ether | ND | | 5.0 | 0.96 | ug/L | | | 10/29/13 18:20 | 1 |
| Diethyl ether | ND | | 1.0 | 0.72 | ug/L | | | 10/29/13 18:20 | 1 |
| Ethyl acetate | ND | | 1.0 | 0.66 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1.0 | 0.31 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,3-Dichlorobenzene | ND | | 1.0 | 0.78 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,2-Dichlorobenzene | ND | | 1.0 | 0.79 | ug/L | | | 10/29/13 18:20 | 1 |
| 1,4-Dichlorobenzene | ND | | 1.0 | 0.84 | ug/L | | | 10/29/13 18:20 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *99* | | *66 - 137* | | *10/29/13 18:20* | *1* |
| *4-Bromofluorobenzene (Surr)* | *98* | | *73 - 120* | | *10/29/13 18:20* | *1* |
| *Toluene-d8 (Surr)* | *101* | | *71 - 126* | | *10/29/13 18:20* | *1* |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

## Method: 8260C - Volatile Organic Compounds by GC/MS

**Lab Sample ID: MB 480-147478/7**
**Matrix: Water**
**Analysis Batch: 147478**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 1.0 | 0.35 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,1,1-Trichloroethane | ND | | 1.0 | 0.82 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | 1.0 | 0.21 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,1,2-Trichloroethane | ND | | 1.0 | 0.23 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,1-Dichloroethane | ND | | 1.0 | 0.38 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,1-Dichloroethene | ND | | 1.0 | 0.29 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,2,3-Trichloropropane | ND | | 1.0 | 0.89 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,2-Dibromo-3-Chloropropane | ND | | 1.0 | 0.39 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,2-Dichloroethane | ND | | 1.0 | 0.21 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,2-Dichloropropane | ND | | 1.0 | 0.72 | ug/L | | | 10/25/13 11:09 | 1 |
| 2-Butanone (MEK) | ND | | 10 | 1.3 | ug/L | | | 10/25/13 11:09 | 1 |
| 2-Hexanone | ND | | 5.0 | 1.2 | ug/L | | | 10/25/13 11:09 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 5.0 | 2.1 | ug/L | | | 10/25/13 11:09 | 1 |
| Acetone | ND | | 10 | 3.0 | ug/L | | | 10/25/13 11:09 | 1 |
| Acetonitrile | ND | | 40 | 26 | ug/L | | | 10/25/13 11:09 | 1 |
| Acrolein | ND | | 20 | 18 | ug/L | | | 10/25/13 11:09 | 1 |
| Acrylonitrile | ND | | 5.0 | 0.83 | ug/L | | | 10/25/13 11:09 | 1 |
| 3-Chloro-1-propene | ND | | 1.0 | 0.44 | ug/L | | | 10/25/13 11:09 | 1 |
| Benzene | ND | | 1.0 | 0.41 | ug/L | | | 10/25/13 11:09 | 1 |
| Dichlorobromomethane | ND | | 1.0 | 0.39 | ug/L | | | 10/25/13 11:09 | 1 |
| Bromoform | ND | | 1.0 | 0.26 | ug/L | | | 10/25/13 11:09 | 1 |
| Bromomethane | ND | | 1.0 | 0.69 | ug/L | | | 10/25/13 11:09 | 1 |
| Carbon disulfide | ND | | 1.0 | 0.19 | ug/L | | | 10/25/13 11:09 | 1 |
| Carbon tetrachloride | ND | | 1.0 | 0.27 | ug/L | | | 10/25/13 11:09 | 1 |
| Chlorobenzene | ND | | 1.0 | 0.75 | ug/L | | | 10/25/13 11:09 | 1 |
| Chlorodibromomethane | ND | | 1.0 | 0.32 | ug/L | | | 10/25/13 11:09 | 1 |
| Chloroethane | ND | | 1.0 | 0.32 | ug/L | | | 10/25/13 11:09 | 1 |
| Chloroform | ND | | 1.0 | 0.34 | ug/L | | | 10/25/13 11:09 | 1 |
| Chloromethane | ND | | 1.0 | 0.35 | ug/L | | | 10/25/13 11:09 | 1 |
| 2-Chloro-1,3-butadiene | ND | | 1.0 | 0.49 | ug/L | | | 10/25/13 11:09 | 1 |
| cis-1,3-Dichloropropene | ND | | 1.0 | 0.36 | ug/L | | | 10/25/13 11:09 | 1 |
| Dibromomethane | ND | | 1.0 | 0.41 | ug/L | | | 10/25/13 11:09 | 1 |
| Dichlorodifluoromethane | ND | | 1.0 | 0.68 | ug/L | | | 10/25/13 11:09 | 1 |
| Ethyl methacrylate | ND | | 1.0 | 0.59 | ug/L | | | 10/25/13 11:09 | 1 |
| Ethylbenzene | ND | | 1.0 | 0.74 | ug/L | | | 10/25/13 11:09 | 1 |
| Ethylene Dibromide | ND | | 1.0 | 0.73 | ug/L | | | 10/25/13 11:09 | 1 |
| Iodomethane | ND | | 1.0 | 0.30 | ug/L | | | 10/25/13 11:09 | 1 |
| Methacrylonitrile | ND | | 5.0 | 0.69 | ug/L | | | 10/25/13 11:09 | 1 |
| Methyl methacrylate | ND | | 1.0 | 0.61 | ug/L | | | 10/25/13 11:09 | 1 |
| Methylene Chloride | ND | | 1.0 | 0.44 | ug/L | | | 10/25/13 11:09 | 1 |
| m-Xylene & p-Xylene | ND | | 2.0 | 0.66 | ug/L | | | 10/25/13 11:09 | 1 |
| o-Xylene | ND | | 1.0 | 0.76 | ug/L | | | 10/25/13 11:09 | 1 |
| Propionitrile | ND | | 10 | 5.8 | ug/L | | | 10/25/13 11:09 | 1 |
| Styrene | ND | | 1.0 | 0.73 | ug/L | | | 10/25/13 11:09 | 1 |
| Tetrachloroethene | ND | | 1.0 | 0.36 | ug/L | | | 10/25/13 11:09 | 1 |
| Toluene | ND | | 1.0 | 0.51 | ug/L | | | 10/25/13 11:09 | 1 |
| trans-1,2-Dichloroethene | ND | | 1.0 | 0.90 | ug/L | | | 10/25/13 11:09 | 1 |
| trans-1,3-Dichloropropene | ND | | 1.0 | 0.37 | ug/L | | | 10/25/13 11:09 | 1 |

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: MB 480-147478/7**
**Matrix: Water**
**Analysis Batch: 147478**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| trans-1,4-Dichloro-2-butene | ND | | 5.0 | 2.1 | ug/L | | | 10/25/13 11:09 | 1 |
| Trichloroethene | ND | | 1.0 | 0.46 | ug/L | | | 10/25/13 11:09 | 1 |
| Trichlorofluoromethane | ND | | 1.0 | 0.88 | ug/L | | | 10/25/13 11:09 | 1 |
| Vinyl acetate | ND | | 5.0 | 0.85 | ug/L | | | 10/25/13 11:09 | 1 |
| Diethyl ether | ND | | 1.0 | 0.72 | ug/L | | | 10/25/13 11:09 | 1 |
| Ethyl acetate | ND | | 1.0 | 0.66 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1.0 | 0.31 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,3-Dichlorobenzene | ND | | 1.0 | 0.78 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,2-Dichlorobenzene | ND | | 1.0 | 0.79 | ug/L | | | 10/25/13 11:09 | 1 |
| 1,4-Dichlorobenzene | ND | | 1.0 | 0.84 | ug/L | | | 10/25/13 11:09 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *104* | | *66 - 137* | | *10/25/13 11:09* | *1* |
| *4-Bromofluorobenzene (Surr)* | *100* | | *73 - 120* | | *10/25/13 11:09* | *1* |
| *Toluene-d8 (Surr)* | *102* | | *71 - 126* | | *10/25/13 11:09* | *1* |

**Lab Sample ID: LCS 480-147478/5**
**Matrix: Water**
**Analysis Batch: 147478**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | 25.0 | 23.7 | | ug/L | | 95 | 71 - 129 |
| 1,1-Dichloroethene | 25.0 | 23.7 | | ug/L | | 95 | 58 - 121 |
| 1,2-Dichloroethane | 25.0 | 23.5 | | ug/L | | 94 | 75 - 127 |
| Benzene | 25.0 | 23.3 | | ug/L | | 93 | 71 - 124 |
| Chlorobenzene | 25.0 | 22.9 | | ug/L | | 92 | 72 - 120 |
| Ethylbenzene | 25.0 | 23.7 | | ug/L | | 95 | 77 - 123 |
| m-Xylene & p-Xylene | 50.0 | 47.1 | | ug/L | | 94 | 76 - 122 |
| o-Xylene | 25.0 | 23.9 | | ug/L | | 95 | 76 - 122 |
| Tetrachloroethene | 25.0 | 23.0 | | ug/L | | 92 | 74 - 122 |
| Toluene | 25.0 | 22.7 | | ug/L | | 91 | 80 - 122 |
| trans-1,2-Dichloroethene | 25.0 | 23.7 | | ug/L | | 95 | 73 - 127 |
| Trichloroethene | 25.0 | 23.0 | | ug/L | | 92 | 74 - 123 |
| 1,2-Dichlorobenzene | 25.0 | 23.8 | | ug/L | | 95 | 80 - 124 |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *102* | | *66 - 137* |
| *4-Bromofluorobenzene (Surr)* | *101* | | *73 - 120* |
| *Toluene-d8 (Surr)* | *99* | | *71 - 126* |

**Lab Sample ID: MB 480-148529/6**
**Matrix: Water**
**Analysis Batch: 148529**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | ND | | 1.0 | 0.35 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,1,1-Trichloroethane | ND | | 1.0 | 0.82 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | 1.0 | 0.21 | ug/L | | | 10/30/13 09:45 | 1 |

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: MB 480-148529/6**
**Matrix: Water**
**Analysis Batch: 148529**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,2-Trichloroethane | ND | | 1.0 | 0.23 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,1-Dichloroethane | ND | | 1.0 | 0.38 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,1-Dichloroethene | ND | | 1.0 | 0.29 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,2,3-Trichloropropane | ND | | 1.0 | 0.89 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,2-Dibromo-3-Chloropropane | ND | | 1.0 | 0.39 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,2-Dichloroethane | ND | | 1.0 | 0.21 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,2-Dichloropropane | ND | | 1.0 | 0.72 | ug/L | | | 10/30/13 09:45 | 1 |
| 2-Butanone (MEK) | ND | | 10 | 1.3 | ug/L | | | 10/30/13 09:45 | 1 |
| 2-Hexanone | ND | | 5.0 | 1.2 | ug/L | | | 10/30/13 09:45 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 5.0 | 2.1 | ug/L | | | 10/30/13 09:45 | 1 |
| Acetone | ND | | 10 | 3.0 | ug/L | | | 10/30/13 09:45 | 1 |
| Acetonitrile | ND | | 40 | 26 | ug/L | | | 10/30/13 09:45 | 1 |
| Acrolein | ND | | 20 | 18 | ug/L | | | 10/30/13 09:45 | 1 |
| Acrylonitrile | ND | | 5.0 | 0.83 | ug/L | | | 10/30/13 09:45 | 1 |
| 3-Chloro-1-propene | ND | | 1.0 | 0.44 | ug/L | | | 10/30/13 09:45 | 1 |
| Benzene | ND | | 1.0 | 0.41 | ug/L | | | 10/30/13 09:45 | 1 |
| Dichlorobromomethane | ND | | 1.0 | 0.39 | ug/L | | | 10/30/13 09:45 | 1 |
| Bromoform | ND | | 1.0 | 0.26 | ug/L | | | 10/30/13 09:45 | 1 |
| Bromomethane | ND | | 1.0 | 0.69 | ug/L | | | 10/30/13 09:45 | 1 |
| Carbon disulfide | ND | | 1.0 | 0.19 | ug/L | | | 10/30/13 09:45 | 1 |
| Carbon tetrachloride | ND | | 1.0 | 0.27 | ug/L | | | 10/30/13 09:45 | 1 |
| Chlorobenzene | ND | | 1.0 | 0.75 | ug/L | | | 10/30/13 09:45 | 1 |
| Chlorodibromomethane | ND | | 1.0 | 0.32 | ug/L | | | 10/30/13 09:45 | 1 |
| Chloroethane | ND | | 1.0 | 0.32 | ug/L | | | 10/30/13 09:45 | 1 |
| Chloroform | ND | | 1.0 | 0.34 | ug/L | | | 10/30/13 09:45 | 1 |
| Chloromethane | ND | | 1.0 | 0.35 | ug/L | | | 10/30/13 09:45 | 1 |
| 2-Chloro-1,3-butadiene | ND | | 1.0 | 0.49 | ug/L | | | 10/30/13 09:45 | 1 |
| cis-1,3-Dichloropropene | ND | | 1.0 | 0.36 | ug/L | | | 10/30/13 09:45 | 1 |
| Dibromomethane | ND | | 1.0 | 0.41 | ug/L | | | 10/30/13 09:45 | 1 |
| Dichlorodifluoromethane | ND | | 1.0 | 0.68 | ug/L | | | 10/30/13 09:45 | 1 |
| Ethyl methacrylate | ND | | 1.0 | 0.59 | ug/L | | | 10/30/13 09:45 | 1 |
| Ethylbenzene | ND | | 1.0 | 0.74 | ug/L | | | 10/30/13 09:45 | 1 |
| Ethylene Dibromide | ND | | 1.0 | 0.73 | ug/L | | | 10/30/13 09:45 | 1 |
| Iodomethane | ND | | 1.0 | 0.30 | ug/L | | | 10/30/13 09:45 | 1 |
| Methacrylonitrile | ND | | 5.0 | 0.69 | ug/L | | | 10/30/13 09:45 | 1 |
| Methyl methacrylate | ND | | 1.0 | 0.61 | ug/L | | | 10/30/13 09:45 | 1 |
| Methylene Chloride | ND | | 1.0 | 0.44 | ug/L | | | 10/30/13 09:45 | 1 |
| m-Xylene & p-Xylene | ND | | 2.0 | 0.66 | ug/L | | | 10/30/13 09:45 | 1 |
| o-Xylene | ND | | 1.0 | 0.76 | ug/L | | | 10/30/13 09:45 | 1 |
| Propionitrile | ND | | 10 | 5.8 | ug/L | | | 10/30/13 09:45 | 1 |
| Styrene | ND | | 1.0 | 0.73 | ug/L | | | 10/30/13 09:45 | 1 |
| Tetrachloroethene | ND | | 1.0 | 0.36 | ug/L | | | 10/30/13 09:45 | 1 |
| Toluene | ND | | 1.0 | 0.51 | ug/L | | | 10/30/13 09:45 | 1 |
| trans-1,2-Dichloroethene | ND | | 1.0 | 0.90 | ug/L | | | 10/30/13 09:45 | 1 |
| trans-1,3-Dichloropropene | ND | | 1.0 | 0.37 | ug/L | | | 10/30/13 09:45 | 1 |
| trans-1,4-Dichloro-2-butene | ND | | 5.0 | 2.1 | ug/L | | | 10/30/13 09:45 | 1 |
| Trichloroethene | ND | | 1.0 | 0.46 | ug/L | | | 10/30/13 09:45 | 1 |
| Trichlorofluoromethane | ND | | 1.0 | 0.88 | ug/L | | | 10/30/13 09:45 | 1 |

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: MB 480-148529/6**
**Matrix: Water**
**Analysis Batch: 148529**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl acetate | ND | | 5.0 | 0.85 | ug/L | | | 10/30/13 09:45 | 1 |
| Diethyl ether | ND | | 1.0 | 0.72 | ug/L | | | 10/30/13 09:45 | 1 |
| Ethyl acetate | ND | | 1.0 | 0.66 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1.0 | 0.31 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,3-Dichlorobenzene | ND | | 1.0 | 0.78 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,2-Dichlorobenzene | ND | | 1.0 | 0.79 | ug/L | | | 10/30/13 09:45 | 1 |
| 1,4-Dichlorobenzene | ND | | 1.0 | 0.84 | ug/L | | | 10/30/13 09:45 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *104* | | *66 - 137* | | *10/30/13 09:45* | *1* |
| *4-Bromofluorobenzene (Surr)* | *100* | | *73 - 120* | | *10/30/13 09:45* | *1* |
| *Toluene-d8 (Surr)* | *95* | | *71 - 126* | | *10/30/13 09:45* | *1* |

**Lab Sample ID: LCS 480-148529/5**
**Matrix: Water**
**Analysis Batch: 148529**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | 25.0 | 27.1 | | ug/L | | 109 | 71 - 129 |
| 1,1-Dichloroethene | 25.0 | 27.1 | | ug/L | | 108 | 58 - 121 |
| 1,2-Dichloroethane | 25.0 | 26.5 | | ug/L | | 106 | 75 - 127 |
| Benzene | 25.0 | 26.9 | | ug/L | | 108 | 71 - 124 |
| Chlorobenzene | 25.0 | 24.1 | | ug/L | | 96 | 72 - 120 |
| Ethylbenzene | 25.0 | 24.5 | | ug/L | | 98 | 77 - 123 |
| m-Xylene & p-Xylene | 50.0 | 48.1 | | ug/L | | 96 | 76 - 122 |
| o-Xylene | 25.0 | 23.9 | | ug/L | | 96 | 76 - 122 |
| Tetrachloroethene | 25.0 | 22.9 | | ug/L | | 92 | 74 - 122 |
| Toluene | 25.0 | 24.3 | | ug/L | | 97 | 80 - 122 |
| trans-1,2-Dichloroethene | 25.0 | 26.2 | | ug/L | | 105 | 73 - 127 |
| Trichloroethene | 25.0 | 25.9 | | ug/L | | 103 | 74 - 123 |
| 1,2-Dichlorobenzene | 25.0 | 23.9 | | ug/L | | 96 | 80 - 124 |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *106* | | *66 - 137* |
| *4-Bromofluorobenzene (Surr)* | *96* | | *73 - 120* |
| *Toluene-d8 (Surr)* | *96* | | *71 - 126* |

**Lab Sample ID: 480-48350-6 MS**
**Matrix: Water**
**Analysis Batch: 148529**

**Client Sample ID: T8006**
**Prep Type: Total/NA**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | ND | | 25000 | 27600 | | ug/L | | 110 | 71 - 129 |
| 1,1-Dichloroethene | ND | | 25000 | 27900 | | ug/L | | 112 | 58 - 121 |
| 1,2-Dichloroethane | ND | | 25000 | 26700 | | ug/L | | 107 | 75 - 127 |
| Benzene | ND | | 25000 | 27400 | | ug/L | | 110 | 71 - 124 |
| Chlorobenzene | ND | | 25000 | 25800 | | ug/L | | 103 | 72 - 120 |
| Ethylbenzene | ND | | 25000 | 25800 | | ug/L | | 103 | 77 - 123 |

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: 480-48350-6 MS**
**Matrix: Water**
**Analysis Batch: 148529**

**Client Sample ID: T8006**
**Prep Type: Total/NA**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| m-Xylene & p-Xylene | ND | | 50000 | 50900 | | ug/L | | 102 | 76 - 122 |
| o-Xylene | ND | | 25000 | 25000 | | ug/L | | 100 | 76 - 122 |
| Tetrachloroethene | ND | | 25000 | 24800 | | ug/L | | 99 | 74 - 122 |
| Toluene | ND | | 25000 | 25600 | | ug/L | | 102 | 80 - 122 |
| trans-1,2-Dichloroethene | ND | | 25000 | 26900 | | ug/L | | 108 | 73 - 127 |
| Trichloroethene | ND | | 25000 | 27100 | | ug/L | | 108 | 74 - 123 |
| 1,2-Dichlorobenzene | ND | | 25000 | 24500 | | ug/L | | 98 | 80 - 124 |

| *Surrogate* | *MS %Recovery* | *MS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *107* | | *66 - 137* |
| *4-Bromofluorobenzene (Surr)* | *101* | | *73 - 120* |
| *Toluene-d8 (Surr)* | *100* | | *71 - 126* |

**Lab Sample ID: 480-48350-6 MSD**
**Matrix: Water**
**Analysis Batch: 148529**

**Client Sample ID: T8006**
**Prep Type: Total/NA**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | ND | | 25000 | 27700 | | ug/L | | 111 | 71 - 129 | 0 | 20 |
| 1,1-Dichloroethene | ND | | 25000 | 27100 | | ug/L | | 108 | 58 - 121 | 3 | 16 |
| 1,2-Dichloroethane | ND | | 25000 | 26600 | | ug/L | | 106 | 75 - 127 | 1 | 20 |
| Benzene | ND | | 25000 | 27100 | | ug/L | | 108 | 71 - 124 | 1 | 13 |
| Chlorobenzene | ND | | 25000 | 24300 | | ug/L | | 97 | 72 - 120 | 6 | 25 |
| Ethylbenzene | ND | | 25000 | 24800 | | ug/L | | 99 | 77 - 123 | 4 | 15 |
| m-Xylene & p-Xylene | ND | | 50000 | 49000 | | ug/L | | 98 | 76 - 122 | 4 | 16 |
| o-Xylene | ND | | 25000 | 24000 | | ug/L | | 96 | 76 - 122 | 4 | 16 |
| Tetrachloroethene | ND | | 25000 | 23300 | | ug/L | | 93 | 74 - 122 | 6 | 20 |
| Toluene | ND | | 25000 | 24500 | | ug/L | | 98 | 80 - 122 | 4 | 15 |
| trans-1,2-Dichloroethene | ND | | 25000 | 26700 | | ug/L | | 107 | 73 - 127 | 1 | 20 |
| Trichloroethene | ND | | 25000 | 26300 | | ug/L | | 105 | 74 - 123 | 3 | 16 |
| 1,2-Dichlorobenzene | ND | | 25000 | 23700 | | ug/L | | 95 | 80 - 124 | 3 | 20 |

| *Surrogate* | *MSD %Recovery* | *MSD Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *103* | | *66 - 137* |
| *4-Bromofluorobenzene (Surr)* | *95* | | *73 - 120* |
| *Toluene-d8 (Surr)* | *95* | | *71 - 126* |

**Lab Sample ID: MB 480-149692/5**
**Matrix: Water**
**Analysis Batch: 149692**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl chloride | ND | | 1.0 | 0.90 | ug/L | | | 11/04/13 23:05 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *104* | | *66 - 137* | | *11/04/13 23:05* | *1* |
| *4-Bromofluorobenzene (Surr)* | *103* | | *73 - 120* | | *11/04/13 23:05* | *1* |

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: MB 480-149692/5**
**Matrix: Water**
**Analysis Batch: 149692**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Surrogate | MB %Recovery | MB Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| Toluene-d8 (Surr) | 106 | | 71 - 126 | | 11/04/13 23:05 | 1 |

**Lab Sample ID: LCS 480-149692/4**
**Matrix: Water**
**Analysis Batch: 149692**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Vinyl chloride | 25.0 | 24.4 | | ug/L | | 98 | 65 - 133 |

| Surrogate | LCS %Recovery | LCS Qualifier | Limits |
|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 105 | | 66 - 137 |
| 4-Bromofluorobenzene (Surr) | 105 | | 73 - 120 |
| Toluene-d8 (Surr) | 104 | | 71 - 126 |

**Lab Sample ID: LCSD 480-149692/26**
**Matrix: Water**
**Analysis Batch: 149692**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl chloride | 25.0 | 23.4 | | ug/L | | 94 | 65 - 133 | 4 | 15 |

| Surrogate | LCSD %Recovery | LCSD Qualifier | Limits |
|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 110 | | 66 - 137 |
| 4-Bromofluorobenzene (Surr) | 103 | | 73 - 120 |
| Toluene-d8 (Surr) | 107 | | 71 - 126 |

**Lab Sample ID: MB 480-158160/7**
**Matrix: Water**
**Analysis Batch: 158160**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl chloride | ND | | 1.0 | 0.90 | ug/L | | | 10/25/13 11:09 | 1 |
| 2-Chloroethyl vinyl ether | ND | | 5.0 | 0.96 | ug/L | | | 10/25/13 11:09 | 1 |

| Surrogate | MB %Recovery | MB Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 104 | | 66 - 137 | | 10/25/13 11:09 | 1 |
| 4-Bromofluorobenzene (Surr) | 100 | | 73 - 120 | | 10/25/13 11:09 | 1 |
| Toluene-d8 (Surr) | 102 | | 71 - 126 | | 10/25/13 11:09 | 1 |

**Lab Sample ID: LCS 480-158160/5**
**Matrix: Water**
**Analysis Batch: 158160**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Vinyl chloride | 25.0 | 22.7 | | ug/L | | 91 | 65 - 133 |
| 2-Chloroethyl vinyl ether | 125 | 120 | | ug/L | | 96 | 70 - 129 |

## Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

**Lab Sample ID: LCS 480-158160/5**
**Matrix: Water**
**Analysis Batch: 158160**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Surrogate | LCS %Recovery | LCS Qualifier | Limits |
|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 102 | | 66 - 137 |
| 4-Bromofluorobenzene (Surr) | 101 | | 73 - 120 |
| Toluene-d8 (Surr) | 99 | | 71 - 126 |

**Lab Sample ID: MB 480-158169/7**
**Matrix: Water**
**Analysis Batch: 158169**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl chloride | ND | | 1.0 | 0.90 | ug/L | | | 10/29/13 11:07 | 1 |
| 2-Chloroethyl vinyl ether | ND | | 5.0 | 0.96 | ug/L | | | 10/29/13 11:07 | 1 |

| Surrogate | MB %Recovery | MB Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 101 | | 66 - 137 | | 10/29/13 11:07 | 1 |
| 4-Bromofluorobenzene (Surr) | 98 | | 73 - 120 | | 10/29/13 11:07 | 1 |
| Toluene-d8 (Surr) | 101 | | 71 - 126 | | 10/29/13 11:07 | 1 |

**Lab Sample ID: LCS 480-158169/5**
**Matrix: Water**
**Analysis Batch: 158169**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Vinyl chloride | 25.0 | 19.7 | | ug/L | | 79 | 65 - 133 |
| 2-Chloroethyl vinyl ether | 125 | 115 | | ug/L | | 92 | 70 - 129 |

| Surrogate | LCS %Recovery | LCS Qualifier | Limits |
|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 100 | | 66 - 137 |
| 4-Bromofluorobenzene (Surr) | 99 | | 73 - 120 |
| Toluene-d8 (Surr) | 98 | | 71 - 126 |

# Lab Chronicle

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

## Client Sample ID: T8005

**Lab Sample ID: 480-48350-5**
**Matrix: Water**
**Date Collected: 10/18/13 10:30**
**Date Received: 10/21/13 09:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 8260C | | 80 | 148248 | 10/29/13 16:31 | RAL | TAL BUF |
| Total/NA | Analysis | 8260C | | 1 | 158160 | 10/25/13 18:06 | MKP | TAL BUF |

## Client Sample ID: T8006

**Lab Sample ID: 480-48350-6**
**Matrix: Water**
**Date Collected: 10/18/13 11:15**
**Date Received: 10/21/13 09:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 8260C | | 200 | 148248 | 10/29/13 16:52 | RAL | TAL BUF |
| Total/NA | Analysis | 8260C | | 1000 | 148529 | 10/30/13 10:23 | NMD1 | TAL BUF |
| Total/NA | Analysis | 8260C | | 1 | 158160 | 10/25/13 18:28 | MKP | TAL BUF |

## Client Sample ID: T8007

**Lab Sample ID: 480-48350-7**
**Matrix: Water**
**Date Collected: 10/18/13 10:22**
**Date Received: 10/21/13 09:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 8260C | | 20 | 147478 | 10/25/13 18:50 | NMD1 | TAL BUF |
| Total/NA | Analysis | 8260C | DL | 100 | 148248 | 10/29/13 17:14 | RAL | TAL BUF |
| Total/NA | Analysis | 8260C | | 100 | 149692 | 11/05/13 00:27 | NQN | TAL BUF |

## Client Sample ID: T8009

**Lab Sample ID: 480-48350-8**
**Matrix: Water**
**Date Collected: 10/18/13 10:40**
**Date Received: 10/21/13 09:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 8260C | | 200 | 148248 | 10/29/13 17:36 | RAL | TAL BUF |
| Total/NA | Analysis | 8260C | | 20 | 158160 | 10/25/13 19:12 | MKP | TAL BUF |

## Client Sample ID: T8010

**Lab Sample ID: 480-48350-9**
**Matrix: Water**
**Date Collected: 10/18/13 10:50**
**Date Received: 10/21/13 09:00**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 8260C | | 1 | 148248 | 10/29/13 17:58 | RAL | TAL BUF |
| Total/NA | Analysis | 8260C | | 1 | 158169 | 10/29/13 17:58 | MKP | TAL BUF |

# Lab Chronicle

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

**Client Sample ID: TB**
**Date Collected: 10/18/13 11:00**
**Date Received: 10/21/13 09:00**

**Lab Sample ID: 480-48350-10**
**Matrix: Water**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 8260C | | 1 | 148248 | 10/29/13 18:20 | RAL | TAL BUF |

**Laboratory References:**

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

# Certification Summary

Client: CWM Chemical Services Inc
TestAmerica Job ID: 480-48350-1
Project/Site: Model City Landfill: GWES Tank Sampling

## Laboratory: TestAmerica Buffalo

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Arkansas DEQ | State Program | 6 | 88-0686 | 07-06-14 |
| California | NELAP | 9 | 1169CA | 09-30-14 |
| Connecticut | State Program | 1 | PH-0568 | 09-30-14 |
| Florida | NELAP | 4 | E87672 | 06-30-14 |
| Georgia | State Program | 4 | N/A | 03-31-14 |
| Illinois | NELAP | 5 | 200003 | 09-30-14 |
| Iowa | State Program | 7 | 374 | 03-01-15 |
| Kansas | NELAP | 7 | E-10187 | 01-31-14 |
| Kentucky | State Program | 4 | 90029 | 12-31-13 * |
| Kentucky (UST) | State Program | 4 | 30 | 04-01-14 |
| Louisiana | NELAP | 6 | 02031 | 06-30-14 |
| Maine | State Program | 1 | NY00044 | 12-04-14 |
| Maryland | State Program | 3 | 294 | 03-31-14 |
| Massachusetts | State Program | 1 | M-NY044 | 06-30-14 |
| Michigan | State Program | 5 | 9937 | 04-01-14 |
| Minnesota | NELAP | 5 | 036-999-337 | 12-31-13 * |
| New Hampshire | NELAP | 1 | 2337 | 11-17-14 |
| New Jersey | NELAP | 2 | NY455 | 06-30-14 |
| New York | NELAP | 2 | 10026 | 04-01-14 |
| North Dakota | State Program | 8 | R-176 | 03-31-14 |
| Oklahoma | State Program | 6 | 9421 | 08-31-14 |
| Oregon | NELAP | 10 | NY200003 | 06-09-14 |
| Pennsylvania | NELAP | 3 | 68-00281 | 07-31-14 |
| Rhode Island | State Program | 1 | LAO00328 | 12-31-13 * |
| Tennessee | State Program | 4 | TN02970 | 04-01-14 |
| Texas | NELAP | 6 | T104704412-11-2 | 07-31-14 |
| USDA | Federal | | P330-11-00386 | 11-22-14 |
| Virginia | NELAP | 3 | 460185 | 09-14-14 |
| Washington | State Program | 10 | C784 | 02-10-14 |
| West Virginia DEP | State Program | 3 | 252 | 03-31-14 |
| Wisconsin | State Program | 5 | 998310390 | 08-31-14 |

* Expired certification is currently pending renewal and is considered valid.

# Method Summary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill: GWES Tank Sampling

TestAmerica Job ID: 480-48350-1

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 8260C | Volatile Organic Compounds by GC/MS | SW846 | TAL BUF |

**Protocol References:**

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# WASTE MANAGEMENT CHAIN OF CUSTODY

Internal Use Only

| Sampler Name (Print) | Signature: |
|---|---|
| J. Hardy | Jessica Hardy |
| Site Name: CWM | Spec Request: AC |
| Site Location: Model City, NY | Event Name: GWES Tank Sampling |

| TA Sample No. | Client Sample ID | Sampling Date | Sampling Time | MATRIX | COMP / GRAB | 8260VOA | T-METALS | D-METALS | CHLORIDE/SULFATE/NITRATE PH, TSS, TDS | ALK / CARB / BICARB | HARDNESS | $NH_3$ / COD | TOC | 8260VOA | | | | | Additional Analysis/Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | INDICATE PRESERVATIVE BY USING KEY BELOW (OPTIONAL) | | | | | | | | | | | | | | | |
| | | | | INDICATE CONTAINER BY USING KEY BELOW | | | | | | | | | | | | | | | |
| | T8005 | 10-18-13 | 1030hr | W | G | 2/1 | | | | | | | | 2/6 | | | | | |
| | T8006 | ↓ | 1115 | ↓ | ↓ | ↓ | | | | | | | | ↓ | | | | | |
| | T8007 | | 1022 | | | | | | | | | | | | | | | | |
| | T8009 | | 1040 | | | | | | | | | | | | | | | | |
| | T8010 | | 1050 | | | | | | | | | | | | | | | | |
| | TB | | 1100 | ↓ | ↓ | | | | | | | | | ↓ | | | | | |

| RELINQUISHED BY | COMPANY | DATE | TIME | RECEIVED BY | COMPANY | DATE | TIME |
|---|---|---|---|---|---|---|---|
| Karen S. Mehr | CWM | 10/18/13 | 1130 | Unknown | TA | 10/21/13 | 0900 |
| RELINQUISHED BY | COMPANY | DATE | TIME | RECEIVED BY | COMPANY | DATE | TIME |
| RELINQUISHED BY | COMPANY | DATE | TIME | RECEIVED BY | COMPANY | DATE | TIME |

**Matrix Key**
WW = Wastewater
W = Water/Groundwater
S = Solid
SI = Sludge
MS = Miscellaneous Solids
OI = Oil
A = Air
O = _____

**Container Key**
1. Plastic
2. VOA Vial
3. Sterile Plastic
4. Amber Glass
5. Widemouth Glass
6. Other

**Preservation Key**
1. HCl, Cool to 4°
2. $H_2SO_4$, Cool to 4°
3. $HNO_3$, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn Acetate, Cool to 4°
6. Cool to 4°
7. None

COMMENTS: Temp 4.6 ICE #1

Courier:

Bill of Lading:

TAL-8219 (1108)

Where a purchaser (Client) places an order for laboratory, consulting or sampling services from TestAmerica Laboratories, Inc., a Delaware corporation (referred to as "TestAmerica"), TestAmerica shall provide the ordered services pursuant to these Terms and Conditions, the related Quotation or Price Schedule, as agreed in a negotiated contract. In the absence of a written agreement to the contrary, the Order constitutes an acceptance of the Client or TestAmerica's offer to do business under these Terms and Conditions, and an agreement to be bound by these Terms and Conditions. No contrary or additional terms and conditions expressed in a Client's document shall be deemed to become a part of the contract created upon acceptance of these Terms and Conditions, unless accepted by TestAmerica in writing.

## 1. ORDERS AND RECEIPT OF SAMPLES

1.1 The Client may place the Order (i.e., specify a Scope of Work) either by submitting a purchase order to TestAmerica in writing or by telephone subsequently confirmed in writing, or by negotiated contract. Whichever option the Client selects for placing the Order, the Order shall not be valid unless it contains sufficient specification to enable TestAmerica to carry out the Client's requirements. In particular, samples must be accompanied by: a) adequate instruction on type of analysis requested, and b) complete written disclosure of the known or suspected presence of any hazardous substances, as defined by applicable federal or state law. Where any samples which were not accompanied by the required disclosure, cause interruptions in the lab's ability to process work due to contamination or instruments or work areas, the Client will be responsible for the costs of clean up and recovery.

1.2 The Client shall provide one week's advance notice of the sample delivery schedule, or any changes to the schedule, wherever possible. Upon timely delivery of samples, TestAmerica will use its best efforts to meet mutually agreed turnaround times. All turnaround times will be calculated from the point in time when TestAmerica has determined that it can proceed with defined work following receipt, inspection of samples, and resolution of any discrepancies (in Chain-of-Custody forms and project guidance regarding work to be done (Sample Delivery Acceptance). TestAmerica reserves the right to modify or delay its turnaround time commitment, to change the date upon which TestAmerica will accept samples, or refuse Sample Delivery Acceptance for the affected samples.

1.3 TestAmerica reserves the right, exercisable at any time, to refuse or revoke Sample Delivery Acceptance for any sample which in the sole judgment of TestAmerica: a) is of unsuitable volume, b) may pose a risk or become unsuitable for handling, transport, or processing and may, therefore, adversely affect, for any reason, whether or not due to the presence in the sample of any hazardous substance and whether or not such presence has been disclosed to TestAmerica by the Client, or c) holding times cannot be met, due to passage of more than 48 hours from the time of sampling or 1/2 the holding time for the requested test, whichever is less.

1.4 Prior to Sample Delivery Acceptance, the entire risk of loss or damage to samples remains with the Client, except where TestAmerica provides courier services. In no event will TestAmerica have any responsibility or liability for the action or inaction of any carrier shipping or delivering any sample (or from TestAmerica's premises). Client is responsible to assure that any sample containing any hazardous substance which is to be delivered to TestAmerica's premises will be packaged, labeled, transported and delivered properly and in accordance with applicable laws.

## 2. PAYMENT TERMS

2.1 Services performed by TestAmerica will be in accordance with prices quoted and later confirmed in writing or as stated in the Price Schedule. Quoted prices do not include sales tax. Applicable sales tax will be added to invoices where required by law. Where requested services on a group of samples received are logged in together at the laboratory total less than $200, there will be a minimum transaction charge of $200 for the sample group, or as shown on any related quote from TestAmerica. An Environmental Management Fee of 5% of the invoice value will also be applied, at TestAmerica's discretion.

2.2 Invoices may be submitted to Client upon completion of any sample delivery group. Billing corrections must be requested within 30 days of invoice date. Payment in advance is required for all Clients except those whose credit has been established with TestAmerica. For Clients with approved credit, payment terms are net 30 days from the date to invoice by TestAmerica. All overdue payments are subject to an additional interest and service charge of one and one-half percent (1.5%) (or the maximum rate permissible by law, whichever is lesser) per month or portion thereof from the due date until the date of payment. All fees are charged or billed directly to the Client.

2.3 TestAmerica may suspend work and withhold delivery of data under this order at any time in the event Client fails to make timely payment of its invoices. Client shall be responsible for all costs and expenses of collection including reasonable attorney's fees. TestAmerica reserves the right to refuse to proceed with work at any time based upon an unfavorable Client credit report.

## 3. CHANGE ORDERS, TERMINATION

3.1 Changes to the Scope of Work, price, or result delivery date may be initiated by TestAmerica after Sample Delivery Acceptance due to any condition which conflicts with analytical QA or other protocols warranted in these Terms and Conditions. TestAmerica will not proceed with such changes until an agreement with the Client is reached on the amount of any cost, schedule change or technical change to the Scope of Work, and such agreement is documented in writing.

3.2 Changes to the Scope of Work, including but not limited to increasing or decreasing the work, changing test and analysis specification, or acceleration in the performance in writing may result in a change in cost and delivery acceptance. Such a change will be documented in writing and may result in a change in cost and turnaround time commitment. TestAmerica's acceptance of such changes is contingent upon technical feasibility and operational capacity.

3.3 Suspension of termination of all or any part of the work may be initiated by the Client. TestAmerica will be compensated consistent with Section 2 of these Terms and Conditions. TestAmerica will complete all work in progress and be paid in full for all work completed.

## 4. WARRANTIES AND LIABILITY

4.1 Where applicable, TestAmerica will use analytical methodologies which are in substantial conformity with published test methods. TestAmerica has implemented these methods in its Laboratory Quality Manuals and referenced Standard Operating Procedures and where the nature or composition of the sample requires it, TestAmerica reserves the right to deviate from these methodologies as necessary or appropriate, based on its reasonable judgment of TestAmerica, which deviations, if any, will be made on a basis consistent with recognized standards of the industry and/or TestAmerica's Laboratory Quality Manuals. Client may request that TestAmerica perform according to a mutually agreed Quality Assurance Project Plan (QAPP). In the event that samples arrive prior to agreement on a QAPP, TestAmerica will proceed with analyses under its standard Quality Manuals then in effect, and TestAmerica will not be responsible for any reanalyzing or other charges if work must be repeated to comply with a subsequently finalized QAPP.

4.2 TestAmerica shall start preparation and/or analysis within holding times provided that Sample Delivery Acceptance occurs within 48 hours of sampling or 1/2 of the holding time for the test, whichever is less. Where resolution of inconsistencies leading to Sample Delivery Acceptance does not occur within this period, TestAmerica will use its best efforts to meet holding times and will proceed with the work provided that, in TestAmerica's reasonable judgment of TestAmerica, which deviations, if any, will be made on a basis consistent with recognized standards of the industry and/or TestAmerica's Laboratory Quality Manuals. Client may request that TestAmerica perform according to a mutually agreed Quality Assurance Project Plan (QAPP). In the event that samples arrive prior to agreement on a QAPP, TestAmerica will proceed with analyses under its standard Quality Manuals then in effect, and TestAmerica will not be responsible for any reanalyzing or other charges if work must be repeated to comply with a subsequently finalized QAPP.

4.3 TestAmerica warrants that it possesses and maintains all licenses and certifications which are required to perform services under these Terms and Conditions provided that such requirements are specified in writing to TestAmerica prior to Sample Delivery Acceptance. TestAmerica will notify the Client in writing of any decertification or revocation of any license, or notice of either, which affects work in progress.

4.4 The warranty obligations set forth in Sections 4.1, 4.2 and 4.3 are the sole and exclusive warranties given by TestAmerica in connection with any services performed by TestAmerica or any Results generated from such services, and TestAmerica gives and makes NO OTHER REPRESENTATION OR WARRANTY OF ANY KIND.

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EXPRESS OR IMPLIED. No representative of TestAmerica is authorized to give or make any other representation or warranty or modify this warranty in any way.

4.5 Client's sole and exclusive remedy for the breach of warranty in connection with any services performed by TestAmerica, will be limited to repeating any services performed, contingent on the Client's providing, at the request of TestAmerica and at the Client's expense, additional sample(s) if necessary. Any reanalysis requested by the Client generating Results consistent with the original Results will be at the Client's expense. If resampling is necessary, TestAmerica's liability for resampling costs will be limited to actual cost or one hundred and fifty dollars ($150) per sample, whichever is less.

4.6 TestAmerica's liability for any and all causes of action arising hereunder, whether based in contract, tort, warranty, negligence or otherwise, shall be limited to the lesser amount of compensation for the services performed during the year after TestAmerica's completion of the services. Under no circumstances shall TestAmerica be responsible for loss of use, loss of profits, or any special, indirect, incidental or consequential damages occasioned by the services performed or by application or use of the reports prepared.

4.7 In no event shall TestAmerica have any responsibility or liability to the Client for any failure or delay in performance by TestAmerica which results, directly or indirectly, in whole or in part, from any cause or circumstance beyond the reasonable control of TestAmerica. Such causes and circumstances shall include, but not be limited to, acts of God, acts of Client, acts of any governmental authority, strikes or other labor disputes, natural disasters, accidents, wars, civil disturbances, equipment breakdown, matrix interference or unknown highly contaminated samples that impact instrument operation, unavailability of supplies from usual suppliers, difficulties or delays in transportation, mail or delivery services, or any other cause beyond TestAmerica's reasonable control.

## 5. RESULTS, WORK PRODUCT

5.1 Data or information provided to TestAmerica or generated by services performed under this agreement shall only become the property of the Client upon receipt in full by TestAmerica of payment for the whole Order. Ownership of any analytical method, QA/QC protocols, software programs or equipment developed by TestAmerica for performance of work will be retained by TestAmerica, and Client shall not disclose such information to any third party.

5.2 Data and sample materials provided by Client or at Client's request, and the result obtained by TestAmerica shall be held in confidence (unless such information is generally available to the public or is in the public domain or Client has failed to pay TestAmerica for all services rendered or is otherwise in breach of these Terms and Conditions), subject to any disclosure required by law or legal process.

5.3 Should the Results delivered by TestAmerica be used by the Client or Client's client, even though subsequently determined not to meet the warranties described in these Terms and Conditions, then the compensation will be adjusted based upon mutual agreement. In no case shall the Client unreasonably withhold TestAmerica's right to independently defend its data.

5.4 TestAmerica reserves the right to perform the services at any laboratory in the TestAmerica network, unless the Client has specified a particular location for the work. In addition, TestAmerica reserves the right to subcontract services ordered by the Client to another laboratory or laboratories, if, in TestAmerica's sole judgment, it is reasonably necessary. Appropriate or advisable to do so. TestAmerica will in no way be liable for any subcontracted services (outside the TestAmerica network) except for work performed at laboratories which have been audited and approved by TestAmerica.

5.5 TestAmerica shall dispose of the Client's samples 30 days after the analytical report is issued, unless instructed to store them for an alternate period of time or to return such samples to the Client, in a manner consistent with U.S. Environmental Protection Agency regulations or other applicable federal, state or local requirements. All samples in Summa canisters will be retained for 5 days after analysis and data review. Longer storage periods may be requested and may be accommodated as space allows for an additional charge. Any samples for projects that are canceled or not accepted, or for which return was requested, may be returned to the Client at his own expense. TestAmerica reserves the right to return to the Client any sample or unused portion of a sample that is not fully consumed. TestAmerica's permitted capability of TestAmerica's designated waste disposal vendor(s). ALL DIOXIN, MIXED WASTE, AND RADIOACTIVE SAMPLES WILL BE RETURNED TO THE CLIENT, unless prior arrangements for disposal are made.

5.6 Unless a different time period is agreed to in any order under these Terms and Conditions, TestAmerica agrees to retain all records for five (5) years.

5.7 In the event that TestAmerica is required to respond to legal process related to services for Client, Client agrees to reimburse TestAmerica for hourly charges for personnel involved in the response and attorney fees reasonably incurred in obtaining advice concerning the response, preparation to testify, and appearances related to the legal process, travel and all reasonable expenses associated with the litigation.

## 6. INSURANCE

6.1 TestAmerica shall maintain in force during the performance of services under these Terms and Conditions, Workers' Compensation and Employers Liability Insurance in accordance with the laws of the states having jurisdiction over TestAmerica's employees who are engaged in the performance of the work. TestAmerica shall also maintain during such period, Comprehensive General and Contractual Liability (limit of $1,000,000 per occurrence/ $2,000,000aggregate), Comprehensive Automobile Liability, owned and hired, ($1,000,000 combined single limit), and Professional Pollution Liability Insurance (limit of $5,000,000 per occurrence/aggregate).

## 7. AUDIT

7.1 Upon prior notice to TestAmerica, the Client may audit and inspect TestAmerica's records and accounts covering reimbursable costs related to work done for the Client, for a period of two (2) years after completion of the work. The purpose of any such audit shall be only for verification of such costs, and TestAmerica shall not be required to provide access to cost records where prices are expressed as fixed fees or published unit prices.

## 8. MISCELLANEOUS PROVISIONS

8.1 These Terms and Conditions, together with any additions or revisions which may be agreed to in writing by TestAmerica, embody the whole agreement of the parties and provide the only remedies available. There are no promises, terms, conditions, understandings, obligations or agreements other than those contained herein, and these Terms and Conditions shall supersede all previous communications, representations, or agreements, either verbal or written, between the Client and TestAmerica. These Terms and Conditions, and any transaction or agreements to which they apply, shall be governed both as to interpretation and performance by the laws of the state where TestAmerica's services are performed.

8.2 The invalidity or unenforceability, in whole or in part of any provision, term or condition hereof shall not affect in any way the validity or enforceability of the remainder of these Terms and Conditions, the intent of the parties being that the provisions be severable. The section headings for these Terms and Conditions are intended solely for convenient reference and shall not define, limit or affect in any way these Terms and Conditions or their interpretations. No waiver by either party of any provision, term or condition hereof or of any obligation of the other party hereunder shall constitute a waiver of any subsequent breach or other obligation.

8.3 The obligations, liabilities, and remedies of the parties, as provided herein, are exclusive and in lieu of any others available at law or in equity. Indemnifications, releases from liability and limitations of liability shall apply, notwithstanding the fault, negligence or strict liability of the party to be indemnified, released, or whose liability is limited, except to the extent of sole negligence or willful misconduct.

1550 Balmer Road
Model City, NY 14107
716-286-1550 Phone
716-286-0326 Fax

01 May 2014

Jill Banaszak
Environmental Monitoring
1550 Balmer Road
Model City, NY 14107

RE: T8000's
Work Order(s): 1404140

CERTIFICATES

NYSDOH LAB ID No.: 11383
U.S. EPA LAB CODE: NY01252

**CWM Chemical Services, LLC.** **Reported:** **05/01/14 10:15**

Client: Environmental Monitoring

Work Order(s): 1404140

**ANALYTICAL REPORT FOR SAMPLES**

| LabSample ID | Client Sample ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| 1404140-01 | T8005 | Aqueous | 04/24/14 11:38 | 04/24/14 12:08 |
| 1404140-02 | T8006 | Aqueous | 04/24/14 12:04 | 04/24/14 12:08 |
| 1404140-03 | T8007 | Aqueous | 04/24/14 11:30 | 04/24/14 12:08 |
| 1404140-04 | T8009 | Aqueous | 04/24/14 11:50 | 04/24/14 12:08 |
| 1404140-05 | T8010 | Aqueous | 04/24/14 11:45 | 04/24/14 12:08 |

*All Quality Control associated with these samples met EPA or laboratory specifications unless noted.*

*The enclosed analytical results are representative of the sample as received by the laboratory. CWM Chemical Services Laboratory makes no representations or certifications as to the methods of sample collection, sample identification, or transportation handling procedures used prior to our receipt of samples. This report is intended for the sole use and benefit of Waste Management and it's companies. No representation concerning significance of the reported data is made to any person or entity. To the best of my knowledge, the information contained in this report is accurate and complete. All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.*

*According to Sample Collection Requirements for Non-Potable Water located in the ELAP Certification Manual, pH analysis is required within 15 minutes of sample collection. Analysis is generally not completed within 15 minutes, but as soon as possible after laboratory receipt.*

Approved By: 

Title: QA/QC Coordinator

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/14 11:38 |
| Work Order: | 1404140 | Project #: | CWM | Received: | 04/24/14 12:08 |
| Lab Sample ID: | 1404140-01 | Client Sample ID: | T8005 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 1000 | ug/L | 04/25/14 19:19 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LAD | " |
| Bromomethane | ND | | 1000 | " | " | LAD | " |
| Chloroethane | ND | | 1000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LAD | " |
| Diethyl ether | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1000 | " | " | LAD | " |
| Acetone | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| Methylene chloride | ND | | 1000 | " | " | LAD | " |
| Carbon disulfide | ND | | 1000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Vinyl acetate | ND | | 1000 | " | " | LAD | " |
| 2-Butanone | ND | | 1000 | " | " | LAD | " |
| Ethyl acetate | ND | | 1000 | " | " | LAD | " |
| Chloroform | ND | | 1000 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 1000 | " | " | LAD | " |
| Carbon tetrachloride | ND | | 1000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Benzene | ND | | 1000 | " | " | LAD | " |
| **Trichloroethene** | **9620** | | 1000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| Toluene | ND | | 1000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 1000 | " | " | LAD | " |
| 2-Hexanone | ND | | 1000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 1000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LAD | " |
| Chlorobenzene | ND | | 1000 | " | " | LAD | " |
| Ethylbenzene | ND | | 1000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 3000 | " | " | LAD | " |
| Styrene | ND | | 1000 | " | " | LAD | " |
| Bromoform | ND | | 1000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 05/01/14 10:15**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/14 11:38 |
| Work Order: | 1404140 | Project #: | CWM | Received: | 04/24/14 12:08 |
| Lab Sample ID: | 1404140-01 | Client Sample ID: | T8005 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 1000 | ug/L | 04/25/14 19:19 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *91.9 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *91.9 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *92.1 %* | | *81-115* | | " | LAD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/14 12:04 |
| Work Order: | 1404140 | Project #: | CWM | Received: | 04/24/14 12:08 |
| Lab Sample ID: | 1404140-02 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 10000 | ug/L | 04/25/14 19:47 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 10000 | " | " | LAD | " |
| Bromomethane | ND | | 10000 | " | " | LAD | " |
| Chloroethane | ND | | 10000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 10000 | " | " | LAD | " |
| Diethyl ether | ND | | 10000 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 10000 | " | " | LAD | " |
| Acetone | ND | | 10000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 10000 | " | " | LAD | " |
| Methylene chloride | ND | | 10000 | " | " | LAD | " |
| Carbon disulfide | ND | | 10000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 10000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 10000 | " | " | LAD | " |
| Vinyl acetate | ND | | 10000 | " | " | LAD | " |
| 2-Butanone | ND | | 10000 | " | " | LAD | " |
| Ethyl acetate | ND | | 10000 | " | " | LAD | " |
| Chloroform | ND | | 10000 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 10000 | " | " | LAD | " |
| **Carbon tetrachloride** | **80400** | | 10000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 10000 | " | " | LAD | " |
| Benzene | ND | | 10000 | " | " | LAD | " |
| Trichloroethene | ND | | 10000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 10000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 10000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 10000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 10000 | " | " | LAD | " |
| Toluene | ND | | 10000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 10000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 10000 | " | " | LAD | " |
| 2-Hexanone | ND | | 10000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 10000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 10000 | " | " | LAD | " |
| Chlorobenzene | ND | | 10000 | " | " | LAD | " |
| Ethylbenzene | ND | | 10000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 30000 | " | " | LAD | " |
| Styrene | ND | | 10000 | " | " | LAD | " |
| Bromoform | ND | | 10000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 10000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 10000 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 10000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 05/01/14 10:15**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/14 12:04 |
| Work Order: | 1404140 | Project #: | CWM | Received: | 04/24/14 12:08 |
| Lab Sample ID: | 1404140-02 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 10000 | ug/L | 04/25/14 19:47 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *93.6 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *93.4 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *91.2 %* | | *81-115* | | " | LAD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/14 11:30 |
| Work Order: | 1404140 | Project #: | CWM | Received: | 04/24/14 12:08 |
| Lab Sample ID: | 1404140-03RE1 | Client Sample ID: | T8007 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 1000 | ug/L | 04/30/14 22:46 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LAD | " |
| Bromomethane | ND | | 1000 | " | " | LAD | " |
| Chloroethane | ND | | 1000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LAD | " |
| Diethyl ether | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1000 | " | " | LAD | " |
| Acetone | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| **Methylene chloride** | **2470** | | 1000 | " | " | LAD | " |
| Carbon disulfide | ND | | 1000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Vinyl acetate | ND | | 1000 | " | " | LAD | " |
| 2-Butanone | ND | | 1000 | " | " | LAD | " |
| Ethyl acetate | ND | | 1000 | " | " | LAD | " |
| Chloroform | ND | | 1000 | " | " | LAD | " |
| **1,1,1-Trichloroethane** | **1430** | | 1000 | " | " | LAD | " |
| Carbon tetrachloride | ND | | 1000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Benzene | ND | | 1000 | " | " | LAD | " |
| **Trichloroethene** | **2770** | | 1000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| Toluene | ND | | 1000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 1000 | " | " | LAD | " |
| 2-Hexanone | ND | | 1000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 1000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LAD | " |
| **Chlorobenzene** | **3380** | | 1000 | " | " | LAD | " |
| Ethylbenzene | ND | | 1000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 3000 | " | " | LAD | " |
| Styrene | ND | | 1000 | " | " | LAD | " |
| Bromoform | ND | | 1000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |
| **1,4-Dichlorobenzene** | **2720** | | 1000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 05/01/14 10:15**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/14 11:30 |
| Work Order: | 1404140 | Project #: | CWM | Received: | 04/24/14 12:08 |
| Lab Sample ID: | 1404140-03RE1 | Client Sample ID: | T8007 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **1,2-Dichlorobenzene** | **10000** | | 1000 | ug/L | 04/30/14 22:46 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *101 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *104 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *100 %* | | *85-115* | | " | LAD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/14 11:50 |
| Work Order: | 1404140 | Project #: | CWM | Received: | 04/24/14 12:08 |
| Lab Sample ID: | 1404140-04 | Client Sample ID: | T8009 | | Aqueous |

**Volatiles - Aqueous**

*Prep Method: EPA 5030C*

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| Chloromethane | ND | | 2000 | ug/L | 04/25/14 20:44 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 2000 | " | " | LAD | " |
| Bromomethane | ND | | 2000 | " | " | LAD | " |
| Chloroethane | ND | | 2000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 2000 | " | " | LAD | " |
| Diethyl ether | ND | | 2000 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 2000 | " | " | LAD | " |
| Acetone | ND | | 2000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 2000 | " | " | LAD | " |
| **Methylene chloride** | **6130** | | 2000 | " | " | LAD | " |
| Carbon disulfide | ND | | 2000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 2000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 2000 | " | " | LAD | " |
| Vinyl acetate | ND | | 2000 | " | " | LAD | " |
| 2-Butanone | ND | | 2000 | " | " | LAD | " |
| Ethyl acetate | ND | | 2000 | " | " | LAD | " |
| **Chloroform** | **3740** | | 2000 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 2000 | " | " | LAD | " |
| **Carbon tetrachloride** | **8800** | | 2000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 2000 | " | " | LAD | " |
| Benzene | ND | | 2000 | " | " | LAD | " |
| **Trichloroethene** | **8480** | | 2000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 2000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 2000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 2000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 2000 | " | " | LAD | " |
| Toluene | ND | | 2000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 2000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 2000 | " | " | LAD | " |
| 2-Hexanone | ND | | 2000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 2000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 2000 | " | " | LAD | " |
| **Chlorobenzene** | **2920** | | 2000 | " | " | LAD | " |
| Ethylbenzene | ND | | 2000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 6000 | " | " | LAD | " |
| Styrene | ND | | 2000 | " | " | LAD | " |
| Bromoform | ND | | 2000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 2000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 2000 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 2000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 05/01/14 10:15**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/14 11:50 |
| Work Order: | 1404140 | Project #: | CWM | Received: | 04/24/14 12:08 |
| Lab Sample ID: | 1404140-04 | Client Sample ID: | T8009 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **1,2-Dichlorobenzene** | **4550** | | 2000 | ug/L | 04/25/14 20:44 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *91.6 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *92.2 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *91.3 %* | | *81-115* | | " | LAD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/14 11:45 |
| Work Order: | 1404140 | Project #: | CWM | Received: | 04/24/14 12:08 |
| Lab Sample ID: | 1404140-05 | Client Sample ID: | T8010 | | Aqueous |

**Volatiles - Aqueous**

*Prep Method: EPA 5030C*

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| Chloromethane | ND | | 50.0 | ug/L | 04/25/14 21:14 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 50.0 | " | " | LAD | " |
| Bromomethane | ND | | 50.0 | " | " | LAD | " |
| Chloroethane | ND | | 50.0 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 50.0 | " | " | LAD | " |
| Diethyl ether | ND | | 50.0 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 50.0 | " | " | LAD | " |
| Acetone | ND | | 50.0 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 50.0 | " | " | LAD | " |
| Methylene chloride | ND | | 50.0 | " | " | LAD | " |
| Carbon disulfide | ND | | 50.0 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 50.0 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 50.0 | " | " | LAD | " |
| Vinyl acetate | ND | | 50.0 | " | " | LAD | " |
| 2-Butanone | ND | | 50.0 | " | " | LAD | " |
| Ethyl acetate | ND | | 50.0 | " | " | LAD | " |
| Chloroform | ND | | 50.0 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 50.0 | " | " | LAD | " |
| Carbon tetrachloride | ND | | 50.0 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 50.0 | " | " | LAD | " |
| Benzene | ND | | 50.0 | " | " | LAD | " |
| Trichloroethene | ND | | 50.0 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 50.0 | " | " | LAD | " |
| Bromodichloromethane | ND | | 50.0 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 50.0 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 50.0 | " | " | LAD | " |
| Toluene | ND | | 50.0 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 50.0 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 50.0 | " | " | LAD | " |
| 2-Hexanone | ND | | 50.0 | " | " | LAD | " |
| Tetrachloroethene | ND | | 50.0 | " | " | LAD | " |
| Dibromochloromethane | ND | | 50.0 | " | " | LAD | " |
| Chlorobenzene | ND | | 50.0 | " | " | LAD | " |
| Ethylbenzene | ND | | 50.0 | " | " | LAD | " |
| Xylenes (Total) | ND | | 150 | " | " | LAD | " |
| Styrene | ND | | 50.0 | " | " | LAD | " |
| Bromoform | ND | | 50.0 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 50.0 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 50.0 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 50.0 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 05/01/14 10:15**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/14 11:45 |
| Work Order: | 1404140 | Project #: | CWM | Received: | 04/24/14 12:08 |
| Lab Sample ID: | 1404140-05 | Client Sample ID: | T8010 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 50.0 | ug/L | 04/25/14 21:14 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *92.9 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *91.9 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *91.8 %* | | *81-115* | | " | LAD | " |

## Notes and Definitions

| | |
|---|---|
| ND | Analyte NOT DETECTED at or above the reporting limit |
| dry | Sample results reported on a dry weight basis |
| ** | Method is not covered under the laboratory's ELAP certifications. |
| *** | For each PCB fuel sample prepared by method 3580A, the chromatogram is reviewed for large, unexpected peaks. Unless otherwise noted, no such peaks were found. |

1550 Balmer Road
Model City, NY 14107
716-286-1550 Phone
716-286-0326 Fax

29 April 2015

Jill Banaszak
Environmental Monitoring
1550 Balmer Road
Model City, NY 14107

RE: T8000's
Work Order(s): 1504143

CERTIFICATES

NYSDOH LAB ID No.: 11383
U.S. EPA LAB CODE: NY01252

**CWM Chemical Services, LLC.** **Reported:** **04/29/15 10:18**

Client: Environmental Monitoring

Work Order(s): 1504143

**ANALYTICAL REPORT FOR SAMPLES**

| LabSample ID | Client Sample ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| 1504143-01 | T8005 | Aqueous | 04/24/15 14:21 | 04/24/15 15:35 |
| 1504143-02 | T8006 | Aqueous | 04/24/15 15:11 | 04/24/15 15:35 |
| 1504143-03 | T8007 | Aqueous | 04/24/15 14:40 | 04/24/15 15:35 |
| 1504143-04 | T8009 | Aqueous | 04/24/15 14:55 | 04/24/15 15:35 |
| 1504143-05 | T8010 | Aqueous | 04/24/15 15:17 | 04/24/15 15:35 |

*All Quality Control associated with these samples met EPA or laboratory specifications unless noted.*

*The enclosed analytical results are representative of the sample as received by the laboratory. CWM Chemical Services Laboratory makes no representations or certifications as to the methods of sample collection, sample identification, or transportation handling procedures used prior to our receipt of samples. This report is intended for the sole use and benefit of Waste Management and it's companies. No representation concerning significance of the reported data is made to any person or entity. To the best of my knowledge, the information contained in this report is accurate and complete. All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.*

*According to Sample Collection Requirements for Non-Potable Water located in the ELAP Certification Manual, pH analysis is required within 15 minutes of sample collection. Analysis is generally not completed within 15 minutes, but as soon as possible after laboratory receipt.*

Approved By: _____.

Title: QA/QC Coordinator

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 14:21 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-01 | Client Sample ID: | T8005 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 1000 | ug/L | 04/27/15 11:42 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LAD | " |
| Bromomethane | ND | | 1000 | " | " | LAD | " |
| Chloroethane | ND | | 1000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LAD | " |
| Diethyl ether | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 1000 | " | " | LAD | " |
| Acetone | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| Methylene chloride | ND | | 1000 | " | " | LAD | " |
| Carbon disulfide | ND | | 1000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Vinyl acetate | ND | | 1000 | " | " | LAD | " |
| 2-Butanone | ND | | 1000 | " | " | LAD | " |
| Ethyl acetate | ND | | 1000 | " | " | LAD | " |
| Chloroform | ND | | 1000 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 1000 | " | " | LAD | " |
| Carbon tetrachloride | ND | | 1000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Benzene | ND | | 1000 | " | " | LAD | " |
| **Trichloroethene** | **15400** | | 1000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| Toluene | ND | | 1000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 1000 | " | " | LAD | " |
| 2-Hexanone | ND | | 1000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 1000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LAD | " |
| Chlorobenzene | ND | | 1000 | " | " | LAD | " |
| Ethylbenzene | ND | | 1000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 3000 | " | " | LAD | " |
| Styrene | ND | | 1000 | " | " | LAD | " |
| Bromoform | ND | | 1000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 04/29/15 10:18**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 14:21 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-01 | Client Sample ID: | T8005 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 1000 | ug/L | 04/27/15 11:42 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *94.3 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *102 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *97.0 %* | | *85-115* | | " | LAD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 15:11 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-02 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 5000 | ug/L | 04/27/15 12:11 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 5000 | " | " | LAD | " |
| Bromomethane | ND | | 5000 | " | " | LAD | " |
| Chloroethane | ND | | 5000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 5000 | " | " | LAD | " |
| Diethyl ether | ND | | 5000 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 5000 | " | " | LAD | " |
| Acetone | ND | | 5000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 5000 | " | " | LAD | " |
| Methylene chloride | ND | | 5000 | " | " | LAD | " |
| Carbon disulfide | ND | | 5000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 5000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 5000 | " | " | LAD | " |
| Vinyl acetate | ND | | 5000 | " | " | LAD | " |
| 2-Butanone | ND | | 5000 | " | " | LAD | " |
| Ethyl acetate | ND | | 5000 | " | " | LAD | " |
| **Chloroform** | **8710** | | 5000 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 5000 | " | " | LAD | " |
| **Carbon tetrachloride** | **116000** | E | 5000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 5000 | " | " | LAD | " |
| Benzene | ND | | 5000 | " | " | LAD | " |
| Trichloroethene | ND | | 5000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 5000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 5000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 5000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 5000 | " | " | LAD | " |
| Toluene | ND | | 5000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 5000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 5000 | " | " | LAD | " |
| 2-Hexanone | ND | | 5000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 5000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 5000 | " | " | LAD | " |
| Chlorobenzene | ND | | 5000 | " | " | LAD | " |
| Ethylbenzene | ND | | 5000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 15000 | " | " | LAD | " |
| Styrene | ND | | 5000 | " | " | LAD | " |
| Bromoform | ND | | 5000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 5000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 5000 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 5000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 04/29/15 10:18**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 15:11 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-02 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 5000 | ug/L | 04/27/15 12:11 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *96.0 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *102 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *96.6 %* | | *85-115* | | " | LAD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 15:11 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-02RE1 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 10000 | ug/L | 04/28/15 14:34 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 10000 | " | " | LAD | " |
| Bromomethane | ND | | 10000 | " | " | LAD | " |
| Chloroethane | ND | | 10000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 10000 | " | " | LAD | " |
| Diethyl ether | ND | | 10000 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 10000 | " | " | LAD | " |
| Acetone | ND | | 10000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 10000 | " | " | LAD | " |
| Methylene chloride | ND | | 10000 | " | " | LAD | " |
| Carbon disulfide | ND | | 10000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 10000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 10000 | " | " | LAD | " |
| Vinyl acetate | ND | | 10000 | " | " | LAD | " |
| 2-Butanone | ND | | 10000 | " | " | LAD | " |
| Ethyl acetate | ND | | 10000 | " | " | LAD | " |
| Chloroform | ND | | 10000 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 10000 | " | " | LAD | " |
| **Carbon tetrachloride** | **102000** | | 10000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 10000 | " | " | LAD | " |
| Benzene | ND | | 10000 | " | " | LAD | " |
| Trichloroethene | ND | | 10000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 10000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 10000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 10000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 10000 | " | " | LAD | " |
| Toluene | ND | | 10000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 10000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 10000 | " | " | LAD | " |
| 2-Hexanone | ND | | 10000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 10000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 10000 | " | " | LAD | " |
| Chlorobenzene | ND | | 10000 | " | " | LAD | " |
| Ethylbenzene | ND | | 10000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 30000 | " | " | LAD | " |
| Styrene | ND | | 10000 | " | " | LAD | " |
| Bromoform | ND | | 10000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 10000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 10000 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 10000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 04/29/15 10:18**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 15:11 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-02RE1 | Client Sample ID: | T8006 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 10000 | ug/L | 04/28/15 14:34 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *98.3 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *105 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *97.0 %* | | *85-115* | | " | LAD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 14:40 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-03 | Client Sample ID: | T8007 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 1000 | ug/L | 04/27/15 12:39 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LAD | " |
| Bromomethane | ND | | 1000 | " | " | LAD | " |
| Chloroethane | ND | | 1000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LAD | " |
| Diethyl ether | ND | | 1000 | " | " | LAD | " |
| **1,1,2-Trichloro-1,2,2-trifluoroethane** | **1180** | | 1000 | " | " | LAD | " |
| Acetone | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| **Methylene chloride** | **2730** | | 1000 | " | " | LAD | " |
| Carbon disulfide | ND | | 1000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Vinyl acetate | ND | | 1000 | " | " | LAD | " |
| 2-Butanone | ND | | 1000 | " | " | LAD | " |
| Ethyl acetate | ND | | 1000 | " | " | LAD | " |
| Chloroform | ND | | 1000 | " | " | LAD | " |
| **1,1,1-Trichloroethane** | **1690** | | 1000 | " | " | LAD | " |
| Carbon tetrachloride | ND | | 1000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Benzene | ND | | 1000 | " | " | LAD | " |
| **Trichloroethene** | **3300** | | 1000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| Toluene | ND | | 1000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 1000 | " | " | LAD | " |
| 2-Hexanone | ND | | 1000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 1000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LAD | " |
| **Chlorobenzene** | **3700** | | 1000 | " | " | LAD | " |
| Ethylbenzene | ND | | 1000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 3000 | " | " | LAD | " |
| Styrene | ND | | 1000 | " | " | LAD | " |
| Bromoform | ND | | 1000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |
| **1,4-Dichlorobenzene** | **2900** | | 1000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 04/29/15 10:18**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 14:40 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-03 | Client Sample ID: | T8007 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **1,2-Dichlorobenzene** | **11300** | | 1000 | ug/L | 04/27/15 12:39 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *93.1 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *103 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *96.0 %* | | *85-115* | | " | LAD | " |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 14:55 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-04 | Client Sample ID: | T8009 | | Aqueous |

## Volatiles - Aqueous

*Prep Method: EPA 5030C*

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| Chloromethane | ND | | 1000 | ug/L | 04/27/15 13:07 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 1000 | " | " | LAD | " |
| Bromomethane | ND | | 1000 | " | " | LAD | " |
| Chloroethane | ND | | 1000 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 1000 | " | " | LAD | " |
| Diethyl ether | ND | | 1000 | " | " | LAD | " |
| **1,1,2-Trichloro-1,2,2-trifluoroethane** | **1050** | | 1000 | " | " | LAD | " |
| Acetone | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| **Methylene chloride** | **3750** | | 1000 | " | " | LAD | " |
| Carbon disulfide | ND | | 1000 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 1000 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Vinyl acetate | ND | | 1000 | " | " | LAD | " |
| 2-Butanone | ND | | 1000 | " | " | LAD | " |
| Ethyl acetate | ND | | 1000 | " | " | LAD | " |
| **Chloroform** | **3050** | | 1000 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 1000 | " | " | LAD | " |
| **Carbon tetrachloride** | **6620** | | 1000 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 1000 | " | " | LAD | " |
| Benzene | ND | | 1000 | " | " | LAD | " |
| **Trichloroethene** | **5560** | | 1000 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 1000 | " | " | LAD | " |
| Bromodichloromethane | ND | | 1000 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 1000 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| **Toluene** | **1130** | | 1000 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 1000 | " | " | LAD | " |
| **1,1,2-Trichloroethane** | **1120** | | 1000 | " | " | LAD | " |
| 2-Hexanone | ND | | 1000 | " | " | LAD | " |
| Tetrachloroethene | ND | | 1000 | " | " | LAD | " |
| Dibromochloromethane | ND | | 1000 | " | " | LAD | " |
| **Chlorobenzene** | **1990** | | 1000 | " | " | LAD | " |
| Ethylbenzene | ND | | 1000 | " | " | LAD | " |
| Xylenes (Total) | ND | | 3000 | " | " | LAD | " |
| Styrene | ND | | 1000 | " | " | LAD | " |
| Bromoform | ND | | 1000 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 1000 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 1000 | " | " | LAD | " |
| **1,2-Dichlorobenzene** | **2600** | | 1000 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 04/29/15 10:18**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 14:55 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-04 | Client Sample ID: | T8009 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| *Surrogate: 1,2-Dichloroethane-d4* | *95.4 %* | | *85-115* | | *04/27/15 13:07* | LAD | *EPA 8260C* |
| *Surrogate: Toluene-d8* | *104 %* | | *85-115* | | *"* | LAD | *"* |
| *Surrogate: 4-Bromofluorobenzene* | *96.6 %* | | *85-115* | | *"* | LAD | *"* |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 15:17 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-05 | Client Sample ID: | T8010 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| **Volatiles - Aqueous** | | | | | | | |
| *Prep Method: EPA 5030C* | | | | | | | |
| Chloromethane | ND | | 10.0 | ug/L | 04/27/15 13:34 | LAD | EPA 8260C |
| Vinyl chloride | ND | | 10.0 | " | " | LAD | " |
| Bromomethane | ND | | 10.0 | " | " | LAD | " |
| Chloroethane | ND | | 10.0 | " | " | LAD | " |
| Trichlorofluoromethane | ND | | 10.0 | " | " | LAD | " |
| Diethyl ether | ND | | 10.0 | " | " | LAD | " |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 10.0 | " | " | LAD | " |
| Acetone | ND | | 10.0 | " | " | LAD | " |
| 1,1-Dichloroethene | ND | | 10.0 | " | " | LAD | " |
| Methylene chloride | ND | | 10.0 | " | " | LAD | " |
| Carbon disulfide | ND | | 10.0 | " | " | LAD | " |
| trans-1,2-Dichloroethene | ND | | 10.0 | " | " | LAD | " |
| 1,1-Dichloroethane | ND | | 10.0 | " | " | LAD | " |
| Vinyl acetate | ND | | 10.0 | " | " | LAD | " |
| 2-Butanone | ND | | 10.0 | " | " | LAD | " |
| Ethyl acetate | ND | | 10.0 | " | " | LAD | " |
| Chloroform | ND | | 10.0 | " | " | LAD | " |
| 1,1,1-Trichloroethane | ND | | 10.0 | " | " | LAD | " |
| Carbon tetrachloride | ND | | 10.0 | " | " | LAD | " |
| 1,2-Dichloroethane | ND | | 10.0 | " | " | LAD | " |
| Benzene | ND | | 10.0 | " | " | LAD | " |
| **Trichloroethene** | **16.0** | | 10.0 | " | " | LAD | " |
| 1,2-Dichloropropane | ND | | 10.0 | " | " | LAD | " |
| Bromodichloromethane | ND | | 10.0 | " | " | LAD | " |
| 4-Methyl-2-pentanone | ND | | 10.0 | " | " | LAD | " |
| cis-1,3-Dichloropropene | ND | | 10.0 | " | " | LAD | " |
| **Toluene** | **11.9** | | 10.0 | " | " | LAD | " |
| trans-1,3-Dichloropropene | ND | | 10.0 | " | " | LAD | " |
| 1,1,2-Trichloroethane | ND | | 10.0 | " | " | LAD | " |
| 2-Hexanone | ND | | 10.0 | " | " | LAD | " |
| Tetrachloroethene | ND | | 10.0 | " | " | LAD | " |
| Dibromochloromethane | ND | | 10.0 | " | " | LAD | " |
| **Chlorobenzene** | **13.8** | | 10.0 | " | " | LAD | " |
| Ethylbenzene | ND | | 10.0 | " | " | LAD | " |
| Xylenes (Total) | ND | | 30.0 | " | " | LAD | " |
| Styrene | ND | | 10.0 | " | " | LAD | " |
| Bromoform | ND | | 10.0 | " | " | LAD | " |
| 1,1,2,2-Tetrachloroethane | ND | | 10.0 | " | " | LAD | " |
| 1,3-Dichlorobenzene | ND | | 10.0 | " | " | LAD | " |
| 1,4-Dichlorobenzene | ND | | 10.0 | " | " | LAD | " |

**CWM Chemical Services, LLC.** **Reported: 04/29/15 10:18**

| | | | | | |
|---|---|---|---|---|---|
| Client: | Environmental Monitoring | Project: | T8000's | Sampled: | 04/24/15 15:17 |
| Work Order: | 1504143 | Project #: | CWM | Received: | 04/24/15 15:35 |
| Lab Sample ID: | 1504143-05 | Client Sample ID: | T8010 | | Aqueous |

| Analyte | Result | Notes | Reporting Limit | Units | Analyzed | Analyst | Method |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | ND | | 10.0 | ug/L | 04/27/15 13:34 | LAD | EPA 8260C |
| *Surrogate: 1,2-Dichloroethane-d4* | *94.5 %* | | *85-115* | | " | LAD | " |
| *Surrogate: Toluene-d8* | *104 %* | | *85-115* | | " | LAD | " |
| *Surrogate: 4-Bromofluorobenzene* | *96.0 %* | | *85-115* | | " | LAD | " |

## Notes and Definitions

| | |
|---|---|
| E | Concentration exceeds calibration range. Result is estimated. |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| dry | Sample results reported on a dry weight basis |
| ** | Method is not covered under the laboratory's ELAP certifications. |
| *** | For each PCB fuel sample prepared by method 3580A, the chromatogram is reviewed for large, unexpected peaks. Unless otherwise noted, no such peaks were found. |

# Attachment 11
# Tanks Software Model Output for ATWS Tanks

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | Frac Tank #3 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | SLF-7 Leachate Processing |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 11.00 |
| *Diameter (ft)* | 18.00 |
| *Liquid Height (ft)* | 11.00 |
| *Avg. Liquid Height (ft)* | 5.50 |
| *Volume (gal)* | 21,000.00 |
| *Turnovers* | 2.38 |
| *Net Throughput (gal/yr)* | 50,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**Frac Tank #3 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 7 Leachate* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3387 | 0.3386 | 0.3387 | 18.0507 | - | - | 18.01 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0012 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0002 | 0.0004 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0021 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9995 | 0.9963 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 131.40 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 7 Leachate* | All | 49.26 | - | - | 47.70 | 0.3387 | - | - | 18.0507 | - | - | 18.01 | - | - | - | - | | - | - | - | - | 18.0507 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0002 | 0.0012 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 180000 | 0.00018 | 0.000003 | 0.000056 | 0.0211 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0002 | 0.0004 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 179000 | 0.000179 | 0.000002 | 0.000045 | 0.0075 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0021 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 167000 | 0.000167 | 0.000002 | 0.000035 | 0.0386 |
| Toluene | | | | | | 0.2342 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 100.20 | 5990 | 0.00000599 | 0.000000 | 0.000001 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9995 | 0.9963 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999450410 | 0.9994504 | 0.055525 | 0.999861 | 17.9834 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 131.40 | 17600 | 0.0000176 | 0.000000 | 0.000002 | 0.0001 |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | check: | **1.00000** | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**Frac Tank #3 - Vertical Fixed Roof Tank**
**Model City, New York**

| Annual Emission Calculations | FROM TANKS DETAILED PDF | | AP-42 EQUATIONS | CALCULATIONS | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 15.4329 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 15.4303 | lbs | | |
| $V_V$ = Vapor Space Volume (cu ft) | 1399.5795 | | | $V_V$ = | 1399.5795 | cu ft | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9102 | | | $K_S$ = | 0.9102 | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume | 1399.5795 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 1399.5795 | cu ft | | |
| D = Tank Diameter | 18.0000 | ft | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 5.5000 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 5.5000 | ft | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 11.0000 | ft | | | | | | |
| $H_L$ = Average Liquid Height | 5.5000 | ft | | | | | | |
| Roof Outage | 0.0000 | ft | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | |
| Roof Outage | 0.0000 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0000 | ft | | |
| Roof Height | 0.0000 | ft | | | | | | |
| $S_R$ = Roof Slope | 0.0000 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.0000 | ft | | |
| $R_S$ = Shell Radius | 9.0000 | ft | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0507 | | | $M_V$ = | 18.0507 | lb/lb-mole | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | As per sources listed on page 6-5 of TANKS user manual: |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}\text{-}T_{AN}) + 0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0001 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9102 | | $K_S = 1/[1 + (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9102 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3387 | psia | | | | | | |
| Vapor Space Outage | 5.5000 | ft | | | | | | |
| *Working Losses* | 7.2774 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 7.2774 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0507 | | | $M_V$ = | 18.0507 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3387 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 50,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 1,190.48 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 2.3810 | | | N = | 2.3810 | | | for turnovers <36, $K_N$ = 1 |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 21000.0000 | gal | | | | | | for crude oils $K_P$ = 0.75 |
| Maximum Liquid Height | 11.0000 | ft | | | | | | |
| Tank Diameter | 18.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 22.7103 | lb | | $L_T$ = | 22.7077 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**Frac Tank #3 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 7 Leachate | 7.28 | 15.43 | 22.71 |
| Methyl ethyl ketone | 0.00 | 0.01 | 0.01 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Water | 7.25 | 15.38 | 22.63 |
| Acetone | 0.01 | 0.02 | 0.03 |
| Methylene chloride | 0.02 | 0.03 | 0.05 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 7.28 | 15.43 | 22.71 |
| 0.00 | 0.01 | 0.01 |
| 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 |
| 7.25 | 15.37 | 22.62 |
| 0.01 | 0.02 | 0.03 |
| 0.02 | 0.03 | 0.05 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-100 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | 3 Year average + GW + Bulk Receipts |

**Tank Dimensions**

| | | |
|---|---|---|
| *Shell Length (ft)* | 23.00 | |
| *Diameter (ft)* | 35.00 | |
| *Liquid Height (ft)* | 23.00 | |
| *Avg. Liquid Height (ft)* | 12.50 | |
| *Volume (gal)* | 160,545.00 | |
| *Turnovers* | 18.6864 | 18.6863 |
| *Net Throughput (gal/yr)* | 3,000,000 | |
| *Is tank heated (y/n)* | N | |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-100 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *T-100 Liquid* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0276 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9996 | 0.9979 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *T-100 Liquid* | All | 49.26 | - | - | 47.70 | 0.3386 | - | - | 18.0276 | - | - | 18.00 | - | - | - | - | | | | | | |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 237000 | 0.000237 | 0.000004 | 0.000073 | 0.0278 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 80500 | 0.0000805 | 0.000001 | 0.000020 | 0.0034 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 9950 | 0.00000995 | 0.000000 | 0.000002 | 0.0001 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 31500 | 0.0000315 | 0.000000 | 0.000007 | 0.0073 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9996 | 0.9979 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999636890 | 0.99963689 | 0.055535 | 0.999897 | 17.9890 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-100 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 105.8100 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 105.8077 | lbs | | |
| $V_V$ = Vapor Space Volume (cu ft) | 10452.9541 | | | $V_V$ = | 10452.9541 | cu ft | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8369 | | | $K_S$ = | 0.8369 | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume | 10452.9541 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 10452.9541 | cu ft | | |
| D = Tank Diameter | 35.0000 | ft | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 10.8646 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 10.8646 | ft | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 23.0000 | ft | | | | | | |
| $H_L$ = Average Liquid Height | 12.5000 | ft | | | | | | |
| Roof Outage | 0.3646 | ft | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | |
| Roof Outage | 0.3646 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.3646 | ft | | |
| Roof Height | 0.0000 | ft | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 1.0938 | ft | | |
| $R_S$ = Shell Radius | 17.5000 | ft | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0276 | | | $M_V$ = | 18.0276 | lb/lb-mole | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8369 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.8369 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Space Outage | 10.8646 | ft | | | | | | |
| *Working Losses* | 435.9674 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 435.9674 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0276 | | | $M_V$ = | 18.0276 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Q = Annual Net Throughput | 3,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 71,428.57 | bbl/yr | | |
| Annual Turnovers | 18.6864 | | | N = | 18.6863 | | | |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | |
| Maximum Liquid Volume | 160545.0000 | gal | | | | | | |
| Maximum Liquid Height | 23.0000 | ft | | | | | | |
| Tank Diameter | 35.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 541.7774 | lb | | $L_T$ = | 541.7751 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-100 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| T-100 Liquid | 435.97 | 105.81 | 541.78 |
| Methyl ethyl ketone | 0.08 | 0.02 | 0.10 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 435.03 | 105.58 | 540.62 |
| Acetone | 0.67 | 0.16 | 0.84 |
| Methylene chloride | 0.18 | 0.04 | 0.22 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 435.96739 | 105.80774 | 541.77512 |
| 0.08125 | 0.01972 | 0.10097 |
| 0.00314 | 0.00076 | 0.00391 |
| 0.00185 | 0.00045 | 0.00230 |
| 435.03289 | 105.58094 | 540.61383 |
| 0.67211 | 0.16312 | 0.83523 |
| 0.17614 | 0.04275 | 0.21889 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-210 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-1111/1112 - T-1410 divided by 3 |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 15.00 |
| *Diameter (ft)* | 18.50 |
| *Liquid Height (ft)* | 15.00 |
| *Avg. Liquid Height (ft)* | 7.50 |
| *Volume (gal)* | 30,000.00 |
| *Turnovers* | 16.67 |
| *Net Throughput (gal/yr)* | 500,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-210 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate (inc NAPL)* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | - | - | 18.04 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | ###### | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate (inc NAPL)* | All | 49.26 | - | - | 47.70 | 0.3394 | - | - | 18.1467 | - | - | 18.04 | - | - | - | - | - | - | - | - | - | 18.1467 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 740000 | 0.00074 | 0.000013 | 0.000230 | 0.0867 |
| Acetonitrile | | | | | | 0.8304 | - | - | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119 B=1314.4 C=230 | 7.1190 | 1314.400 | 230.00 | 41.05 | 6400 | 0.0000064 | 0.000000 | 0.000003 | 0.0003 |
| Acrylonitrile | | | | | | 1.0305 | - | - | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038 B=1232.53 C=222.47 | 7.0380 | 1232.530 | 222.47 | 53.06 | 160 | 0.00000016 | 0.000000 | 0.000000 | 0.0000 |
| Aniline | | | | | | 0.0038 | - | - | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32 B=1731.515 C=206.049 | 7.3200 | 1731.515 | 206.05 | 93.10 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 920 | 0.00000092 | 0.000000 | 0.000000 | 0.0000 |
| Butanol-(1) | | | | | | 0.0339 | - | - | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768 B=1362.39 C=178.77 | 7.4768 | 1362.390 | 178.77 | 74.12 | 290000 | 0.00029 | 0.000004 | 0.000071 | 0.0005 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 1000 | 0.000001 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 7800 | 0.0000078 | 0.000000 | 0.000001 | 0.0008 |
| Cresol (-m) | | | | | | 0.0008 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508 B=1856.36 C=199.07 | 7.5080 | 1856.360 | 199.07 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cyclohexanone | | | | | | 0.0377 | - | - | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492 B=2137.192 C=273.16 | 7.8492 | 2137.192 | 273.16 | 98.20 | 2100 | 0.0000021 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2012 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | - | - | - | 98.97 | 2700 | 0.0000027 | 0.000000 | 0.000000 | 0.0003 |
| Ethylene dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 6900 | 0.0000069 | 0.000000 | 0.000001 | 0.0003 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | - | - | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965 B=1141.9 C=231.9 | 6.9650 | 1141.900 | 231.90 | 96.95 | 300 | 0.0000003 | 0.000000 | 0.000000 | 0.0001 |
| Diethyl ether | | | | | | 5.5303 | - | - | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92 B=1064.07 C=228.8 | 6.9200 | 1064.070 | 228.80 | 74.12 | 9400 | 0.0000094 | 0.000000 | 0.000002 | 0.0028 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 280 | 0.00000028 | 0.000000 | 0.000000 | 0.0000 |
| Dioxane (1,4) | | | | | | 0.3139 | - | - | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431 B=1554.68 C=240.34 | 7.4310 | 1554.680 | 240.34 | 88.10 | 95000 | 0.000095 | 0.000001 | 0.000019 | 0.0016 |
| Ethyl chloride | | | | | | 13.2558 | - | - | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986 B=1030.01 C=238.61 | 6.9860 | 1030.010 | 238.61 | 64.52 | 110 | 0.00000011 | 0.000000 | 0.000000 | 0.0001 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 170 | 0.00000017 | 0.000000 | 0.000000 | 0.0000 |
| Iso-butyl alcohol | | | | | | 0.0584 | - | - | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636 B=1236.991 | 7.3064 | 1236.991 | 171.62 | 74.12 | 37000 | 0.000037 | 0.000000 | 0.000009 | 0.0001 |
| Methyl alcohol | | | | | | 1.0194 | - | - | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897 B=1474.08 C=229.13 | 7.8970 | 1474.080 | 229.13 | 32.04 | 970000 | 0.00097 | 0.000030 | 0.000546 | 0.0525 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0006 | 0.0013 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 550000 | 0.00055 | 0.000008 | 0.000138 | 0.0229 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 79000 | 0.000079 | 0.000001 | 0.000014 | 0.0006 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 220000 | 0.00022 | 0.000003 | 0.000047 | 0.0508 |
| Pyridine | | | | | | 0.1621 | - | - | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041 B=1373.8 C=214.98 | 7.0410 | 1373.800 | 214.98 | 79.10 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 12000 | 0.000012 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 500 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0001 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 3900 | 0.0000039 | 0.000000 | 0.000001 | 0.0003 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 13000 | 0.000013 | 0.000000 | 0.000002 | 0.0004 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 410 | 0.00000041 | 0.000000 | 0.000000 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9969 | 0.9878 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 996897970 | 0.99689797 | 0.055383 | 0.998905 | 17.9253 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 820 | | | | |
| | | | | | | | | | | | | | | | | | | | | | check: | **1.00000** |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-210 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 22.1895 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 22.1705 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 2067.8194 | | | $V_V$ = | 2067.8194 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8784 | | | $K_S$ = | 0.8784 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 2067.8194 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 2067.8194 | cu ft | | | |
| D = Tank Diameter | 18.5000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 7.6927 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 7.6927 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 15.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 7.5000 | ft | | | | | | | |
| Roof Outage | 0.1927 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1927 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.1927 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.5781 | ft | | | |
| $R_S$ = Shell Radius | 9.2500 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{delta} P_V - \text{delta } P_B)/(P_A - P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX} - T_{AN}) + 0.028 * \text{alpha} * I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | $P_{VX}$ = | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | $P_{VN}$ = | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8784 | | $K_S = 1/[1 + (.053 * P_{VA} * H_{VO})]$ | $K_S$ = | 0.8784 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Space Outage | 7.6927 | ft | | | | | | |

*Working Losses*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 73.3280 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 73.3280 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 500,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 11,904.76 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 16.6667 | | | N = | 16.6667 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 30000.0000 | gal | | | | | | for crude oils $K_P = 0.75$ |
| Maximum Liquid Height | 15.0000 | ft | | | | | | |
| Tank Diameter | 18.5000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 95.5175 | lb | | $L_T$ = | 95.4985 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-210 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 1-6 Leachate (inc NAPL) | 73.33 | 22.19 | 95.52 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Ethylene dichloride | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.00 | 0.01 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Diethyl ether | 0.01 | 0.00 | 0.01 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.09 | 0.03 | 0.12 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.35 | 0.11 | 0.46 |
| Methylene chloride | 0.21 | 0.06 | 0.27 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.21 | 0.06 | 0.28 |
| Butanol-(1) | 0.00 | 0.00 | 0.00 |
| Water | 72.43 | 21.92 | 94.35 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 73.32801 | 22.17049 | 95.49850 |
| 0.00103 | 0.00031 | 0.00134 |
| 0.00017 | 0.00005 | 0.00023 |
| 0.00128 | 0.00039 | 0.00166 |
| 0.00056 | 0.00017 | 0.00073 |
| 0.00102 | 0.00031 | 0.00133 |
| 0.00640 | 0.00194 | 0.00834 |
| 0.00114 | 0.00034 | 0.00149 |
| 0.00004 | 0.00001 | 0.00005 |
| 0.00017 | 0.00005 | 0.00022 |
| 0.00002 | 0.00001 | 0.00003 |
| 0.00031 | 0.00009 | 0.00041 |
| 0.00304 | 0.00092 | 0.00396 |
| 0.01116 | 0.00337 | 0.01454 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00046 | 0.00014 | 0.00060 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00024 | 0.00007 | 0.00031 |
| 0.00021 | 0.00006 | 0.00028 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00002 | 0.00001 | 0.00002 |
| 0.00007 | 0.00002 | 0.00009 |
| 0.09268 | 0.02802 | 0.12071 |
| 0.00245 | 0.00074 | 0.00319 |
| 0.35037 | 0.10593 | 0.45631 |
| 0.20539 | 0.06210 | 0.26749 |
| 0.00164 | 0.00050 | 0.00214 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00014 | 0.00004 | 0.00019 |
| 0.21232 | 0.06420 | 0.27652 |
| 0.00211 | 0.00064 | 0.00275 |
| 72.43351 | 21.90004 | 94.33356 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-220 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-1111 + T-1112 - T-1410 divided by 3 |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 15.00 |
| *Diameter (ft)* | 18.50 |
| *Liquid Height (ft)* | 15.00 |
| *Avg. Liquid Height (ft)* | 7.50 |
| *Volume (gal)* | 30,000.00 |
| *Turnovers* | 16.67 |
| *Net Throughput (gal/yr)* | 500,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-220 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate (inc NAPL)* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | - | - | 18.04 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Ethylene dichloride | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | ###### | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate (inc NAPL)* | All | 49.26 | - | - | 47.70 | 0.3394 | - | - | 18.1467 | - | - | 18.04 | - | - | - | - | - | - | - | - | - | 18.1467 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 740000 | 0.00074 | 0.000013 | 0.000230 | 0.0867 |
| Acetonitrile | | | | | | 0.8304 | - | - | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119 B=1314.4 C=230 | 7.1190 | 1314.400 | 230.00 | 41.05 | 6400 | 0.0000064 | 0.000000 | 0.000003 | 0.0003 |
| Acrylonitrile | | | | | | 1.0305 | - | - | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038 B=1232.53 C=222.47 | 7.0380 | 1232.530 | 222.47 | 53.06 | 160 | 0.00000016 | 0.000000 | 0.000000 | 0.0000 |
| Aniline | | | | | | 0.0038 | - | - | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32 B=1731.515 C=206.049 | 7.3200 | 1731.515 | 206.05 | 93.10 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 920 | 0.00000092 | 0.000000 | 0.000000 | 0.0000 |
| Butanol-(1) | | | | | | 0.0339 | - | - | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768 B=1362.39 C=178.77 | 7.4768 | 1362.390 | 178.77 | 74.12 | 290000 | 0.00029 | 0.000004 | 0.000071 | 0.0005 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 1000 | 0.000001 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 7800 | 0.0000078 | 0.000000 | 0.000001 | 0.0008 |
| Cresol (-m) | | | | | | 0.0008 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508 B=1856.36 C=199.07 | 7.5080 | 1856.360 | 199.07 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cyclohexanone | | | | | | 0.0377 | - | - | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492 B=2137.192 C=273.16 | 7.8492 | 2137.192 | 273.16 | 98.20 | 2100 | 0.0000021 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2012 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | - | - | - | 98.97 | 2700 | 0.0000027 | 0.000000 | 0.000000 | 0.0003 |
| Ethylene dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 6900 | 0.0000069 | 0.000000 | 0.000001 | 0.0003 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | - | - | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965 B=1141.9 C=231.9 | 6.9650 | 1141.900 | 231.90 | 96.95 | 300 | 0.0000003 | 0.000000 | 0.000000 | 0.0001 |
| Diethyl ether | | | | | | 5.5303 | - | - | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92 B=1064.07 C=228.8 | 6.9200 | 1064.070 | 228.80 | 74.12 | 9400 | 0.0000094 | 0.000000 | 0.000002 | 0.0028 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 280 | 0.00000028 | 0.000000 | 0.000000 | 0.0000 |
| Dioxane (1,4) | | | | | | 0.3139 | - | - | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431 B=1554.68 C=240.34 | 7.4310 | 1554.680 | 240.34 | 88.10 | 95000 | 0.000095 | 0.000001 | 0.000019 | 0.0016 |
| Ethyl chloride | | | | | | 13.2558 | - | - | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986 B=1030.01 C=238.61 | 6.9860 | 1030.010 | 238.61 | 64.52 | 110 | 0.00000011 | 0.000000 | 0.000000 | 0.0001 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 170 | 0.00000017 | 0.000000 | 0.000000 | 0.0000 |
| Iso-butyl alcohol | | | | | | 0.0584 | - | - | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636 B=1236.991 | 7.3064 | 1236.991 | 171.62 | 74.12 | 37000 | 0.000037 | 0.000000 | 0.000009 | 0.0001 |
| Methyl alcohol | | | | | | 1.0194 | - | - | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897 B=1474.08 C=229.13 | 7.8970 | 1474.080 | 229.13 | 32.04 | 970000 | 0.00097 | 0.000030 | 0.000546 | 0.0525 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0006 | 0.0013 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 550000 | 0.00055 | 0.000008 | 0.000138 | 0.0229 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 79000 | 0.000079 | 0.000001 | 0.000014 | 0.0006 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 220000 | 0.00022 | 0.000003 | 0.000047 | 0.0508 |
| Pyridine | | | | | | 0.1621 | - | - | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041 B=1373.8 C=214.98 | 7.0410 | 1373.800 | 214.98 | 79.10 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 12000 | 0.000012 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 500 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0001 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 3900 | 0.0000039 | 0.000000 | 0.000001 | 0.0003 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 13000 | 0.000013 | 0.000000 | 0.000002 | 0.0004 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 410 | 0.00000041 | 0.000000 | 0.000000 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9969 | 0.9878 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 996897970 | 0.99689797 | 0.055383 | 0.998905 | 17.9253 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 820 | | | | |
| | | | | | | | | | | | | | | | | | | | | | check: | **1.00000** |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-220 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 22.1895 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 22.1705 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 2067.8194 | | | $V_V$ = | 2067.8194 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8784 | | | $K_S$ = | 0.8784 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 2067.8194 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 2067.8194 | cu ft | | | |
| D = Tank Diameter | 18.5000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 7.6927 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 7.6927 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 15.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 7.5000 | ft | | | | | | | |
| Roof Outage | 0.1927 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1927 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.1927 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.5781 | ft | | | |
| $R_S$ = Shell Radius | 9.2500 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{delta} P_V - \text{delta } P_B)/(P_A - P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX} - T_{AN}) + 0.028 * \text{alpha} * I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8784 | | $K_S = 1/[1 + (.053 * P_{VA} * H_{VO})]$ | $K_S$ = | 0.8784 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Space Outage | 7.6927 | ft | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Working Losses* | 73.3280 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 73.3280 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Q = Annual Net Throughput | 500,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 11,904.76 | bbl/yr | | |
| Annual Turnovers | 16.6667 | | | N = | 16.6667 | | | |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | |
| Maximum Liquid Volume | 30000.0000 | gal | | | | | | |
| Maximum Liquid Height | 15.0000 | ft | | | | | | |
| Tank Diameter | 18.5000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 95.5175 | lb | | $L_T$ = | 95.4985 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-220 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 1-6 Leachate (inc NAPL) | 73.33 | 22.19 | 95.52 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Ethylene dichloride | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.00 | 0.01 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Diethyl ether | 0.01 | 0.00 | 0.01 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.09 | 0.03 | 0.12 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.35 | 0.11 | 0.46 |
| Methylene chloride | 0.21 | 0.06 | 0.27 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.21 | 0.06 | 0.28 |
| Butanol-(1) | 0.00 | 0.00 | 0.00 |
| Water | 72.43 | 21.92 | 94.35 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 73.32801 | 22.17049 | 95.49850 |
| 0.00103 | 0.00031 | 0.00134 |
| 0.00017 | 0.00005 | 0.00023 |
| 0.00128 | 0.00039 | 0.00166 |
| 0.00056 | 0.00017 | 0.00073 |
| 0.00102 | 0.00031 | 0.00133 |
| 0.00640 | 0.00194 | 0.00834 |
| 0.00114 | 0.00034 | 0.00149 |
| 0.00004 | 0.00001 | 0.00005 |
| 0.00017 | 0.00005 | 0.00022 |
| 0.00002 | 0.00001 | 0.00003 |
| 0.00031 | 0.00009 | 0.00041 |
| 0.00304 | 0.00092 | 0.00396 |
| 0.01116 | 0.00337 | 0.01454 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00046 | 0.00014 | 0.00060 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00024 | 0.00007 | 0.00031 |
| 0.00021 | 0.00006 | 0.00028 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00002 | 0.00001 | 0.00002 |
| 0.00007 | 0.00002 | 0.00009 |
| 0.09268 | 0.02802 | 0.12071 |
| 0.00245 | 0.00074 | 0.00319 |
| 0.35037 | 0.10593 | 0.45631 |
| 0.20539 | 0.06210 | 0.26749 |
| 0.00164 | 0.00050 | 0.00214 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00014 | 0.00004 | 0.00019 |
| 0.21232 | 0.06420 | 0.27652 |
| 0.00211 | 0.00064 | 0.00275 |
| 72.43351 | 21.90004 | 94.33356 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-230 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-1111 / T-1112 - T-1410 divided by 3 |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 15.00 |
| *Diameter (ft)* | 18.50 |
| *Liquid Height (ft)* | 15.00 |
| *Avg. Liquid Height (ft)* | 7.50 |
| *Volume (gal)* | 30,000.00 |
| *Turnovers* | 16.67 |
| *Net Throughput (gal/yr)* | 500,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-230 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate (inc NAPL)* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | - | - | 18.04 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | ###### | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9996 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate (inc NAPL)* | All | 49.26 | - | - | 47.70 | 0.3394 | - | - | 18.1467 | - | - | 18.04 | - | - | - | - | - | - | - | - | - | 18.1467 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 740000 | 0.00074 | 0.000013 | 0.000230 | 0.0867 |
| Acetonitrile | | | | | | 0.8304 | - | - | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119 B=1314.4 C=230 | 7.1190 | 1314.400 | 230.00 | 41.05 | 6400 | 0.0000064 | 0.000000 | 0.000003 | 0.0003 |
| Acrylonitrile | | | | | | 1.0305 | - | - | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038 B=1232.53 C=222.47 | 7.0380 | 1232.530 | 222.47 | 53.06 | 160 | 0.00000016 | 0.000000 | 0.000000 | 0.0000 |
| Aniline | | | | | | 0.0038 | - | - | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32 B=1731.515 C=206.049 | 7.3200 | 1731.515 | 206.05 | 93.10 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 920 | 0.00000092 | 0.000000 | 0.000000 | 0.0000 |
| Butanol-(1) | | | | | | 0.0339 | - | - | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768 B=1362.39 C=178.77 | 7.4768 | 1362.390 | 178.77 | 74.12 | 290000 | 0.00029 | 0.000004 | 0.000071 | 0.0005 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 1000 | 0.000001 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 7800 | 0.0000078 | 0.000000 | 0.000001 | 0.0008 |
| Cresol (-m) | | | | | | 0.0008 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508 B=1856.36 C=199.07 | 7.5080 | 1856.360 | 199.07 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cyclohexanone | | | | | | 0.0377 | - | - | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492 B=2137.192 C=273.16 | 7.8492 | 2137.192 | 273.16 | 98.20 | 2100 | 0.0000021 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2012 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | - | - | - | 98.97 | 2700 | 0.0000027 | 0.000000 | 0.000000 | 0.0003 |
| Ethylene dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 6900 | 0.0000069 | 0.000000 | 0.000001 | 0.0003 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | - | - | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965 B=1141.9 C=231.9 | 6.9650 | 1141.900 | 231.90 | 96.95 | 300 | 0.0000003 | 0.000000 | 0.000000 | 0.0001 |
| Diethyl ether | | | | | | 5.5303 | - | - | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92 B=1064.07 C=228.8 | 6.9200 | 1064.070 | 228.80 | 74.12 | 9400 | 0.0000094 | 0.000000 | 0.000002 | 0.0028 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 280 | 0.00000028 | 0.000000 | 0.000000 | 0.0000 |
| Dioxane (1,4) | | | | | | 0.3139 | - | - | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431 B=1554.68 C=240.34 | 7.4310 | 1554.680 | 240.34 | 88.10 | 95000 | 0.000095 | 0.000001 | 0.000019 | 0.0016 |
| Ethyl chloride | | | | | | 13.2558 | - | - | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986 B=1030.01 C=238.61 | 6.9860 | 1030.010 | 238.61 | 64.52 | 110 | 0.00000011 | 0.000000 | 0.000000 | 0.0001 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 170 | 0.00000017 | 0.000000 | 0.000000 | 0.0000 |
| Iso-butyl alcohol | | | | | | 0.0584 | - | - | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636 B=1236.991 | 7.3064 | 1236.991 | 171.62 | 74.12 | 37000 | 0.000037 | 0.000000 | 0.000009 | 0.0001 |
| Methyl alcohol | | | | | | 1.0194 | - | - | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897 B=1474.08 C=229.13 | 7.8970 | 1474.080 | 229.13 | 32.04 | 970000 | 0.00097 | 0.000030 | 0.000546 | 0.0525 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0006 | 0.0013 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 550000 | 0.00055 | 0.000008 | 0.000138 | 0.0229 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 79000 | 0.000079 | 0.000001 | 0.000014 | 0.0006 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 220000 | 0.00022 | 0.000003 | 0.000047 | 0.0508 |
| Pyridine | | | | | | 0.1621 | - | - | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041 B=1373.8 C=214.98 | 7.0410 | 1373.800 | 214.98 | 79.10 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 12000 | 0.000012 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 500 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0001 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 3900 | 0.0000039 | 0.000000 | 0.000001 | 0.0003 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 13000 | 0.000013 | 0.000000 | 0.000002 | 0.0004 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 410 | 0.00000041 | 0.000000 | 0.000000 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9969 | 0.9878 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 996897970 | 0.99689797 | 0.055383 | 0.998905 | 17.9253 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 820 | | | | |
| | | | | | | | | | | | | | | | | | | | | | check: | **1.00000** |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-230 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 22.1895 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 22.1705 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 2067.8194 | | | $V_V$ = | 2067.8194 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8784 | | | $K_S$ = | 0.8784 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 2067.8194 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 2067.8194 | cu ft | | | |
| D = Tank Diameter | 18.5000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 7.6927 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 7.6927 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 15.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 7.5000 | ft | | | | | | | |
| Roof Outage | 0.1927 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1927 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.1927 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.5781 | ft | | | |
| $R_S$ = Shell Radius | 9.2500 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{delta} P_V - \text{delta } P_B)/(P_A - P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX} - T_{AN}) + 0.028 * \text{alpha} * I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8784 | | $K_S = 1/[1 + (.053 * P_{VA} * H_{VO})]$ | $K_S$ = | 0.8784 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Space Outage | 7.6927 | ft | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Working Losses* | 73.3280 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 73.3280 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Q = Annual Net Throughput | 500,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 11,904.76 | bbl/yr | | |
| Annual Turnovers | 16.6667 | | | N = | 16.6667 | | | |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | |
| Maximum Liquid Volume | 30000.0000 | gal | | | | | | |
| Maximum Liquid Height | 15.0000 | ft | | | | | | |
| Tank Diameter | 18.5000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 95.5175 | lb | | $L_T$ = | 95.4985 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-230 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 1-6 Leachate (inc NAPL) | 73.33 | 22.19 | 95.52 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Ethylene dichloride | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.00 | 0.01 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Diethyl ether | 0.01 | 0.00 | 0.01 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.09 | 0.03 | 0.12 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.35 | 0.11 | 0.46 |
| Methylene chloride | 0.21 | 0.06 | 0.27 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.21 | 0.06 | 0.28 |
| Butanol-(1) | 0.00 | 0.00 | 0.00 |
| Water | 72.43 | 21.92 | 94.35 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 73.32801 | 22.17049 | 95.49850 |
| 0.00103 | 0.00031 | 0.00134 |
| 0.00017 | 0.00005 | 0.00023 |
| 0.00128 | 0.00039 | 0.00166 |
| 0.00056 | 0.00017 | 0.00073 |
| 0.00102 | 0.00031 | 0.00133 |
| 0.00640 | 0.00194 | 0.00834 |
| 0.00114 | 0.00034 | 0.00149 |
| 0.00004 | 0.00001 | 0.00005 |
| 0.00017 | 0.00005 | 0.00022 |
| 0.00002 | 0.00001 | 0.00003 |
| 0.00031 | 0.00009 | 0.00041 |
| 0.00304 | 0.00092 | 0.00396 |
| 0.01116 | 0.00337 | 0.01454 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00046 | 0.00014 | 0.00060 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00024 | 0.00007 | 0.00031 |
| 0.00021 | 0.00006 | 0.00028 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00002 | 0.00001 | 0.00002 |
| 0.00007 | 0.00002 | 0.00009 |
| 0.09268 | 0.02802 | 0.12071 |
| 0.00245 | 0.00074 | 0.00319 |
| 0.35037 | 0.10593 | 0.45631 |
| 0.20539 | 0.06210 | 0.26749 |
| 0.00164 | 0.00050 | 0.00214 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00014 | 0.00004 | 0.00019 |
| 0.21232 | 0.06420 | 0.27652 |
| 0.00211 | 0.00064 | 0.00275 |
| 72.43351 | 21.90004 | 94.33356 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-710 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 16.00 |
| *Diameter (ft)* | 9.00 |
| *Liquid Height (ft)* | 16.00 |
| *Avg. Liquid Height (ft)* | 16.00 |
| *Volume (gal)* | 8,000.00 |
| *Turnovers* | 12.50 |
| *Net Throughput (gal/yr)* | 100,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-710 - Vertical Fixed Roof Tank**
**Model City, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_u = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 710 Liquid* | All | 49.26 | - | - | 47.70 | 0.3394 | - | - | 18.1467 | - | - | 18.15 | - | - | - | - | - | - | - | - | - | 18.1467 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 740000 | 0.00074 | 0.000013 | 0.000230 | 0.0867 |
| Acetonitrile | | | | | | 0.8304 | - | - | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119 B=1314.4 C=230 | 7.1190 | 1314.400 | 230.00 | 41.05 | 6400 | 0.0000064 | 0.000000 | 0.000003 | 0.0003 |
| Acrylonitrile | | | | | | 1.0305 | - | - | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038 B=1232.53 C=222.47 | 7.0380 | 1232.530 | 222.47 | 53.06 | 160 | 0.00000016 | 0.000000 | 0.000000 | 0.0000 |
| Aniline | | | | | | 0.0038 | - | - | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32 B=1731.515 C=206.049 | 7.3200 | 1731.515 | 206.05 | 93.10 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 920 | 0.00000092 | 0.000000 | 0.000000 | 0.0000 |
| Butanol-(1) | | | | | | 0.0339 | - | - | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768 B=1362.39 C=178.77 | 7.4768 | 1362.390 | 178.77 | 74.12 | 290000 | 0.00029 | 0.000004 | 0.000071 | 0.0005 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 1000 | 0.000001 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 7800 | 0.0000078 | 0.000000 | 0.000001 | 0.0008 |
| Cresol (-m) | | | | | | 0.0008 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508 B=1856.36 C=199.07 | 7.5080 | 1856.360 | 199.07 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cyclohexanone | | | | | | 0.0377 | - | - | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492 B=2137.192 C=273.16 | 7.8492 | 2137.192 | 273.16 | 98.20 | 2100 | 0.0000021 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2074 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | 6.9853 | 1171.420 | 228.13 | 98.97 | 2700 | 0.0000027 | 0.000000 | 0.000000 | 0.0003 |
| Ethylene Dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 6900 | 0.0000069 | 0.000000 | 0.000001 | 0.0003 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | - | - | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965 B=1141.9 C=231.9 | 6.9650 | 1141.900 | 231.90 | 96.95 | 300 | 0.0000003 | 0.000000 | 0.000000 | 0.0001 |
| Diethyl ether | | | | | | 5.5303 | - | - | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92 B=1064.07 C=228.8 | 6.9200 | 1064.070 | 228.80 | 74.12 | 9400 | 0.0000094 | 0.000000 | 0.000002 | 0.0028 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 280 | 0.00000028 | 0.000000 | 0.000000 | 0.0000 |
| Dioxane (1,4) | | | | | | 0.3139 | - | - | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431 B=1554.68 C=240.34 | 7.4310 | 1554.680 | 240.34 | 88.10 | 95000 | 0.000095 | 0.000001 | 0.000019 | 0.0016 |
| Ethyl chloride | | | | | | 13.2558 | - | - | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986 B=1030.01 C=238.61 | 6.9860 | 1030.010 | 238.61 | 64.52 | 110 | 0.00000011 | 0.000000 | 0.000000 | 0.0001 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 170 | 0.00000017 | 0.000000 | 0.000000 | 0.0000 |
| Iso-butyl alcohol | | | | | | 0.0584 | - | - | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636 B=1236.991 | 7.3064 | 1236.991 | 171.62 | 74.12 | 37000 | 0.000037 | 0.000000 | 0.000009 | 0.0001 |
| Methyl alcohol | | | | | | 1.0194 | - | - | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897 B=1474.08 C=229.13 | 7.8970 | 1474.080 | 229.13 | 32.04 | 970000 | 0.00097 | 0.000030 | 0.000546 | 0.0525 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0006 | 0.0013 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 550000 | 0.00055 | 0.000008 | 0.000138 | 0.0229 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 79000 | 0.000079 | 0.000001 | 0.000014 | 0.0006 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 220000 | 0.00022 | 0.000003 | 0.000047 | 0.0508 |
| Pyridine | | | | | | 0.1621 | - | - | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041 B=1373.8 C=214.98 | 7.0410 | 1373.800 | 214.98 | 79.10 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 12000 | 0.000012 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 500 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0001 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 3900 | 0.0000039 | 0.000000 | 0.000001 | 0.0003 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 13000 | 0.000013 | 0.000000 | 0.000002 | 0.0004 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 410 | 0.00000041 | 0.000000 | 0.000000 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9969 | 0.9878 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 996897970 | 0.99689797 | 0.055383 | 0.998905 | 17.9253 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 820 | 0.00000082 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | check: | **1.00000** |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-710 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 22.1895 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.0727 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 2067.8194 | | | $V_V$ = | 5.9641 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8784 | | | $K_S$ = | 0.9983 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 2067.8194 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 5.9641 | cu ft | | | |
| D = Tank Diameter | 9.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 7.6927 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 0.0938 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 16.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 16.0000 | ft | | | | | | | |
| Roof Outage | 0.1927 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1927 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0938 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.2813 | ft | | | |
| $R_S$ = Shell Radius | 4.5000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8784 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9983 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Space Outage | 7.6927 | ft | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Working Losses* | 73.3280 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 14.6656 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 100,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 2,380.95 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 12.5000 | | | N = | 12.5000 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 8000.0000 | gal | | | | | | for crude oils $K_P = 0.75$ |
| Maximum Liquid Height | 16.0000 | ft | | | | | | |
| Tank Diameter | 9.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 95.5175 | lb | | $L_T$ = | 14.7383 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-710 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

**CALCULATED VALUES**

| Components | Losses (lbs) | | | Losses (lbs) | | |
|---|---|---|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 710 Liquid | | | | 14.66560 | 0.07267 | 14.73828 |
| Trichloroethane (1,1,1) | | | | 0.00021 | 0.00000 | 0.00021 |
| Trichloroethane (1,1,2) | | | | 0.00003 | 0.00000 | 0.00004 |
| Dichloroethane (1,1) | | | | 0.00026 | 0.00000 | 0.00026 |
| Vinylidene chloride | | | | 0.00011 | 0.00000 | 0.00011 |
| Ethylene Dichloride | | | | 0.00020 | 0.00000 | 0.00021 |
| Dioxane (1,4) | | | | 0.00128 | 0.00001 | 0.00129 |
| Acetonitrile | | | | 0.00023 | 0.00000 | 0.00023 |
| Acrylonitrile | | | | 0.00001 | 0.00000 | 0.00001 |
| Benzene | | | | 0.00003 | 0.00000 | 0.00003 |
| Chlorobenzene | | | | 0.00000 | 0.00000 | 0.00000 |
| Ethyl chloride | | | | 0.00006 | 0.00000 | 0.00006 |
| Chloroform | | | | 0.00061 | 0.00000 | 0.00061 |
| Diethyl ether | | | | 0.00223 | 0.00001 | 0.00224 |
| Ethylbenzene | | | | 0.00000 | 0.00000 | 0.00000 |
| Iso-butyl alcohol | | | | 0.00009 | 0.00000 | 0.00009 |
| Tetrachloroethylene | | | | 0.00000 | 0.00000 | 0.00000 |
| Toluene | | | | 0.00005 | 0.00000 | 0.00005 |
| Dichloroethylene (-trans-1,2) | | | | 0.00004 | 0.00000 | 0.00004 |
| Xylenes (mixed isomers) | | | | 0.00000 | 0.00000 | 0.00000 |
| Cyclohexanone | | | | 0.00000 | 0.00000 | 0.00000 |
| Tetrachloroethane (1,1,2,2) | | | | 0.00001 | 0.00000 | 0.00001 |
| Methyl ethyl ketone | | | | 0.01854 | 0.00009 | 0.01863 |
| Methyl isobutyl ketone | | | | 0.00049 | 0.00000 | 0.00049 |
| Acetone | | | | 0.07007 | 0.00035 | 0.07042 |
| Methylene chloride | | | | 0.04108 | 0.00020 | 0.04128 |
| Trichloroethylene | | | | 0.00033 | 0.00000 | 0.00033 |
| Cresol (-o) | | | | 0.00000 | 0.00000 | 0.00000 |
| Cresol (-m) | | | | 0.00000 | 0.00000 | 0.00000 |
| Cresol (-p) | | | | 0.00000 | 0.00000 | 0.00000 |
| Aniline | | | | 0.00000 | 0.00000 | 0.00000 |
| Dimethyl phthalate | | | | 0.00000 | 0.00000 | 0.00000 |
| Pyridine | | | | 0.00003 | 0.00000 | 0.00003 |
| Methyl alcohol | | | | 0.04246 | 0.00021 | 0.04267 |
| Butanol-(1) | | | | 0.00042 | 0.00000 | 0.00042 |
| Water | | | | 14.48670 | 0.07179 | 14.55849 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-810 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 16.00 |
| *Diameter (ft)* | 9.00 |
| *Liquid Height (ft)* | 16.00 |
| *Avg. Liquid Height (ft)* | 16.00 |
| *Volume (gal)* | 8,000.00 |
| *Turnovers* | 12.50 |
| *Net Throughput (gal/yr)* | 100,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-810 - Vertical Fixed Roof Tank**
**Model City, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_u = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 810 Liquid* | All | 49.26 | - | - | 47.70 | 0.3394 | - | - | 18.1467 | - | - | 18.15 | - | - | - | - | - | - | - | - | - | 18.1467 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 740000 | 0.00074 | 0.000013 | 0.000230 | 0.0867 |
| Acetonitrile | | | | | | 0.8304 | - | - | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119 B=1314.4 C=230 | 7.1190 | 1314.400 | 230.00 | 41.05 | 6400 | 0.0000064 | 0.000000 | 0.000003 | 0.0003 |
| Acrylonitrile | | | | | | 1.0305 | - | - | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038 B=1232.53 C=222.47 | 7.0380 | 1232.530 | 222.47 | 53.06 | 160 | 0.00000016 | 0.000000 | 0.000000 | 0.0000 |
| Aniline | | | | | | 0.0038 | - | - | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32 B=1731.515 C=206.049 | 7.3200 | 1731.515 | 206.05 | 93.10 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 920 | 0.00000092 | 0.000000 | 0.000000 | 0.0000 |
| Butanol-(1) | | | | | | 0.0339 | - | - | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768 B=1362.39 C=178.77 | 7.4768 | 1362.390 | 178.77 | 74.12 | 290000 | 0.00029 | 0.000004 | 0.000071 | 0.0005 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 1000 | 0.000001 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 7800 | 0.0000078 | 0.000000 | 0.000001 | 0.0008 |
| Cresol (-m) | | | | | | 0.0008 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508 B=1856.36 C=199.07 | 7.5080 | 1856.360 | 199.07 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cyclohexanone | | | | | | 0.0377 | - | - | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492 B=2137.192 C=273.16 | 7.8492 | 2137.192 | 273.16 | 98.20 | 2100 | 0.0000021 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2074 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | 6.9853 | 1171.420 | 228.13 | 98.97 | 2700 | 0.0000027 | 0.000000 | 0.000000 | 0.0003 |
| Ethylene Dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 6900 | 0.0000069 | 0.000000 | 0.000001 | 0.0003 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | - | - | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965 B=1141.9 C=231.9 | 6.9650 | 1141.900 | 231.90 | 96.95 | 300 | 0.0000003 | 0.000000 | 0.000000 | 0.0001 |
| Diethyl ether | | | | | | 5.5303 | - | - | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92 B=1064.07 C=228.8 | 6.9200 | 1064.070 | 228.80 | 74.12 | 9400 | 0.0000094 | 0.000000 | 0.000002 | 0.0028 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 280 | 0.00000028 | 0.000000 | 0.000000 | 0.0000 |
| Dioxane (1,4) | | | | | | 0.3139 | - | - | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431 B=1554.68 C=240.34 | 7.4310 | 1554.680 | 240.34 | 88.10 | 95000 | 0.000095 | 0.000001 | 0.000019 | 0.0016 |
| Ethyl chloride | | | | | | 13.2558 | - | - | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986 B=1030.01 C=238.61 | 6.9860 | 1030.010 | 238.61 | 64.52 | 110 | 0.00000011 | 0.000000 | 0.000000 | 0.0001 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 170 | 0.00000017 | 0.000000 | 0.000000 | 0.0000 |
| Iso-butyl alcohol | | | | | | 0.0584 | - | - | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636 B=1236.991 | 7.3064 | 1236.991 | 171.62 | 74.12 | 37000 | 0.000037 | 0.000000 | 0.000009 | 0.0001 |
| Methyl alcohol | | | | | | 1.0194 | - | - | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897 B=1474.08 C=229.13 | 7.8970 | 1474.080 | 229.13 | 32.04 | 970000 | 0.00097 | 0.000030 | 0.000546 | 0.0525 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0006 | 0.0013 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 550000 | 0.00055 | 0.000008 | 0.000138 | 0.0229 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 79000 | 0.000079 | 0.000001 | 0.000014 | 0.0006 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 220000 | 0.00022 | 0.000003 | 0.000047 | 0.0508 |
| Pyridine | | | | | | 0.1621 | - | - | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041 B=1373.8 C=214.98 | 7.0410 | 1373.800 | 214.98 | 79.10 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 12000 | 0.000012 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 500 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0001 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 3900 | 0.0000039 | 0.000000 | 0.000001 | 0.0003 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 13000 | 0.000013 | 0.000000 | 0.000002 | 0.0004 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 410 | 0.00000041 | 0.000000 | 0.000000 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9969 | 0.9878 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 996897970 | 0.99689797 | 0.055383 | 0.998905 | 17.9253 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 820 | 0.00000082 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | check: | **1.00000** |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-810 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 22.1895 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.0727 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 2067.8194 | | | $V_V$ = | 5.9641 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8784 | | | $K_S$ = | 0.9983 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 2067.8194 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 5.9641 | cu ft | | | |
| D = Tank Diameter | 9.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 7.6927 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 0.0938 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 16.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 16.0000 | ft | | | | | | | |
| Roof Outage | 0.1927 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1927 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0938 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.2813 | ft | | | |
| $R_S$ = Shell Radius | 4.5000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8784 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9983 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Space Outage | 7.6927 | ft | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Working Losses* | 73.3280 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 14.6656 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 100,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 2,380.95 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 12.5000 | | | N = | 12.5000 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 8000.0000 | gal | | | | | | for crude oils $K_P = 0.75$ |
| Maximum Liquid Height | 16.0000 | ft | | | | | | |
| Tank Diameter | 9.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 95.5175 | lb | | $L_T$ = | 14.7383 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-810 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

**CALCULATED VALUES**

| Components | Losses (lbs) | | | Losses (lbs) | | |
|---|---|---|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 810 Liquid | | | | 14.66560 | 0.07267 | 14.73828 |
| Trichloroethane (1,1,1) | | | | 0.00021 | 0.00000 | 0.00021 |
| Trichloroethane (1,1,2) | | | | 0.00003 | 0.00000 | 0.00004 |
| Dichloroethane (1,1) | | | | 0.00026 | 0.00000 | 0.00026 |
| Vinylidene chloride | | | | 0.00011 | 0.00000 | 0.00011 |
| Ethylene Dichloride | | | | 0.00020 | 0.00000 | 0.00021 |
| Dioxane (1,4) | | | | 0.00128 | 0.00001 | 0.00129 |
| Acetonitrile | | | | 0.00023 | 0.00000 | 0.00023 |
| Acrylonitrile | | | | 0.00001 | 0.00000 | 0.00001 |
| Benzene | | | | 0.00003 | 0.00000 | 0.00003 |
| Chlorobenzene | | | | 0.00000 | 0.00000 | 0.00000 |
| Ethyl chloride | | | | 0.00006 | 0.00000 | 0.00006 |
| Chloroform | | | | 0.00061 | 0.00000 | 0.00061 |
| Diethyl ether | | | | 0.00223 | 0.00001 | 0.00224 |
| Ethylbenzene | | | | 0.00000 | 0.00000 | 0.00000 |
| Iso-butyl alcohol | | | | 0.00009 | 0.00000 | 0.00009 |
| Tetrachloroethylene | | | | 0.00000 | 0.00000 | 0.00000 |
| Toluene | | | | 0.00005 | 0.00000 | 0.00005 |
| Dichloroethylene (-trans-1,2) | | | | 0.00004 | 0.00000 | 0.00004 |
| Xylenes (mixed isomers) | | | | 0.00000 | 0.00000 | 0.00000 |
| Cyclohexanone | | | | 0.00000 | 0.00000 | 0.00000 |
| Tetrachloroethane (1,1,2,2) | | | | 0.00001 | 0.00000 | 0.00001 |
| Methyl ethyl ketone | | | | 0.01854 | 0.00009 | 0.01863 |
| Methyl isobutyl ketone | | | | 0.00049 | 0.00000 | 0.00049 |
| Acetone | | | | 0.07007 | 0.00035 | 0.07042 |
| Methylene chloride | | | | 0.04108 | 0.00020 | 0.04128 |
| Trichloroethylene | | | | 0.00033 | 0.00000 | 0.00033 |
| Cresol (-o) | | | | 0.00000 | 0.00000 | 0.00000 |
| Cresol (-m) | | | | 0.00000 | 0.00000 | 0.00000 |
| Cresol (-p) | | | | 0.00000 | 0.00000 | 0.00000 |
| Aniline | | | | 0.00000 | 0.00000 | 0.00000 |
| Dimethyl phthalate | | | | 0.00000 | 0.00000 | 0.00000 |
| Pyridine | | | | 0.00003 | 0.00000 | 0.00003 |
| Methyl alcohol | | | | 0.04246 | 0.00021 | 0.04267 |
| Butanol-(1) | | | | 0.00042 | 0.00000 | 0.00042 |
| Water | | | | 14.48670 | 0.07179 | 14.55849 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-820 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 16.00 |
| *Diameter (ft)* | 9.00 |
| *Liquid Height (ft)* | 16.00 |
| *Avg. Liquid Height (ft)* | 16.00 |
| *Volume (gal)* | 8,000.00 |
| *Turnovers* | 12.50 |
| *Net Throughput (gal/yr)* | 100,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-820 - Vertical Fixed Roof Tank**
**Model City, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_u = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 820 Liquid* | All | 49.26 | - | - | 47.70 | 0.3394 | - | - | 18.1467 | - | - | 18.15 | - | - | - | - | - | - | - | - | - | 18.1467 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 740000 | 0.00074 | 0.000013 | 0.000230 | 0.0867 |
| Acetonitrile | | | | | | 0.8304 | - | - | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119 B=1314.4 C=230 | 7.1190 | 1314.400 | 230.00 | 41.05 | 6400 | 0.0000064 | 0.000000 | 0.000003 | 0.0003 |
| Acrylonitrile | | | | | | 1.0305 | - | - | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038 B=1232.53 C=222.47 | 7.0380 | 1232.530 | 222.47 | 53.06 | 160 | 0.00000016 | 0.000000 | 0.000000 | 0.0000 |
| Aniline | | | | | | 0.0038 | - | - | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32 B=1731.515 C=206.049 | 7.3200 | 1731.515 | 206.05 | 93.10 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 920 | 0.00000092 | 0.000000 | 0.000000 | 0.0000 |
| Butanol-(1) | | | | | | 0.0339 | - | - | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768 B=1362.39 C=178.77 | 7.4768 | 1362.390 | 178.77 | 74.12 | 290000 | 0.00029 | 0.000004 | 0.000071 | 0.0005 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 1000 | 0.000001 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 7800 | 0.0000078 | 0.000000 | 0.000001 | 0.0008 |
| Cresol (-m) | | | | | | 0.0008 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508 B=1856.36 C=199.07 | 7.5080 | 1856.360 | 199.07 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cyclohexanone | | | | | | 0.0377 | - | - | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492 B=2137.192 C=273.16 | 7.8492 | 2137.192 | 273.16 | 98.20 | 2100 | 0.0000021 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2074 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | 6.9853 | 1171.420 | 228.13 | 98.97 | 2700 | 0.0000027 | 0.000000 | 0.000000 | 0.0003 |
| Ethylene Dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 6900 | 0.0000069 | 0.000000 | 0.000001 | 0.0003 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | - | - | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965 B=1141.9 C=231.9 | 6.9650 | 1141.900 | 231.90 | 96.95 | 300 | 0.0000003 | 0.000000 | 0.000000 | 0.0001 |
| Diethyl ether | | | | | | 5.5303 | - | - | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92 B=1064.07 C=228.8 | 6.9200 | 1064.070 | 228.80 | 74.12 | 9400 | 0.0000094 | 0.000000 | 0.000002 | 0.0028 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 280 | 0.00000028 | 0.000000 | 0.000000 | 0.0000 |
| Dioxane (1,4) | | | | | | 0.3139 | - | - | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431 B=1554.68 C=240.34 | 7.4310 | 1554.680 | 240.34 | 88.10 | 95000 | 0.000095 | 0.000001 | 0.000019 | 0.0016 |
| Ethyl chloride | | | | | | 13.2558 | - | - | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986 B=1030.01 C=238.61 | 6.9860 | 1030.010 | 238.61 | 64.52 | 110 | 0.00000011 | 0.000000 | 0.000000 | 0.0001 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 170 | 0.00000017 | 0.000000 | 0.000000 | 0.0000 |
| Iso-butyl alcohol | | | | | | 0.0584 | - | - | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636 B=1236.991 | 7.3064 | 1236.991 | 171.62 | 74.12 | 37000 | 0.000037 | 0.000000 | 0.000009 | 0.0001 |
| Methyl alcohol | | | | | | 1.0194 | - | - | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897 B=1474.08 C=229.13 | 7.8970 | 1474.080 | 229.13 | 32.04 | 970000 | 0.00097 | 0.000030 | 0.000546 | 0.0525 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0006 | 0.0013 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 550000 | 0.00055 | 0.000008 | 0.000138 | 0.0229 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 79000 | 0.000079 | 0.000001 | 0.000014 | 0.0006 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 220000 | 0.00022 | 0.000003 | 0.000047 | 0.0508 |
| Pyridine | | | | | | 0.1621 | - | - | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041 B=1373.8 C=214.98 | 7.0410 | 1373.800 | 214.98 | 79.10 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 12000 | 0.000012 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 500 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0001 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 3900 | 0.0000039 | 0.000000 | 0.000001 | 0.0003 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 13000 | 0.000013 | 0.000000 | 0.000002 | 0.0004 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 410 | 0.00000041 | 0.000000 | 0.000000 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9969 | 0.9878 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 996897970 | 0.99689797 | 0.055383 | 0.998905 | 17.9253 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 820 | 0.00000082 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | check: | **1.00000** |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-820 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 22.1895 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.0727 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 2067.8194 | | | $V_V$ = | 5.9641 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8784 | | | $K_S$ = | 0.9983 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 2067.8194 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 5.9641 | cu ft | | | |
| D = Tank Diameter | 9.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 7.6927 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 0.0938 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 16.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 16.0000 | ft | | | | | | | |
| Roof Outage | 0.1927 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1927 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0938 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.2813 | ft | | | |
| $R_S$ = Shell Radius | 4.5000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8784 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9983 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Space Outage | 7.6927 | ft | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Working Losses* | 73.3280 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 14.6656 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 100,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 2,380.95 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 12.5000 | | | N = | 12.5000 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 8000.0000 | gal | | | | | | for crude oils $K_P = 0.75$ |
| Maximum Liquid Height | 16.0000 | ft | | | | | | |
| Tank Diameter | 9.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 95.5175 | lb | | $L_T$ = | 14.7383 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-820 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

**CALCULATED VALUES**

| Components | Losses (lbs) | | | Losses (lbs) | | |
|---|---|---|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 820 Liquid | | | | 14.66560 | 0.07267 | 14.73828 |
| Trichloroethane (1,1,1) | | | | 0.00021 | 0.00000 | 0.00021 |
| Trichloroethane (1,1,2) | | | | 0.00003 | 0.00000 | 0.00004 |
| Dichloroethane (1,1) | | | | 0.00026 | 0.00000 | 0.00026 |
| Vinylidene chloride | | | | 0.00011 | 0.00000 | 0.00011 |
| Ethylene Dichloride | | | | 0.00020 | 0.00000 | 0.00021 |
| Dioxane (1,4) | | | | 0.00128 | 0.00001 | 0.00129 |
| Acetonitrile | | | | 0.00023 | 0.00000 | 0.00023 |
| Acrylonitrile | | | | 0.00001 | 0.00000 | 0.00001 |
| Benzene | | | | 0.00003 | 0.00000 | 0.00003 |
| Chlorobenzene | | | | 0.00000 | 0.00000 | 0.00000 |
| Ethyl chloride | | | | 0.00006 | 0.00000 | 0.00006 |
| Chloroform | | | | 0.00061 | 0.00000 | 0.00061 |
| Diethyl ether | | | | 0.00223 | 0.00001 | 0.00224 |
| Ethylbenzene | | | | 0.00000 | 0.00000 | 0.00000 |
| Iso-butyl alcohol | | | | 0.00009 | 0.00000 | 0.00009 |
| Tetrachloroethylene | | | | 0.00000 | 0.00000 | 0.00000 |
| Toluene | | | | 0.00005 | 0.00000 | 0.00005 |
| Dichloroethylene (-trans-1,2) | | | | 0.00004 | 0.00000 | 0.00004 |
| Xylenes (mixed isomers) | | | | 0.00000 | 0.00000 | 0.00000 |
| Cyclohexanone | | | | 0.00000 | 0.00000 | 0.00000 |
| Tetrachloroethane (1,1,2,2) | | | | 0.00001 | 0.00000 | 0.00001 |
| Methyl ethyl ketone | | | | 0.01854 | 0.00009 | 0.01863 |
| Methyl isobutyl ketone | | | | 0.00049 | 0.00000 | 0.00049 |
| Acetone | | | | 0.07007 | 0.00035 | 0.07042 |
| Methylene chloride | | | | 0.04108 | 0.00020 | 0.04128 |
| Trichloroethylene | | | | 0.00033 | 0.00000 | 0.00033 |
| Cresol (-o) | | | | 0.00000 | 0.00000 | 0.00000 |
| Cresol (-m) | | | | 0.00000 | 0.00000 | 0.00000 |
| Cresol (-p) | | | | 0.00000 | 0.00000 | 0.00000 |
| Aniline | | | | 0.00000 | 0.00000 | 0.00000 |
| Dimethyl phthalate | | | | 0.00000 | 0.00000 | 0.00000 |
| Pyridine | | | | 0.00003 | 0.00000 | 0.00003 |
| Methyl alcohol | | | | 0.04246 | 0.00021 | 0.04267 |
| Butanol-(1) | | | | 0.00042 | 0.00000 | 0.00042 |
| Water | | | | 14.48670 | 0.07179 | 14.55849 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-58 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 23.50 |
| *Diameter (ft)* | 81.00 |
| *Liquid Height (ft)* | 23.50 |
| *Avg. Liquid Height (ft)* | 23.50 |
| *Volume (gal)* | 488,529.00 |
| *Turnovers* | 16.38 |
| *Net Throughput (gal/yr)* | 8,000,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-58 - Vertical Fixed Roof Tank**
**Model City, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_u = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 58 Liquid* | All | 49.26 | - | - | 47.70 | 0.3384 | - | - | 18.0000 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | 18.0000 |
| Vinyl chloride | | | | | | 32.6452 | - | - | 62.4980 | 0.0000 | 0.0000 | 62.50 | | 6.4971 | 783.400 | 230.01 | 62.498 | 0.15 | 1.5E-10 | 0.000000 | 0.000000 | 0.0000 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0000 | 0.0000 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 0.9 | 9E-10 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 0.155 | 1.55E-10 | 0.000000 | 0.000000 | 0.0000 |
| Carbon tetrachloride | | | | | | 1.0831 | - | - | 98.9600 | 0.0000 | 0.0000 | 98.96 | | 6.9340 | 1242.430 | 230.00 | 98.96 | 0.165 | 1.65E-10 | 0.000000 | 0.000000 | 0.0000 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 0.16 | 1.6E-10 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 0.145 | 1.45E-10 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2074 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | 6.9853 | 1171.420 | 228.13 | 98.97 | 0.155 | 1.55E-10 | 0.000000 | 0.000000 | 0.0000 |
| Ethylene Dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 0.18 | 1.8E-10 | 0.000000 | 0.000000 | 0.0000 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 1.1 | 1.1E-09 | 0.000000 | 0.000000 | 0.0000 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 1.2 | 1.2E-09 | 0.000000 | 0.000000 | 0.0000 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 0.325 | 3.25E-10 | 0.000000 | 0.000000 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 0.175 | 1.75E-10 | 0.000000 | 0.000000 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 0.19 | 1.9E-10 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 0.175 | 1.75E-10 | 0.000000 | 0.000000 | 0.0000 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 0.15 | 1.5E-10 | 0.000000 | 0.000000 | 0.0000 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 0.17 | 1.7E-10 | 0.000000 | 0.000000 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 0.165 | 1.65E-10 | 0.000000 | 0.000000 | 0.0000 |
| o-Dichlorobenzene | | | | | | 0.0090 | - | - | 147.0100 | 0.0000 | 0.0000 | 147.01 | | 7.0703 | 1649.550 | 213.32 | 147.01 | 0.375 | 3.75E-10 | 0.000000 | 0.000000 | 0.0000 |
| p-Dichlorobenzene | | | | | | 0.0116 | - | - | 147.0000 | 0.0000 | 0.0000 | 147.00 | | 6.9980 | 1575.110 | 208.52 | 147.00 | 0.425 | 4.25E-10 | 0.000000 | 0.000000 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 1.0000 | 1.0000 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999999993.5 | 0.999999994 | 0.055556 | 1.000000 | 18.0000 |
| | | | | | | | | | | | | | | | | | | | | check: | **1.00000** | |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-58 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 22.1895 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 51.6958 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 2067.8194 | | | $V_V$ = | 4347.8415 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8784 | | | $K_S$ = | 0.9851 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 2067.8194 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 4347.8415 | cu ft | | | |
| D = Tank Diameter | 81.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 7.6927 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 0.8438 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 23.5000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 23.5000 | ft | | | | | | | |
| Roof Outage | 0.1927 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1927 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.8438 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 2.5313 | ft | | | |
| $R_S$ = Shell Radius | 40.5000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0000 | | | $M_V$ = | 18.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN}) + 0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8784 | | $K_S = 1/[1 + (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9851 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Vapor Space Outage | 7.6927 | ft | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Working Losses* | 73.3280 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 1160.2068 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0000 | | | $M_V$ = | 18.0000 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Q = Annual Net Throughput | 8,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 190,476.19 | bbl/yr | | |
| Annual Turnovers | 16.3757 | | | N = | 16.3757 | | | |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | |
| Maximum Liquid Volume | 488529.0000 | gal | | | | | | |
| Maximum Liquid Height | 23.5000 | ft | | | | | | |
| Tank Diameter | 81.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 95.5175 | lb | | $L_T$ = | 1211.9026 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-58 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 58 Liquid | | | |
| Vinyl chloride | | | |
| Acetone | | | |
| Benzene | | | |
| Carbon tetrachloride | | | |
| Chlorobenzene | | | |
| Chloroform | | | |
| Dichloroethane (1,1) | | | |
| Ethylene Dichloride | | | |
| Methyl ethyl ketone | | | |
| Methyl isobutyl ketone | | | |
| Methylene chloride | | | |
| Tetrachloroethane (1,1,2,2) | | | |
| Tetrachloroethylene | | | |
| Toluene | | | |
| Trichloroethane (1,1,1) | | | |
| Trichloroethane (1,1,2) | | | |
| Trichloroethylene | | | |
| o-Dichlorobenzene | | | |
| p-Dichlorobenzene | | | |
| Water | | | |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 1160.20679 | 51.69577 | 1211.90256 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00001 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 1160.20676 | 51.69577 | 1211.90253 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-125 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 12.00 |
| *Diameter (ft)* | 80.00 |
| *Liquid Height (ft)* | 12.00 |
| *Avg. Liquid Height (ft)* | 12.00 |
| *Volume (gal)* | 394,721.00 |
| *Turnovers* | 20.27 |
| *Net Throughput (gal/yr)* | 8,000,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-125 - Vertical Fixed Roof Tank**
**Model City, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_v = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 125 Liquid* | All | 49.26 | - | - | 47.70 | 0.3384 | - | - | 18.0000 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | 18.0000 |
| Vinyl chloride | | | | | | 32.6452 | - | - | 62.4980 | 0.0000 | 0.0000 | 62.50 | | 6.4971 | 783.400 | 230.01 | 62.498 | 0.15 | 1.5E-10 | 0.000000 | 0.000000 | 0.0000 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0000 | 0.0000 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 0.9 | 9E-10 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 0.155 | 1.55E-10 | 0.000000 | 0.000000 | 0.0000 |
| Carbon tetrachloride | | | | | | 1.0831 | - | - | 98.9600 | 0.0000 | 0.0000 | 98.96 | | 6.9340 | 1242.430 | 230.00 | 98.96 | 0.165 | 1.65E-10 | 0.000000 | 0.000000 | 0.0000 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 0.16 | 1.6E-10 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 0.145 | 1.45E-10 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2074 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | 6.9853 | 1171.420 | 228.13 | 98.97 | 0.155 | 1.55E-10 | 0.000000 | 0.000000 | 0.0000 |
| Ethylene Dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 0.18 | 1.8E-10 | 0.000000 | 0.000000 | 0.0000 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0000 | 0.0000 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 1.1 | 1.1E-09 | 0.000000 | 0.000000 | 0.0000 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 1.2 | 1.2E-09 | 0.000000 | 0.000000 | 0.0000 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 0.325 | 3.25E-10 | 0.000000 | 0.000000 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 0.175 | 1.75E-10 | 0.000000 | 0.000000 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 0.19 | 1.9E-10 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 0.175 | 1.75E-10 | 0.000000 | 0.000000 | 0.0000 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 0.15 | 1.5E-10 | 0.000000 | 0.000000 | 0.0000 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 0.17 | 1.7E-10 | 0.000000 | 0.000000 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 0.165 | 1.65E-10 | 0.000000 | 0.000000 | 0.0000 |
| o-Dichlorobenzene | | | | | | 0.0090 | - | - | 147.0100 | 0.0000 | 0.0000 | 147.01 | | 7.0703 | 1649.550 | 213.32 | 147.01 | 0.375 | 3.75E-10 | 0.000000 | 0.000000 | 0.0000 |
| p-Dichlorobenzene | | | | | | 0.0116 | - | - | 147.0000 | 0.0000 | 0.0000 | 147.00 | | 6.9980 | 1575.110 | 208.52 | 147.00 | 0.425 | 4.25E-10 | 0.000000 | 0.000000 | 0.0000 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 1.0000 | 1.0000 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999999993.5 | 0.999999994 | 0.055556 | 1.000000 | 18.0000 |
| | | | | | | | | | | | | | | | | | | | | check: | **1.00000** | |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-125 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 22.1895 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 49.8138 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 2067.8194 | | | $V_V$ = | 4188.7902 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.8784 | | | $K_S$ = | 0.9853 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 2067.8194 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 4188.7902 | cu ft | | | |
| D = Tank Diameter | 80.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 7.6927 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 0.8333 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 12.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 12.0000 | ft | | | | | | | |
| Roof Outage | 0.1927 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1927 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.8333 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 2.5000 | ft | | | |
| $R_S$ = Shell Radius | 40.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0000 | | | $M_V$ = | 18.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.8784 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9853 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Vapor Space Outage | 7.6927 | ft | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Working Losses* | 73.3280 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 1160.2068 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0000 | | | $M_V$ = | 18.0000 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3384 | psia | | | | | | |
| Q = Annual Net Throughput | 8,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 190,476.19 | bbl/yr | | |
| Annual Turnovers | 20.2675 | | | N = | 20.2675 | | | |
| $K_N$ = Turnover Factor | 1.0000 | | $K_N = (180 + N)/6N$ | $K_N$ = | 1.0000 | | | |
| Maximum Liquid Volume | 394721.0000 | gal | | | | | | |
| Maximum Liquid Height | 12.0000 | ft | | | | | | |
| Tank Diameter | 80.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 95.5175 | lb | | $L_T$ = | 1210.0206 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-125 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 125 Liquid | | | |
| Vinyl chloride | | | |
| Acetone | | | |
| Benzene | | | |
| Carbon tetrachloride | | | |
| Chlorobenzene | | | |
| Chloroform | | | |
| Dichloroethane (1,1) | | | |
| Ethylene Dichloride | | | |
| Methyl ethyl ketone | | | |
| Methyl isobutyl ketone | | | |
| Methylene chloride | | | |
| Tetrachloroethane (1,1,2,2) | | | |
| Tetrachloroethylene | | | |
| Toluene | | | |
| Trichloroethane (1,1,1) | | | |
| Trichloroethane (1,1,2) | | | |
| Trichloroethylene | | | |
| o-Dichlorobenzene | | | |
| p-Dichlorobenzene | | | |
| Water | | | |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 1160.20679 | 49.81382 | 1210.02061 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00001 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 1160.20676 | 49.81382 | 1210.02058 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-310 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 38.00 |
| *Diameter (ft)* | 12.00 |
| *Liquid Height (ft)* | 38.00 |
| *Avg. Liquid Height (ft)* | 19.00 |
| *Volume (gal)* | 30,457.00 |
| *Turnovers* | 98.50 |
| *Net Throughput (gal/yr)* | 3,000,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-310 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *T-310* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3385 | 0.3385 | 0.3385 | 18.0130 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0001 | 0.0009 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9998 | 0.9999 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | $MW_i$ (g/mol) | Detected Compounds Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_v = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-310 | All | 49.26 | - | - | 47.70 | 0.3385 | - | - | 18.0130 | - | - | 18.00 | - | - | - | - | | | - | - | - | - | 18.0130 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0001 | 0.0009 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | | 58.08 | 135000 | 0.000135 | 0.000002 | 0.000042 | 0.0158 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | | 72.1 | 41000 | 0.000041 | 0.000001 | 0.000010 | 0.0017 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | | 100.2 | 3250 | 0.000003 | 0.000000 | 0.000001 | 0.0000 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | | 84.94 | 3980 | 0.000004 | 0.000000 | 0.000001 | 0.0009 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9998 | 0.9990 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | | 18.00 | 999816770 | 0.99981677 | 0.055545 | 0.999946 | 17.9945 |
| | | | | | | | | check: | | 1.0000 | 1.0000 | | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-310 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 19.4580 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 19.4582 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 2162.9865 | | | $V_V$ = | 2162.9865 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.7446 | | | $K_S$ = | 0.7446 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 2162.9865 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 2162.9865 | cu ft | | | |
| D = Tank Diameter | 12.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 19.1250 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 19.1250 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 38.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 19.0000 | ft | | | | | | | |
| Roof Outage | 0.1250 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.125 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.1250 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.3750 | ft | | | |
| $R_S$ = Shell Radius | 6.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0130 | | | $M_V$ = | 18.0130 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}\text{-}T_{AN}) + 0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.7446 | | $K_S = 1/[1 + (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.7446 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Space Outage | 19.1250 | ft | | | | | | |
| *Working Losses* | 205.2242 | lbs | $L_W = 0.0010 \, M_V \, P_{VA} \, Q \, K_N \, K_P$ | $L_W$ = | 205.2242 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0130 | | | $M_V$ = | 18.0130 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Q = Annual Net Throughput | 3,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 71,428.57 | bbl/yr | | |
| Annual Turnovers | 98.4995 | | | N = | 98.4995 | | | |
| $K_N$ = Turnover Factor | 0.4712 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.4712 | | | |
| Maximum Liquid Volume | 30457.0000 | gal | | | | | | |
| Maximum Liquid Height | 38.0000 | ft | | | | | | |
| Tank Diameter | 12.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 224.6822 | lb | | $L_T$ = | 224.6824 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-310 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| T-310 | 205.22 | 19.46 | 224.68 |
| Acetone | 0.18 | 0.02 | 0.20 |
| Methylene chloride | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.02 | 0.00 | 0.02 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 205.01 | 19.44 | 224.45 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 205.22417 | 19.45819 | 224.68236 |
| 0.18039 | 0.01710 | 0.19749 |
| 0.01049 | 0.00099 | 0.01148 |
| 0.01950 | 0.00185 | 0.02135 |
| 0.00028 | 0.00003 | 0.00031 |
| 205.01352 | 19.43821 | 224.45173 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-320 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 38.00 |
| *Diameter (ft)* | 12.00 |
| *Liquid Height (ft)* | 38.00 |
| *Avg. Liquid Height (ft)* | 19.00 |
| *Volume (gal)* | 30,457.00 |
| *Turnovers* | 98.50 |
| *Net Throughput (gal/yr)* | 3,000,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-320 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *T-320* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3385 | 0.3385 | 0.3385 | 18.0144 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0010 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9998 | 0.9989 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | $MW_i$ (g/mol) | Detected Compounds Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_v = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-320 | All | 49.26 | - | - | 47.70 | 0.3385 | - | - | 18.0144 | - | - | 18.00 | - | - | - | - | | | - | - | - | - | 18.0144 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0002 | 0.0010 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | | 58.08 | 153000 | 0.000153 | 0.000003 | 0.000047 | 0.0179 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | | 72.1 | 40500 | 0.0000405 | 0.000001 | 0.000010 | 0.0017 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | | 100.2 | 3200 | 0.0000032 | 0.000000 | 0.000001 | 0.0000 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | | 84.94 | 3800 | 0.0000038 | 0.000000 | 0.000001 | 0.0009 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9998 | 0.9989 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | | 18.00 | 999799500 | 0.9997995 | 0.055544 | 0.999941 | 17.9938 |
| | | | | | | | | check: | | 1.0000 | 1.0000 | | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-320 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 19.4601 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 19.4595 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 2162.9865 | | | $V_V$ = | 2162.9865 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.7445 | | | $K_S$ = | 0.7445 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 2162.9865 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 2162.9865 | cu ft | | | |
| D = Tank Diameter | 12.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 19.1250 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 19.1250 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 38.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 19.0000 | ft | | | | | | | |
| Roof Outage | 0.1250 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1250 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.1250 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.3750 | ft | | | |
| $R_S$ = Shell Radius | 6.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0144 | | | $M_V$ = | 18.0144 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}\text{-}T_{AN}) + 0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.7445 | | $K_S = 1/[1 + (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.7445 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Space Outage | 19.1250 | ft | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Working Losses* | 205.2464 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 205.2464 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0144 | | | $M_V$ = | 18.0144 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 3,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 71,428.57 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 98.4995 | | | N = | 98.4995 | | | for turnovers <36, $K_N$ = 1 |
| $K_N$ = Turnover Factor | 0.4712 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.4712 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 30457.0000 | gal | | | | | | for crude oils $K_P$ = 0.75 |
| Maximum Liquid Height | 38.0000 | ft | | | | | | |
| Tank Diameter | 12.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 224.7065 | lb | | $L_T$ = | 224.7060 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-320 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| T-320 | 205.25 | 19.46 | 224.71 |
| Acetone | 0.2 | 0.02 | 0.22 |
| Methylene chloride | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.02 | 0.00 | 0.02 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 205.01 | 19.44 | 224.45 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 205.24640 | 19.45955 | 224.70595 |
| 0.20444 | 0.01938 | 0.22383 |
| 0.01001 | 0.00095 | 0.01096 |
| 0.01926 | 0.00183 | 0.02109 |
| 0.00028 | 0.00003 | 0.00031 |
| 205.01241 | 19.43736 | 224.44977 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-1010 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-100 divided by 2 - GW & Bulk Receipts |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 9.00 |
| *Diameter (ft)* | 14.00 |
| *Liquid Height (ft)* | 9.00 |
| *Avg. Liquid Height (ft)* | 4.50 |
| *Volume (gal)* | 10,000.00 |
| *Turnovers* | 60.00 |
| *Net Throughput (gal/yr)* | 600,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-1010 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate (inc NAPL)* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | - | - | 18.04 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | ###### | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate (inc NAPL)* | All | 49.26 | - | - | 47.70 | 0.3394 | - | - | 18.1467 | - | - | 18.04 | - | - | - | - | - | - | - | - | - | 18.1467 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 740000 | 0.00074 | 0.000013 | 0.000230 | 0.0867 |
| Acetonitrile | | | | | | 0.8304 | - | - | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119 B=1314.4 C=230 | 7.1190 | 1314.400 | 230.00 | 41.05 | 6400 | 0.0000064 | 0.000000 | 0.000003 | 0.0003 |
| Acrylonitrile | | | | | | 1.0305 | - | - | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038 B=1232.53 C=222.47 | 7.0380 | 1232.530 | 222.47 | 53.06 | 160 | 0.00000016 | 0.000000 | 0.000000 | 0.0000 |
| Aniline | | | | | | 0.0038 | - | - | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32 B=1731.515 C=206.049 | 7.3200 | 1731.515 | 206.05 | 93.10 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 920 | 0.00000092 | 0.000000 | 0.000000 | 0.0000 |
| Butanol-(1) | | | | | | 0.0339 | - | - | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768 B=1362.39 C=178.77 | 7.4768 | 1362.390 | 178.77 | 74.12 | 290000 | 0.00029 | 0.000004 | 0.000071 | 0.0005 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 1000 | 0.000001 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 7800 | 0.0000078 | 0.000000 | 0.000001 | 0.0008 |
| Cresol (-m) | | | | | | 0.0008 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508 B=1856.36 C=199.07 | 7.5080 | 1856.360 | 199.07 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cyclohexanone | | | | | | 0.0377 | - | - | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492 B=2137.192 C=273.16 | 7.8492 | 2137.192 | 273.16 | 98.20 | 2100 | 0.0000021 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2012 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | - | - | - | 98.97 | 2700 | 0.0000027 | 0.000000 | 0.000000 | 0.0003 |
| Ethylene dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 6900 | 0.0000069 | 0.000000 | 0.000001 | 0.0003 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | - | - | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965 B=1141.9 C=231.9 | 6.9650 | 1141.900 | 231.90 | 96.95 | 300 | 0.0000003 | 0.000000 | 0.000000 | 0.0001 |
| Diethyl ether | | | | | | 5.5303 | - | - | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92 B=1064.07 C=228.8 | 6.9200 | 1064.070 | 228.80 | 74.12 | 9400 | 0.0000094 | 0.000000 | 0.000002 | 0.0028 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 280 | 0.00000028 | 0.000000 | 0.000000 | 0.0000 |
| Dioxane (1,4) | | | | | | 0.3139 | - | - | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431 B=1554.68 C=240.34 | 7.4310 | 1554.680 | 240.34 | 88.10 | 95000 | 0.000095 | 0.000001 | 0.000019 | 0.0016 |
| Ethyl chloride | | | | | | 13.2558 | - | - | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986 B=1030.01 C=238.61 | 6.9860 | 1030.010 | 238.61 | 64.52 | 110 | 0.00000011 | 0.000000 | 0.000000 | 0.0001 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 170 | 0.00000017 | 0.000000 | 0.000000 | 0.0000 |
| Iso-butyl alcohol | | | | | | 0.0584 | - | - | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636 B=1236.991 C=171.622 | 7.3064 | 1236.991 | 171.62 | 74.12 | 37000 | 0.000037 | 0.000000 | 0.000009 | 0.0001 |
| Methyl alcohol | | | | | | 1.0194 | - | - | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897 B=1474.08 C=229.13 | 7.8970 | 1474.080 | 229.13 | 32.04 | 970000 | 0.00097 | 0.000030 | 0.000546 | 0.0525 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0006 | 0.0013 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 550000 | 0.00055 | 0.000008 | 0.000138 | 0.0229 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 79000 | 0.000079 | 0.000001 | 0.000014 | 0.0006 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 220000 | 0.00022 | 0.000003 | 0.000047 | 0.0508 |
| Pyridine | | | | | | 0.1621 | - | - | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041 B=1373.8 C=214.98 | 7.0410 | 1373.800 | 214.98 | 79.10 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 12000 | 0.000012 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 500 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0001 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 3900 | 0.0000039 | 0.000000 | 0.000001 | 0.0003 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 13000 | 0.000013 | 0.000000 | 0.000002 | 0.0004 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 410 | 0.00000041 | 0.000000 | 0.000000 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9969 | 0.9878 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 996897970 | 0.99689797 | 0.055383 | 0.998905 | 17.9253 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 820 | 0.00000082 | 0.000000 | 0.000000 | 0.0000 |
| | | | | | | | | | | | | | | | | | | | | | check: | **1.00000** |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-1010 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 8.0626 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 8.0557 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 715.1705 | | | $V_V$ = | 715.1705 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9229 | | | $K_S$ = | 0.9229 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 715.1705 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 715.1705 | cu ft | | | |
| D = Tank Diameter | 14.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 4.6458 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 4.6458 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 9.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 4.5000 | ft | | | | | | | |
| Roof Outage | 0.1458 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.1458 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.1458 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.4375 | ft | | | |
| $R_S$ = Shell Radius | 7.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_v$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9229 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9229 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Space Outage | 4.6458 | ft | | | | | | |
| *Working Losses* | 58.6624 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 58.6624 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 600,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 14,285.71 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 60.0000 | | | N = | 60.0000 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 0.6667 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.6667 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 10000.0000 | gal | | | | | | for crude oils $K_P = 0.75$ |
| Maximum Liquid Height | 9.0000 | ft | | | | | | |
| Tank Diameter | 14.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 66.7250 | lb | | $L_T$ = | 66.7181 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-1010 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| SLF 1-6 Leachate (inc NAPL) | 58.66 | 8.06 | 66.72 |
| Acetone | 0.28 | 0.04 | 0.32 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Butanol-(1) | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.00 |
| Ethylene dichloride | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Diethyl ether | 0.01 | 0.00 | 0.01 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.00 | 0.01 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.17 | 0.02 | 0.19 |
| Methyl ethyl ketone | 0.07 | 0.01 | 0.08 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Methylene chloride | 0.16 | 0.02 | 0.19 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Water | 57.95 | 7.96 | 65.91 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 58.66241 | 8.05570 | 66.71812 |
| 0.28030 | 0.03849 | 0.31879 |
| 0.00091 | 0.00013 | 0.00104 |
| 0.00003 | 0.00000 | 0.00003 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00014 | 0.00002 | 0.00015 |
| 0.00169 | 0.00023 | 0.00192 |
| 0.00002 | 0.00000 | 0.00002 |
| 0.00243 | 0.00033 | 0.00277 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00001 | 0.00000 | 0.00002 |
| 0.00102 | 0.00014 | 0.00116 |
| 0.00082 | 0.00011 | 0.00093 |
| 0.00017 | 0.00002 | 0.00020 |
| 0.00893 | 0.00123 | 0.01016 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00512 | 0.00070 | 0.00583 |
| 0.00025 | 0.00003 | 0.00028 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00037 | 0.00005 | 0.00042 |
| 0.16986 | 0.02333 | 0.19318 |
| 0.07415 | 0.01018 | 0.08433 |
| 0.00196 | 0.00027 | 0.00223 |
| 0.16431 | 0.02256 | 0.18688 |
| 0.00012 | 0.00002 | 0.00013 |
| 0.00006 | 0.00001 | 0.00006 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00019 | 0.00003 | 0.00022 |
| 0.00082 | 0.00011 | 0.00094 |
| 0.00014 | 0.00002 | 0.00016 |
| 0.00131 | 0.00018 | 0.00149 |
| 0.00045 | 0.00006 | 0.00051 |
| 57.94680 | 7.95743 | 65.90424 |
| 0.00001 | 0.00000 | 0.00001 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-1020 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-100 divided by 2 - GW & Bulk Receipts |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 10.00 |
| *Diameter (ft)* | 12.00 |
| *Liquid Height (ft)* | 10.00 |
| *Avg. Liquid Height (ft)* | 5.00 |
| *Volume (gal)* | 8,000.00 |
| *Turnovers* | 75.00 |
| *Net Throughput (gal/yr)* | 600,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-1020 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate (inc NAPL)* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | - | - | 18.04 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | ###### | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SLF 1-6 Leachate (inc NAPL)* | All | 49.26 | - | - | 47.70 | 0.3394 | - | - | 18.1467 | - | - | 18.04 | - | - | - | - | - | - | - | - | - | 18.1467 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 740000 | 0.00074 | 0.000013 | 0.000230 | 0.0867 |
| Acetonitrile | | | | | | 0.8304 | - | - | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119 B=1314.4 C=230 | 7.1190 | 1314.400 | 230.00 | 41.05 | 6400 | 0.0000064 | 0.000000 | 0.000003 | 0.0003 |
| Acrylonitrile | | | | | | 1.0305 | - | - | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038 B=1232.53 C=222.47 | 7.0380 | 1232.530 | 222.47 | 53.06 | 160 | 0.00000016 | 0.000000 | 0.000000 | 0.0000 |
| Aniline | | | | | | 0.0038 | - | - | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32 B=1731.515 C=206.049 | 7.3200 | 1731.515 | 206.05 | 93.10 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Benzene | | | | | | 0.8603 | - | - | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905 B=1211.033 C=220.79 | 6.9050 | 1211.033 | 220.79 | 78.11 | 920 | 0.00000092 | 0.000000 | 0.000000 | 0.0000 |
| Butanol-(1) | | | | | | 0.0339 | - | - | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768 B=1362.39 C=178.77 | 7.4768 | 1362.390 | 178.77 | 74.12 | 290000 | 0.00029 | 0.000004 | 0.000071 | 0.0005 |
| Chlorobenzene | | | | | | 0.0920 | - | - | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978 B=1431.05 C=217.55 | 6.9780 | 1431.050 | 217.55 | 112.60 | 1000 | 0.000001 | 0.000000 | 0.000000 | 0.0000 |
| Chloroform | | | | | | 1.8160 | - | - | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493 B=929.44 C=196.03 | 6.4930 | 929.440 | 196.03 | 119.39 | 7800 | 0.0000078 | 0.000000 | 0.000001 | 0.0008 |
| Cresol (-m) | | | | | | 0.0008 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508 B=1856.36 C=199.07 | 7.5080 | 1856.360 | 199.07 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cresol (-o) | | | | | | 0.0010 | - | - | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911 B=1435.5 C=165.16 | 6.9110 | 1435.500 | 165.16 | 108.14 | 2200 | 0.0000022 | 0.000000 | 0.000000 | 0.0000 |
| Cresol (-p) | | | | | | 0.0003 | - | - | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035 B=1511.08 C=161.85 | 7.0350 | 1511.080 | 161.85 | 108.10 | 17000 | 0.000017 | 0.000000 | 0.000003 | 0.0000 |
| Cyclohexanone | | | | | | 0.0377 | - | - | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492 B=2137.192 C=273.16 | 7.8492 | 2137.192 | 273.16 | 98.20 | 2100 | 0.0000021 | 0.000000 | 0.000000 | 0.0000 |
| Dichloroethane (1,1) | | | | | | 2.2012 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 | - | - | - | 98.97 | 2700 | 0.0000027 | 0.000000 | 0.000000 | 0.0003 |
| Ethylene dichloride | | | | | | 0.6899 | - | - | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025 B=1272.3 C=222.9 | 7.0250 | 1272.300 | 222.90 | 98.97 | 6900 | 0.0000069 | 0.000000 | 0.000001 | 0.0003 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | - | - | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965 B=1141.9 C=231.9 | 6.9650 | 1141.900 | 231.90 | 96.95 | 300 | 0.0000003 | 0.000000 | 0.000000 | 0.0001 |
| Diethyl ether | | | | | | 5.5303 | - | - | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92 B=1064.07 C=228.8 | 6.9200 | 1064.070 | 228.80 | 74.12 | 9400 | 0.0000094 | 0.000000 | 0.000002 | 0.0028 |
| Dimethyl phthalate | | | | | | 0.0000 | - | - | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522 B=700.31 C=51.42 | 4.5220 | 700.310 | 51.42 | 194.20 | 280 | 0.00000028 | 0.000000 | 0.000000 | 0.0000 |
| Dioxane (1,4) | | | | | | 0.3139 | - | - | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431 B=1554.68 C=240.34 | 7.4310 | 1554.680 | 240.34 | 88.10 | 95000 | 0.000095 | 0.000001 | 0.000019 | 0.0016 |
| Ethyl chloride | | | | | | 13.2558 | - | - | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986 B=1030.01 C=238.61 | 6.9860 | 1030.010 | 238.61 | 64.52 | 110 | 0.00000011 | 0.000000 | 0.000000 | 0.0001 |
| Ethylbenzene | | | | | | 0.0739 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975 B=1424.255 C=213.21 | 6.9750 | 1424.255 | 213.21 | 106.17 | 170 | 0.00000017 | 0.000000 | 0.000000 | 0.0000 |
| Iso-butyl alcohol | | | | | | 0.0584 | - | - | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636 B=1236.991 | 7.3064 | 1236.991 | 171.62 | 74.12 | 37000 | 0.000037 | 0.000000 | 0.000009 | 0.0001 |
| Methyl alcohol | | | | | | 1.0194 | - | - | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897 B=1474.08 C=229.13 | 7.8970 | 1474.080 | 229.13 | 32.04 | 970000 | 0.00097 | 0.000030 | 0.000546 | 0.0525 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0006 | 0.0013 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 550000 | 0.00055 | 0.000008 | 0.000138 | 0.0229 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 79000 | 0.000079 | 0.000001 | 0.000014 | 0.0006 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 220000 | 0.00022 | 0.000003 | 0.000047 | 0.0508 |
| Pyridine | | | | | | 0.1621 | - | - | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041 B=1373.8 C=214.98 | 7.0410 | 1373.800 | 214.98 | 79.10 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | - | - | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631 B=1228.1 C=179.9 | 6.6310 | 1228.100 | 179.90 | 167.85 | 12000 | 0.000012 | 0.000000 | 0.000001 | 0.0000 |
| Tetrachloroethylene | | | | | | 0.1445 | - | - | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98 B=1386.92 C=217.53 | 6.9800 | 1386.920 | 217.53 | 165.83 | 500 | 0.0000005 | 0.000000 | 0.000000 | 0.0000 |
| Toluene | | | | | | 0.2342 | - | - | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954 B=1344.8 C=219.48 | 6.9540 | 1344.800 | 219.48 | 92.13 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0001 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | - | - | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643 B=2136.6 C=302.8 | 8.6430 | 2136.600 | 302.80 | 133.42 | 3900 | 0.0000039 | 0.000000 | 0.000001 | 0.0003 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | - | - | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951 B=1314.41 C=209.2 | 6.9510 | 1314.410 | 209.20 | 133.40 | 4800 | 0.0000048 | 0.000000 | 0.000001 | 0.0000 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | 131.40 | 13000 | 0.000013 | 0.000000 | 0.000002 | 0.0004 |
| Vinylidene chloride | | | | | | 6.3609 | - | - | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972 B=1099.4 C=237.2 | 6.9720 | 1099.400 | 237.20 | 96.50 | 410 | 0.00000041 | 0.000000 | 0.000000 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9969 | 0.9878 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 996897970 | 0.99689797 | 0.055383 | 0.998905 | 17.9253 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | - | - | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009 B=1462.266 C=215.11 | 7.0090 | 1462.266 | 215.11 | 106.17 | 820 | | | | |
| | | | | | | | | | | | | | | | | | | | | | check: | **1.00000** |
| | | | | | | | | | check: | **1.0000** | **1.0000** | | | | | | | | | | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-1020 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 6.4829 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 6.4768 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 579.6238 | | | $V_V$ = | 579.6238 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9156 | | | $K_S$ = | 0.9156 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 579.6238 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 579.6238 | cu ft | | | |
| D = Tank Diameter | 12.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 5.1250 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 5.1250 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 10.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 5.0000 | ft | | | | | | | |
| Roof Outage | 0.125 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.125 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.1250 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.3750 | ft | | | |
| $R_S$ = Shell Radius | 6.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | delta $T_V = 0.72(T_{AX}\text{-}T_{AN}) + 0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0003 | psia | $R\ T_{LX}\ W_V / M_V = P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3393 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3396 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9156 | | $K_S = 1/[1 + (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9156 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Vapor Space Outage | 5.1250 | ft | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Working Losses* | 49.8630 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 49.8630 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.1467 | | | $M_V$ = | 18.1467 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3394 | psia | | | | | | |
| Q = Annual Net Throughput | 600,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 14,285.71 | bbl/yr | | |
| Annual Turnovers | 75.0000 | | | N = | 75.0000 | | | |
| $K_N$ = Turnover Factor | 0.5667 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.5667 | | | |
| Maximum Liquid Volume | 8000.0000 | gal | | | | | | |
| Maximum Liquid Height | 10.0000 | ft | | | | | | |
| Tank Diameter | 12.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 56.3459 | lb | | $L_T$ = | 56.3398 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-1020 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Diethyl ether | 0.01 | 0.00 | 0.01 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| SLF 1-6 Leachate (inc NAPL) | 49.86 | 6.48 | 56.35 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Ethylene dichloride | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.00 | 0.01 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.06 | 0.01 | 0.07 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.24 | 0.03 | 0.27 |
| Methylene chloride | 0.14 | 0.02 | 0.16 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.14 | 0.02 | 0.16 |
| Butanol-(1) | 0.00 | 0.00 | 0.00 |
| Water | 49.25 | 6.40 | 55.66 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 0.00759 | 0.00099 | 0.00858 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00032 | 0.00004 | 0.00036 |
| 0.00001 | 0.00000 | 0.00001 |
| 49.86305 | 6.47679 | 56.33984 |
| 0.00070 | 0.00009 | 0.00079 |
| 0.00012 | 0.00002 | 0.00013 |
| 0.00087 | 0.00011 | 0.00098 |
| 0.00038 | 0.00005 | 0.00043 |
| 0.00070 | 0.00009 | 0.00079 |
| 0.00435 | 0.00057 | 0.00492 |
| 0.00078 | 0.00010 | 0.00088 |
| 0.00002 | 0.00000 | 0.00003 |
| 0.00012 | 0.00002 | 0.00013 |
| 0.00001 | 0.00000 | 0.00002 |
| 0.00021 | 0.00003 | 0.00024 |
| 0.00207 | 0.00027 | 0.00234 |
| 0.00016 | 0.00002 | 0.00019 |
| 0.00015 | 0.00002 | 0.00016 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00001 | 0.00000 | 0.00001 |
| 0.00005 | 0.00001 | 0.00005 |
| 0.06303 | 0.00819 | 0.07121 |
| 0.00167 | 0.00022 | 0.00188 |
| 0.23825 | 0.03095 | 0.26920 |
| 0.13967 | 0.01814 | 0.15781 |
| 0.00111 | 0.00014 | 0.00126 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00000 | 0.00000 | 0.00000 |
| 0.00010 | 0.00001 | 0.00011 |
| 0.14438 | 0.01875 | 0.16313 |
| 0.00144 | 0.00019 | 0.00162 |
| 49.25479 | 6.39778 | 55.65257 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-3002 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 5.66 |
| *Diameter (ft)* | 5.00 |
| *Liquid Height (ft)* | 5.66 |
| *Avg. Liquid Height (ft)* | 2.83 |
| *Volume (gal)* | 900.00 |
| *Turnovers* | 3333.33 |
| *Net Throughput (gal/yr)* | 3,000,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-3002 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *T-100 Liquid* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0276 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9996 | 0.9979 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_v = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-100 Liquid | All | 49.26 | - | - | 47.70 | 0.3386 | - | - | 18.0276 | - | - | 18.00 | - | - | - | - | | | - | - | - | - | 18.0276 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | | 58.08 | 237000 | 0.000237 | 0.000004 | 0.000073 | 0.0278 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | | 72.1 | 80500 | 0.0000805 | 0.000001 | 0.000020 | 0.0034 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | | 100.2 | 9950 | 0.00000995 | 0.000000 | 0.000002 | 0.0001 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | | 84.94 | 31500 | 0.0000315 | 0.000000 | 0.000007 | 0.0073 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | | 131.4 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9996 | 0.9979 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | | 18.00 | 999636890 | 0.99963689 | 0.055535 | 0.999897 | 17.9890 |
| | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-3002 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 0.6508 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.6507 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 56.5896 | | | $V_V$ = | 56.5896 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9508 | | | $K_S$ = | 0.9508 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 56.5896 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 56.5896 | cu ft | | | |
| D = Tank Diameter | 5.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 2.8821 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 2.8821 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 5.6600 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 2.8300 | ft | | | | | | | |
| Roof Outage | 0.0521 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.0521 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0521 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.1563 | ft | | | |
| $R_S$ = Shell Radius | 2.5000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0276 | | | $M_V$ = | 18.0276 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9508 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9508 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Space Outage | 2.8821 | ft | | | | | | |

*Working Losses*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 76.5849 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 76.5849 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0276 | | | $M_V$ = | 18.0276 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 3,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 71,428.57 | bbl/yr | | for turnovers >36, $K_N$ = (180 + N)/6N |
| Annual Turnovers | 3333.3333 | | | N = | 3,333.3333 | | | for turnovers <36, $K_N$ = 1 |
| $K_N$ = Turnover Factor | 0.1757 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.1757 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 900.0000 | gal | | | | | | for crude oils $K_P$ = 0.75 |
| Maximum Liquid Height | 5.6600 | ft | | | | | | |
| Tank Diameter | 5.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 77.2358 | lb | | $L_T$ = | 77.2357 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3002 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| T-100 Liquid | 76.58 | 0.65 | 77.24 |
| Acetone | 0.12 | 0.00 | 0.12 |
| Methylene chloride | 0.03 | 0.00 | 0.03 |
| Methyl ethyl ketone | 0.01 | 0.00 | 0.01 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 76.42 | 0.65 | 77.07 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 76.58494 | 0.65074 | 77.23568 |
| 0.11807 | 0.00100 | 0.11907 |
| 0.03094 | 0.00026 | 0.03121 |
| 0.01427 | 0.00012 | 0.01439 |
| 0.00055 | 0.00000 | 0.00056 |
| 0.00032 | 0.00000 | 0.00033 |
| 76.42078 | 0.64935 | 77.07013 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-3003 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 6.50 |
| *Diameter (ft)* | 5.00 |
| *Liquid Height (ft)* | 6.50 |
| *Avg. Liquid Height (ft)* | 3.25 |
| *Volume (gal)* | 954.72 |
| *Turnovers* | 3142.28 |
| *Net Throughput (gal/yr)* | 3,000,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-3003 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *T-100 Liquid* | All | 49.26 | 44.94 | 53.57 | 47.7 | 0.3386 | 0.3385 | 0.3386 | 18.0276 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9996 | 0.9979 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_v = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-100 Liquid | All | 49.26 | - | - | 47.70 | 0.3386 | - | - | 18.0276 | - | - | 18.00 | - | - | - | - | | | - | - | - | - | 18.0276 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | | 58.08 | 237000 | 0.000237 | 0.000004 | 0.000073 | 0.0278 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | | 72.1 | 80500 | 0.0000805 | 0.000001 | 0.000020 | 0.0034 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | | 100.2 | 9950 | 0.00000995 | 0.000000 | 0.000002 | 0.0001 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | | 84.94 | 31500 | 0.0000315 | 0.000000 | 0.000007 | 0.0073 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | | 131.4 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9996 | 0.9979 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | | 18.00 | 999636890 | 0.99963689 | 0.055535 | 0.999897 | 17.9890 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-3003 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 0.7404 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.7403 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 64.8363 | | | $V_V$ = | 64.8363 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9441 | | | $K_S$ = | 0.9441 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 64.8363 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 64.8363 | cu ft | | | |
| D = Tank Diameter | 5.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 3.3021 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 3.3021 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 6.5000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 3.2500 | ft | | | | | | | |
| Roof Outage | 0.0521 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.0521 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0521 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.1563 | ft | | | |
| $R_S$ = Shell Radius | 2.5000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0276 | | | $M_V$ = | 18.0276 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}\text{-}T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9441 | | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9441 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Space Outage | 3.3021 | ft | | | | | | |

*Working Losses*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 76.8235 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 76.8235 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0276 | | | $M_V$ = | 18.0276 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 3,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 71,428.57 | bbl/yr | | for turnovers >36, $K_N$ = (180 + N)/6N |
| Annual Turnovers | 3142.2796 | | | N = | 3,142.2796 | | | for turnovers <36, $K_N$ = 1 |
| $K_N$ = Turnover Factor | 0.1762 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.1762 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 954.7209 | gal | | | | | | for crude oils $K_P$ = 0.75 |
| Maximum Liquid Height | 6.5000 | ft | | | | | | |
| Tank Diameter | 5.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 77.5639 | lb | | $L_T$ = | 77.5638 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3003 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| T-100 Liquid | 76.82 | 0.74 | 77.56 |
| Acetone | 0.12 | 0.00 | 0.12 |
| Methylene chloride | 0.03 | 0.00 | 0.03 |
| Methyl ethyl ketone | 0.01 | 0.00 | 0.01 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 76.66 | 0.74 | 77.40 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 76.82350 | 0.74027 | 77.56377 |
| 0.11844 | 0.00114 | 0.11958 |
| 0.03104 | 0.00030 | 0.03134 |
| 0.01432 | 0.00014 | 0.01446 |
| 0.00055 | 0.00001 | 0.00056 |
| 0.00033 | 0.00000 | 0.00033 |
| 76.65883 | 0.73868 | 77.39751 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-3009 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

**Tank Dimensions**

| | |
|---|---|
| *Shell Length (ft)* | 16.00 |
| *Diameter (ft)* | 8.00 |
| *Volume (gal)* | 5,000.00 |
| *Turnovers* | 60.00 |
| *Net Throughput (gal/yr)* | 300,000 |
| *Is tank heated (y/n)* | N |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-3009 - Horizontal Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 3009* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3385 | 0.3385 | 0.3386 | 18.0184 | - | - | 18.00 | - |
| Acetone | | | | | | 2.8026 | 2.1379 | 3.6292 | 58.0800 | 0.0002 | 0.0013 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 1.0299 | 0.7577 | 1.3789 | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1998 | 0.1384 | 0.2829 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 5.4129 | 4.2270 | 6.8607 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9998 | 0.9985 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_{iv} = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tank 3009* | All | 58.30 | - | - | 52.02 | 0.3386 | - | - | 18.0349 | - | - | 18.00 | - | - | - | - | - | - | - | - | - | 18.0349 |
| Acetone | | | | | | 2.8026 | - | - | 58.0800 | 0.0002 | 0.0020 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 237000 | 0.000237 | 0.000004 | 0.000073 | 0.0353 |
| Methyl ethyl ketone | | | | | | 1.0299 | - | - | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.10 | 80500 | 0.0000805 | 0.000001 | 0.000020 | 0.0044 |
| Methyl isobutyl ketone | | | | | | 0.1998 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.20 | 9950 | 0.00000995 | 0.000000 | 0.000002 | 0.0001 |
| Methylene chloride | | | | | | 5.4129 | - | - | 84.9400 | 0.0000 | 0.0005 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 31500 | 0.0000315 | 0.000000 | 0.000007 | 0.0091 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9996 | 0.9973 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999641050 | 0.99964105 | 0.055536 | 0.999898 | 17.9860 |
| | | | | | | | | check: | | **1.0000** | **1.0000** | | | | | | | | | check: | **1.00000** | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-3009 - Horizontal Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | **AP-42 EQUATIONS** | | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 14.2473 | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 14.2451 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 512.2597 | | $V_V$ = | 512.2597 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0744 | | $K_E$ = | 0.0744 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9330 | | $K_S$ = | 0.9330 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 512.2597 | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 512.2597 | cu ft | | | |
| D = Tank Diameter (ft) | 16.0000 | | | | | | | |
| $D_E$ = Effective Diameter (ft) | 12.7694 | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 12.7694 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | 8.0000 | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 4.0000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | 16.0000 | | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | $W_V = M_V\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0184 | | $M_V$ = | 18.0349 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3385 | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | 517.9736 | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | 47.6792 | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | 10.7310 | | | | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | 511.6892 | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.8900 | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | 1165.4120 | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | As per sources listed on page 6-5 of TANKS user manual: |
| KE = Vapor Space Expansion Factor | 0.0744 | | KE = [delta TV/TLA]+ [(deltaPV-delta PB)/(PA-PVA)] | $K_E$ = | 0.0744 | | $T_{AX}$ = | 515.4867 |
| delta TV = Daily Vapor Temperature Range (deg. R) | 40.7601 | | delta TV = 0.72(TAX-TAN)+0.028*alpha*I] | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta PV = Daily Vapor Pressure Range (psia) | 0.0001 | psia | R $T_{LX}$ $W_V$ / $M_V$ = $P_{VX}$ | delta $P_V$ = | 0.0000 | psia | | |
| delta PB = Breather Vent Press. Setting Range (psia) | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3385 | | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | 0.3385 | | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | 0.3386 | | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | 517.9736 | | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | 507.7836 | | TLN = TLA - 0.25 delta TV | $T_{LN}$ = | 507.7836 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | 528.1636 | | TLX = TLA + 0.25 delta TV | $T_{LX}$ = | 528.1636 | R | | |
| delta TA = Daily Ambient Temp. Range (deg. R) | 16.2750 | | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9330 | | $K_S$ = 1/[1+ (.053*$P_{VA}$*$H_{VO}$)] | $K_S$ = | 0.9330 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Space Outage (ft) | 8.0000 | ft | | | | | | |
| *Working Losses (lb)* | 29.0457 | | $L_W$ = 0.0010 $M_V$ $P_{VA}$ Q $K_N$ $K_P$ | $L_W$ = | 29.0811 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0184 | | | $M_V$ = | 18.0349 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | 0.3385 | | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput (gal/yr) | 300,000 | | 1 bbl/yr = 42 US gal/yr | Q = | 7,142.86 | bbl/yr | | for turnovers >36, $K_N$ = (180 + N)/6N |
| Annual Turnovers | 60.00 | | | N = | 60.0000 | | | for turnovers <36, $K_N$ = 1 |
| $K_N$ = Turnover Factor | 0.6667 | | $K_N$ = (180 + N)/6N | $K_N$ = | 0.6667 | | | $K_P$ = working loss product factor, dimensionless |
| Tank Diameter (ft) | 8.0000 | | | | | | | for crude oils $K_P$ = 0.75 |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses (lb) | 43.2930 | | | $L_T$ = | 43.3262 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3009 - Horizontal Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| Tank 3009 | 29.05 | 14.25 | 43.29 |
| Acetone | 0.04 | 0.02 | 0.05 |
| Methylene chloride | 0.00 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 29.00 | 14.23 | 43.23 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 29.08105 | 14.24513 | 43.32619 |
| 0.05695 | 0.02790 | 0.08484 |
| 0.01462 | 0.00716 | 0.02178 |
| 0.00711 | 0.00348 | 0.01059 |
| 0.00017 | 0.00008 | 0.00025 |
| 29.00221 | 14.20651 | 43.20872 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-3011 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-100 Processing |

**Tank Dimensions**

| | | |
|---|---|---|
| *Shell Length (ft)* | 5.00 | |
| *Diameter (ft)* | 4.50 | |
| *Liquid Height (ft)* | 5.00 | |
| *Avg. Liquid Height (ft)* | 2.50 | |
| *Volume (gal)* | 594.86 | |
| *Turnovers* | 5043.1646 | 5043.1644 |
| *Net Throughput (gal/yr)* | 3,000,000 | |
| *Is tank heated (y/n)* | N | |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-3011 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *T-3011* | All | 49.26 | 44.94 | 53.57 | 47.7 | 0.3386 | 0.3385 | 0.3385 | 18.0144 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0010 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9998 | 0.9989 | 18.00 | Option 1: VP40 = .3383936375<br>VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_V = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-3011 | All | 49.26 | - | - | 47.70 | 0.3385 | - | - | 18.0144 | - | - | 18.00 | - | - | - | - | | - | - | - | - | 18.0144 |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0002 | 0.0010 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | 58.08 | 153000 | 0.000153 | 0.000003 | 0.000047 | 0.0179 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | 72.1 | 40500 | 0.0000405 | 0.000001 | 0.000010 | 0.0017 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | 100.2 | 3200 | 0.0000032 | 0.000000 | 0.000001 | 0.0000 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | 84.94 | 3800 | 0.0000038 | 0.000000 | 0.000001 | 0.0009 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9998 | 0.9989 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | 18.00 | 999799500 | 0.9997995 | 0.055544 | 0.999941 | 17.9938 |
| | | | | | | | | | check: | 1.0000 | 1.0000 | | | | | | | | | check: | 1.00000 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-3011 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | |
|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 0.4681 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.4682 | lbs | | |
| $V_V$ = Vapor Space Volume (cu ft) | 40.5063 | | | $V_V$ = | 40.5063 | cu ft | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9563 | | | $K_S$ = | 0.9563 | | | |
| *Tank Vapor Space Volume* | | | | | | | | |
| $V_V$ = Vapor Space Volume | 40.5063 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 40.5063 | cu ft | | |
| D = Tank Diameter | 4.5000 | ft | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 2.5469 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 2.5469 | ft | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 5.0000 | ft | | | | | | |
| $H_L$ = Average Liquid Height | 2.5000 | ft | | | | | | |
| Roof Outage | 0.0469 | ft | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | |
| Roof Outage | 0.0469 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0469 | ft | | |
| Roof Height | 0.0000 | ft | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.1406 | ft | | |
| $R_S$ = Shell Radius | 2.2500 | ft | | | | | | |
| *Vapor Density* | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0144 | | | $M_V$ = | 18.0144 | lb/lb-mole | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{delta}P_V - \text{delta } P_B)/(P_A - P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX} - T_{AN}) + 0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9563 | | $K_S = 1/[1 + (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9563 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Space Outage | 2.5469 | ft | | | | | | |
| *Working Losses* | 75.1826 | lbs | $L_W = 0.0010\ M_V\ P_{VA}\ Q\ K_N\ K_P$ | $L_W$ = | 75.1823 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0144 | | | $M_V$ = | 18.0144 | lb/lb-mole | | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Q = Annual Net Throughput | 3,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 71,428.57 | bbl/yr | | |
| Annual Turnovers | 5043.1646 | | | N = | 5,043.1646 | | | |
| $K_N$ = Turnover Factor | 0.1726 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.1726 | | | |
| Maximum Liquid Volume | 594.8646 | gal | | | | | | |
| $K_N$ = Turnover Factor | 2.1726 | | | | | | | |
| Maximum Liquid Height | 5.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 75.6507 | lb | | $L_T$ = | 75.6505 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3011 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| T-3011 | 75.18 | 0.47 | 75.65 |
| Acetone | 0.07 | 0.00 | 0.08 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.01 | 0.00 | 0.01 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 75.10 | 0.47 | 75.56 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 75.18233 | 0.46820 | 75.65054 |
| 0.07489 | 0.00047 | 0.07535 |
| 0.00367 | 0.00002 | 0.00369 |
| 0.00706 | 0.00004 | 0.00710 |
| 0.00010 | 0.00000 | 0.00010 |
| 75.09662 | 0.46767 | 75.56429 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

**Identification**

| | |
|---|---|
| *User Identification* | T-3012 |
| *City* | Model City |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Vertical Fixed Roof Tank |
| *Description* | T-100 Processing |

**Tank Dimensions**

| | | |
|---|---|---|
| *Shell Length (ft)* | 5.00 | |
| *Diameter (ft)* | 4.00 | |
| *Liquid Height (ft)* | 5.00 | |
| *Avg. Liquid Height (ft)* | 2.50 | |
| *Volume (gal)* | 470.02 | |
| *Turnovers* | 6,382.7552 | 6,382.7546 |
| *Net Throughput (gal/yr)* | 3,000,000 | |
| *Is tank heated (y/n)* | N | |

**Paint Characteristics**

| | |
|---|---|
| *Shell Color/Shade* | White/White |
| *Shell Condition* | Good |
| *Roof Color/Shade* | White/White |
| *Roof Condition* | Good |

**Roof Characteristics**

| | |
|---|---|
| *Type* | Cone |
| *Height (ft)* | 0.00 |
| *Slope (ft/ft) Cone Roof)* | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-3012 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *T-100 Liquid* | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0276 | - | - | 18.00 | - |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9996 | 0.9979 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surface Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations | Table 7.1-3 A | B | C | CAS Number | Detected Compounds $MW_i$ (g/mol) | Leachate Concentration [1] (ug/L) | $C_i$ | $C_i / MW_i$ | $X_i$ | $M_v = M_i [(P X_i)/P_{VA}]$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-100 Liquid | All | 49.26 | - | - | 47.70 | 0.3386 | - | - | 18.0276 | - | - | 18.00 | - | - | - | - | | | | | | | | |
| Acetone | | | | | | 2.2051 | - | - | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117 B=1210.595 C=229.664 | 7.1170 | 1210.595 | 229.66 | | 58.08 | 237000 | 0.000237 | 0.000004 | 0.000073 | 0.0278 |
| Methyl ethyl ketone | | | | | | 0.7848 | - | - | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645 B=1150.207 C=209.246 | 6.8645 | 1150.207 | 209.25 | | 72.1 | 80500 | 0.0000805 | 0.000001 | 0.000020 | 0.0034 |
| Methyl isobutyl ketone | | | | | | 0.1444 | - | - | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672 B=1168.4 C=191.9 | 6.6720 | 1168.400 | 191.90 | | 100.2 | 9950 | 0.00000995 | 0.000000 | 0.000002 | 0.0001 |
| Methylene chloride | | | | | | 4.3481 | - | - | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409 B=1325.9 C=252.6 | 7.4090 | 1325.900 | 252.60 | | 84.94 | 31500 | 0.0000315 | 0.000000 | 0.000007 | 0.0073 |
| Trichloroethylene | | | | | | 0.5874 | - | - | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518 B=1018.6 C=192.7 | 6.5180 | 1018.600 | 192.70 | | 131.4 | 4160 | 0.00000416 | 0.000000 | 0.000001 | 0.0001 |
| Water | | | | | | 0.3384 | - | - | 18.0000 | 0.9996 | 0.9979 | 18.00 | 0.3384 psia at 68 deg F via engineeringtoolbox.com | - | - | - | | 18.00 | 999636890 | 0.99963689 | 0.055535 | 0.999897 | 17.9890 |
| | | | | | | | | check: | | **1.0000** | **1.0000** | | | | | | | | | | check: | **1.00000** | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-3012 - Vertical Fixed Roof Tank**
**Model City, New York**

| **Annual Emission Calculations** | **FROM TANKS DETAILED PDF** | | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | 0.3695 | | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.3695 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | 31.9395 | | | $V_V$ = | 31.9395 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | 0.0011 | | | $W_V$ = | 0.0011 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | | $K_E$ = | 0.0296 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | 0.9564 | | | $K_S$ = | 0.9564 | | | | |
| *Tank Vapor Space Volume* | | | | | | | | | |
| $V_V$ = Vapor Space Volume | 31.9395 | cu ft | $V_V = [(Pi/4)\ D^2]\ H_{VO}$ | $V_V$ = | 31.9395 | cu ft | | | |
| D = Tank Diameter | 4.0000 | ft | | | | | | | |
| $H_{VO}$ = Vapor Space Outage | 2.5417 | ft | $H_{VO} = H_S - H_L + H_{RO}$ | $H_{VO}$ = | 2.5417 | ft | | | $H_{VO} = H_E/2$ for horizontal tank |
| Hs = Tank Shell Length | 5.0000 | ft | | | | | | | |
| $H_L$ = Average Liquid Height | 2.5000 | ft | | | | | | | |
| Roof Outage | 0.0417 | ft | | | | | | | |
| *Roof Outage (Cone Roof)* | | | | | | | | | |
| Roof Outage | 0.0417 | ft | $H_{RO} = 1/3\ H_R$ | $H_{RO}$ = | 0.0417 | ft | | | |
| Roof Height | 0.0000 | ft | | | | | | | |
| $S_R$ = Roof Slope | 0.0625 | ft/ft | $H_R = S_R * R_S$ | $H_R$ = | 0.1250 | ft | | | |
| $R_S$ = Shell Radius | 2.0000 | ft | | | | | | | |
| *Vapor Density* | | | | | | | | | |
| $W_V$ = Vapor Density | 0.0011 | lb/cu-ft | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0011 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | 18.0276 | | | $M_V$ = | 18.0276 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp | 508.9255 | R | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079 * alpha * I$ | $T_{LA}$ = | 508.9255 | R = | 9.59 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp | 47.6792 | deg F | $T_{AA} = T_{AX} + T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R | 10.7310 | psia cuft / (lb-mol-deg R) | | | | | | | |
| $T_B$ = Liquid Bulk Temperature | 507.3692 | R | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 507.3692 | R | | | |
| Tank Paint Solar Absorptance (Shell) | 0.17 | | | | 0.17 | | | | As per Table 7.1-6: White/Good = .17 |
| Tank Paint Solar Absorptance (Roof) | 0.17 | | | | 0.17 | | | | |
| I = Daily Total Solar Insulation Factor | 1165.4120 | Btu/ sqft day | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | 0.0297 | | $K_E = [\text{delta } T_V/T_{LA}] + [(\text{deltaP}_V\text{-delta } P_B)/(P_A\text{-}P_{VA})]$ | $K_E$ = | 0.0296 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range | 17.2654 | R | $\text{delta } T_V = 0.72(T_{AX}\text{-}T_{AN}) + 0.028*\text{alpha}*I]$ | delta $T_V$ = | 17.2654 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range | 0.0000 | psia | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range | 0.0600 | psia | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature | 0.3385 | psia | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Daily Avg. Liquid Surface Temp. | 508.9255 | R | | | 508.9255 | R | | |
| Daily Min. Liquid Surface Temp | 504.6092 | R | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 504.6092 | R | | |
| Daily Max. Liquid Surface Temp | 513.2419 | R | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 513.2419 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range | 16.2750 | R | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | 0.9564 | | $K_S = 1/[1 + (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9564 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | |
| Vapor Space Outage | 2.5417 | ft | | | | | | |

*Working Losses*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 74.7103 | lbs | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 74.7103 | lbs | | |
| $M_V$ = Vapor Molecular Weight | 18.0276 | | | $M_V$ = | 18.0276 | lb/lb-mole | | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature | 0.3386 | psia | | | | | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput | 3,000,000 | gal/yr | 1 bbl/yr = 42 US gal/yr | Q = | 71,428.57 | bbl/yr | | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | 6382.7552 | | | N = | 6,382.7552 | | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | 0.1714 | | $K_N = (180 + N)/6N$ | $K_N$ = | 0.1714 | | | $K_P$ = working loss product factor, dimensionless |
| Maximum Liquid Volume | 470.0165 | gal | | | | | | for crude oils $K_P = 0.75$ |
| Maximum Liquid Height | 5.0000 | ft | | | | | | |
| Tank Diameter | 4.0000 | ft | | | | | | |
| $K_P$ = Working Loss Product Factor | 1.0000 | | | $K_P$ = | 1.00 | | | |
| Total Losses | 75.0798 | lb | | $L_T$ = | 75.0798 | lbs | | |

As per sources listed on page 6-5 of TANKS user manual:

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3012 - Vertical Fixed Roof Tank**
**Model City, New York**

**GIVEN VALUES**

| Components | Losses (lbs) | | |
|---|---|---|---|
| | *Working Loss* | *Breathing Loss* | *Total Emissions* |
| T-100 Liquid | 74.71 | 0.37 | 75.08 |
| Acetone | 0.12 | 0.00 | 0.12 |
| Methylene chloride | 0.03 | 0.00 | 0.03 |
| Methyl ethyl ketone | 0.01 | 0.00 | 0.01 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 74.55 | 0.37 | 74.92 |

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 74.71035 | 0.36948 | 75.07983 |
| 0.11518 | 0.00057 | 0.11575 |
| 0.03018 | 0.00015 | 0.03033 |
| 0.01392 | 0.00007 | 0.01399 |
| 0.00054 | 0.00000 | 0.00054 |
| 0.00032 | 0.00000 | 0.00032 |
| 74.55021 | 0.36869 | 74.91889 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-100 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | 3 Year average + GW + Bulk Receipts |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 23.00 |
| Diameter (ft): | 35.00 |
| Liquid Height (ft) : | 23.00 |
| Avg. Liquid Height (ft): | 12.50 |
| Volume (gallons): | 160,545.00 |
| Turnovers: | 18.69 |
| Net Throughput(gal/yr): | 3,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-100 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-100 Liquid | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0276 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9996 | 0.9979 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-100 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 105.8100 |
| Vapor Space Volume (cu ft): | 10,452.9541 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.8369 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 10,452.9541 |
| Tank Diameter (ft): | 35.0000 |
| Vapor Space Outage (ft): | 10.8646 |
| Tank Shell Height (ft): | 23.0000 |
| Average Liquid Height (ft): | 12.5000 |
| Roof Outage (ft): | 0.3646 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.3646 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 17.5000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0276 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.8369 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3386 |
| Vapor Space Outage (ft): | 10.8646 |
| Working Losses (lb): | 435.9674 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0276 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Annual Net Throughput (gal/yr.): | 3,000,000.0000 |
| Annual Turnovers: | 18.6864 |
| Turnover Factor: | 1.0000 |
| Maximum Liquid Volume (gal): | 160,545.0000 |
| Maximum Liquid Height (ft): | 23.0000 |
| Tank Diameter (ft): | 35.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 541.7774 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-100 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| T-100 Liquid | 435.97 | 105.81 | 541.78 |
| Methyl ethyl ketone | 0.08 | 0.02 | 0.10 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 435.03 | 105.58 | 540.62 |
| Acetone | 0.67 | 0.16 | 0.84 |
| Methylene chloride | 0.18 | 0.04 | 0.22 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-210 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-1111/1112 - T-1410 divided by 3 |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 15.00 |
| Diameter (ft): | 18.50 |
| Liquid Height (ft) : | 15.00 |
| Avg. Liquid Height (ft): | 7.50 |
| Volume (gallons): | 30,000.00 |
| Turnovers: | 16.67 |
| Net Throughput(gal/yr): | 500,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-210 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | | | 18.04 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | 12.0759 | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-210 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 22.1895 |
| Vapor Space Volume (cu ft): | 2,067.8194 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.8784 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 2,067.8194 |
| Tank Diameter (ft): | 18.5000 |
| Vapor Space Outage (ft): | 7.6927 |
| Tank Shell Height (ft): | 15.0000 |
| Average Liquid Height (ft): | 7.5000 |
| Roof Outage (ft): | 0.1927 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.1927 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 9.2500 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0004 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3393 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3396 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.8784 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3394 |
| Vapor Space Outage (ft): | 7.6927 |
| Working Losses (lb): | 73.3280 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Annual Net Throughput (gal/yr.): | 500,000.0000 |
| Annual Turnovers: | 16.6667 |
| Turnover Factor: | 1.0000 |
| Maximum Liquid Volume (gal): | 30,000.0000 |
| Maximum Liquid Height (ft): | 15.0000 |
| Tank Diameter (ft): | 18.5000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 95.5175 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-210 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 73.33 | 22.19 | 95.52 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,2) | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.00 | 0.01 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Diethyl ether | 0.01 | 0.00 | 0.01 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.09 | 0.03 | 0.12 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.35 | 0.11 | 0.46 |
| Methylene chloride | 0.21 | 0.06 | 0.27 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.21 | 0.06 | 0.28 |
| Butanol-(1) | 0.00 | 0.00 | 0.00 |
| Water | 72.43 | 21.92 | 94.35 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-220 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-1111 + T-1112 - T-1410 divided by 3 |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 15.00 |
| Diameter (ft): | 18.50 |
| Liquid Height (ft) : | 15.00 |
| Avg. Liquid Height (ft): | 7.50 |
| Volume (gallons): | 30,000.00 |
| Turnovers: | 16.67 |
| Net Throughput(gal/yr): | 500,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-220 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | | | 18.04 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | 12.0759 | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-220 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 22.1895 |
| Vapor Space Volume (cu ft): | 2,067.8194 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.8784 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 2,067.8194 |
| Tank Diameter (ft): | 18.5000 |
| Vapor Space Outage (ft): | 7.6927 |
| Tank Shell Height (ft): | 15.0000 |
| Average Liquid Height (ft): | 7.5000 |
| Roof Outage (ft): | 0.1927 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.1927 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 9.2500 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0004 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3393 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3396 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.8784 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3394 |
| Vapor Space Outage (ft): | 7.6927 |
| Working Losses (lb): | 73.3280 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Annual Net Throughput (gal/yr.): | 500,000.0000 |
| Annual Turnovers: | 16.6667 |
| Turnover Factor: | 1.0000 |
| Maximum Liquid Volume (gal): | 30,000.0000 |
| Maximum Liquid Height (ft): | 15.0000 |
| Tank Diameter (ft): | 18.5000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 95.5175 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-220 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 73.33 | 22.19 | 95.52 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,2) | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.00 | 0.01 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Diethyl ether | 0.01 | 0.00 | 0.01 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.09 | 0.03 | 0.12 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.35 | 0.11 | 0.46 |
| Methylene chloride | 0.21 | 0.06 | 0.27 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.21 | 0.06 | 0.28 |
| Butanol-(1) | 0.00 | 0.00 | 0.00 |
| Water | 72.43 | 21.92 | 94.35 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-230 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-1111/1112 - T-1410 divided by 3 |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 15.00 |
| Diameter (ft): | 18.50 |
| Liquid Height (ft) : | 15.00 |
| Avg. Liquid Height (ft): | 7.50 |
| Volume (gallons): | 30,000.00 |
| Turnovers: | 16.67 |
| Net Throughput(gal/yr): | 500,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-230 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | | | 18.04 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | 12.0759 | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-230 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 22.1895 |
| Vapor Space Volume (cu ft): | 2,067.8194 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.8784 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 2,067.8194 |
| Tank Diameter (ft): | 18.5000 |
| Vapor Space Outage (ft): | 7.6927 |
| Tank Shell Height (ft): | 15.0000 |
| Average Liquid Height (ft): | 7.5000 |
| Roof Outage (ft): | 0.1927 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.1927 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 9.2500 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0004 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3393 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3396 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.8784 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3394 |
| Vapor Space Outage (ft): | 7.6927 |
| Working Losses (lb): | 73.3280 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Annual Net Throughput (gal/yr.): | 500,000.0000 |
| Annual Turnovers: | 16.6667 |
| Turnover Factor: | 1.0000 |
| Maximum Liquid Volume (gal): | 30,000.0000 |
| Maximum Liquid Height (ft): | 15.0000 |
| Tank Diameter (ft): | 18.5000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 95.5175 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-230 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 73.33 | 22.19 | 95.52 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.35 | 0.11 | 0.46 |
| Methylene chloride | 0.21 | 0.06 | 0.27 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,2) | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.00 | 0.01 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Diethyl ether | 0.01 | 0.00 | 0.01 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.09 | 0.03 | 0.12 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.21 | 0.06 | 0.28 |
| Butanol-(1) | 0.00 | 0.00 | 0.00 |
| Water | 72.43 | 21.92 | 94.35 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-1010 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-100 divided by 2 - GW & Bulk Receipts |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 9.00 |
| Diameter (ft): | 14.00 |
| Liquid Height (ft) : | 9.00 |
| Avg. Liquid Height (ft): | 4.50 |
| Volume (gallons): | 10,000.00 |
| Turnovers: | 60.00 |
| Net Throughput(gal/yr): | 600,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Liquid Contents of Storage Tank

**T-1010 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | | | 18.04 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | 12.0759 | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-1010 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 8.0626 |
| Vapor Space Volume (cu ft): | 715.1705 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9229 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 715.1705 |
| Tank Diameter (ft): | 14.0000 |
| Vapor Space Outage (ft): | 4.6458 |
| Tank Shell Height (ft): | 9.0000 |
| Average Liquid Height (ft): | 4.5000 |
| Roof Outage (ft): | 0.1458 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.1458 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 7.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0004 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3393 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3396 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9229 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3394 |
| Vapor Space Outage (ft): | 4.6458 |
| Working Losses (lb): | 58.6624 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Annual Net Throughput (gal/yr.): | 600,000.0000 |
| Annual Turnovers: | 60.0000 |
| Turnover Factor: | 0.6667 |
| Maximum Liquid Volume (gal): | 10,000.0000 |
| Maximum Liquid Height (ft): | 9.0000 |
| Tank Diameter (ft): | 14.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 66.7250 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-1010 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 1-6 Leachate (Including NAPL) | 58.66 | 8.06 | 66.72 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,2) | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.01 | 0.00 | 0.01 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Diethyl ether | 0.01 | 0.00 | 0.01 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.07 | 0.01 | 0.08 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.28 | 0.04 | 0.32 |
| Methylene chloride | 0.16 | 0.02 | 0.19 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.17 | 0.02 | 0.19 |
| Butanol-(1) | 0.00 | 0.00 | 0.00 |
| Water | 57.95 | 7.96 | 65.91 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-1020 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-100 divided by 2 - GW & Bulk Receipts |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 10.00 |
| Diameter (ft): | 12.00 |
| Liquid Height (ft) : | 10.00 |
| Avg. Liquid Height (ft): | 5.00 |
| Volume (gallons): | 8,000.00 |
| Turnovers: | 75.00 |
| Net Throughput(gal/yr): | 600,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-1020 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 1-6 Leachate (Including NAPL) | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3394 | 0.3393 | 0.3396 | 18.1467 | | | 18.04 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0007 | 0.0048 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Acetonitrile | | | | | | 0.8304 | 0.7308 | 0.9411 | 41.0500 | 0.0000 | 0.0000 | 41.05 | Option 2: A=7.119, B=1314.4, C=230 |
| Acrylonitrile | | | | | | 1.0305 | 0.9070 | 1.1678 | 53.0600 | 0.0000 | 0.0000 | 53.06 | Option 2: A=7.038, B=1232.53, C=222.47 |
| Aniline | | | | | | 0.0038 | 0.0031 | 0.0046 | 93.1000 | 0.0000 | 0.0000 | 93.10 | Option 2: A=7.32, B=1731.515, C=206.049 |
| Benzene | | | | | | 0.8603 | 0.7574 | 0.9745 | 78.1100 | 0.0000 | 0.0000 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Butanol-(1) | | | | | | 0.0339 | 0.0273 | 0.0418 | 74.1200 | 0.0003 | 0.0000 | 74.12 | Option 2: A=7.4768, B=1362.39, C=178.77 |
| Chlorobenzene | | | | | | 0.0920 | 0.0788 | 0.1071 | 112.6000 | 0.0000 | 0.0000 | 112.60 | Option 2: A=6.978, B=1431.05, C=217.55 |
| Chloroform | | | | | | 1.8160 | 1.6061 | 2.0475 | 119.3900 | 0.0000 | 0.0000 | 119.39 | Option 2: A=6.493, B=929.44, C=196.03 |
| Cresol (-m) | | | | | | 0.0008 | 0.0006 | 0.0010 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.508, B=1856.36, C=199.07 |
| Cresol (-o) | | | | | | 0.0010 | 0.0007 | 0.0012 | 108.1400 | 0.0000 | 0.0000 | 108.14 | Option 2: A=6.911, B=1435.5, C=165.16 |
| Cresol (-p) | | | | | | 0.0003 | 0.0002 | 0.0004 | 108.1000 | 0.0000 | 0.0000 | 108.10 | Option 2: A=7.035, B=1511.08, C=161.85 |
| Cyclohexanone | | | | | | 0.0377 | 0.0325 | 0.0437 | 98.2000 | 0.0000 | 0.0000 | 98.20 | Option 2: A=7.8492, B=2137.192, C=273.16 |
| Dichloroethane (1,1) | | | | | | 2.2012 | 1.9591 | 2.4780 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 1: VP40 = 1.682 VP50 = 2.243 |
| Dichloroethane (1,2) | | | | | | 0.6899 | 0.6050 | 0.7847 | 98.9700 | 0.0000 | 0.0000 | 98.97 | Option 2: A=7.025, B=1272.3, C=222.9 |
| Dichloroethylene (-trans-1,2) | | | | | | 3.3324 | 2.9876 | 3.7089 | 96.9500 | 0.0000 | 0.0000 | 96.95 | Option 2: A=6.965, B=1141.9, C=231.9 |
| Diethyl ether | | | | | | 5.5303 | 4.9819 | 6.1264 | 74.1200 | 0.0000 | 0.0002 | 74.12 | Option 2: A=6.92, B=1064.07, C=228.8 |
| Dimethyl phthalate | | | | | | 0.0000 | 0.0000 | 0.0000 | 194.2000 | 0.0000 | 0.0000 | 194.20 | Option 2: A=4.522, B=700.31, C=51.42 |
| Dioxane (1,4) | | | | | | 0.3139 | 0.2733 | 0.3597 | 88.1000 | 0.0001 | 0.0001 | 88.10 | Option 2: A=7.431, B=1554.68, C=240.34 |
| Ethyl chloride | | | | | | 13.2558 | 12.0759 | 14.5250 | 64.5200 | 0.0000 | 0.0000 | 64.52 | Option 2: A=6.986, B=1030.01, C=238.61 |
| Ethylbenzene | | | | | | 0.0739 | 0.0630 | 0.0865 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Iso-butyl alcohol | | | | | | 0.0584 | 0.0473 | 0.0717 | 74.1200 | 0.0000 | 0.0000 | 74.12 | Option 2: A=7.30636, B=1236.991, C=171.622 |
| Methyl alcohol | | | | | | 1.0194 | 0.8825 | 1.1743 | 32.0400 | 0.0010 | 0.0029 | 32.04 | Option 2: A=7.897, B=1474.08, C=229.13 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0005 | 0.0013 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0001 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0028 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Pyridine | | | | | | 0.1621 | 0.1392 | 0.1881 | 79.1000 | 0.0000 | 0.0000 | 79.10 | Option 2: A=7.041, B=1373.8, C=214.98 |
| Tetrachloroethane (1,1,2,2) | | | | | | 0.0273 | 0.0225 | 0.0329 | 167.8500 | 0.0000 | 0.0000 | 167.85 | Option 2: A=6.631, B=1228.1, C=179.9 |
| Tetrachloroethylene | | | | | | 0.1445 | 0.1243 | 0.1673 | 165.8300 | 0.0000 | 0.0000 | 165.83 | Option 2: A=6.98, B=1386.92, C=217.53 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Trichloroethane (1,1,1) | | | | | | 1.2296 | 1.0886 | 1.3864 | 133.4200 | 0.0000 | 0.0000 | 133.42 | Option 2: A=8.643, B=2136.6, C=302.8 |
| Trichloroethane (1,1,2) | | | | | | 0.1697 | 0.1456 | 0.1971 | 133.4000 | 0.0000 | 0.0000 | 133.40 | Option 2: A=6.951, B=1314.41, C=209.2 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Vinylidene chloride | | | | | | 6.3609 | 5.7519 | 7.0209 | 96.5000 | 0.0000 | 0.0000 | 96.50 | Option 2: A=6.972, B=1099.4, C=237.2 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9969 | 0.9878 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-1020 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 6.4829 |
| Vapor Space Volume (cu ft): | 579.6238 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9156 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 579.6238 |
| Tank Diameter (ft): | 12.0000 |
| Vapor Space Outage (ft): | 5.1250 |
| Tank Shell Height (ft): | 10.0000 |
| Average Liquid Height (ft): | 5.0000 |
| Roof Outage (ft): | 0.1250 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.1250 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 6.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0004 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3393 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3396 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9156 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3394 |
| Vapor Space Outage (ft): | 5.1250 |
| Working Losses (lb): | 49.8630 |
| Vapor Molecular Weight (lb/lb-mole): | 18.1467 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3394 |
| Annual Net Throughput (gal/yr.): | 600,000.0000 |
| Annual Turnovers: | 75.0000 |
| Turnover Factor: | 0.5667 |
| Maximum Liquid Volume (gal): | 8,000.0000 |
| Maximum Liquid Height (ft): | 10.0000 |
| Tank Diameter (ft): | 12.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 56.3459 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-1020 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Diethyl ether | 0.01 | 0.00 | 0.01 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Iso-butyl alcohol | 0.00 | 0.00 | 0.00 |
| Tetrachloroethylene | 0.00 | 0.00 | 0.00 |
| SLF 1-6 Leachate (Including NAPL) | 49.86 | 6.48 | 56.35 |
| Trichloroethane (1,1,1) | 0.00 | 0.00 | 0.00 |
| Trichloroethane (1,1,2) | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,1) | 0.00 | 0.00 | 0.00 |
| Vinylidene chloride | 0.00 | 0.00 | 0.00 |
| Dichloroethane (1,2) | 0.00 | 0.00 | 0.00 |
| Dioxane (1,4) | 0.00 | 0.00 | 0.00 |
| Acetonitrile | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Chlorobenzene | 0.00 | 0.00 | 0.00 |
| Ethyl chloride | 0.00 | 0.00 | 0.00 |
| Chloroform | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Dichloroethylene (-trans-1,2) | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Cyclohexanone | 0.00 | 0.00 | 0.00 |
| Tetrachloroethane (1,1,2,2) | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.06 | 0.01 | 0.07 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Acetone | 0.24 | 0.03 | 0.27 |
| Methylene chloride | 0.14 | 0.02 | 0.16 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Cresol (-o) | 0.00 | 0.00 | 0.00 |
| Cresol (-m) | 0.00 | 0.00 | 0.00 |
| Cresol (-p) | 0.00 | 0.00 | 0.00 |
| Aniline | 0.00 | 0.00 | 0.00 |
| Dimethyl phthalate | 0.00 | 0.00 | 0.00 |
| Pyridine | 0.00 | 0.00 | 0.00 |
| Methyl alcohol | 0.14 | 0.02 | 0.16 |
| Butanol-(1) | 0.00 | 0.00 | 0.00 |
| Water | 49.25 | 6.40 | 55.66 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-310 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 38.00 |
| Diameter (ft): | 12.00 |
| Liquid Height (ft) : | 38.00 |
| Avg. Liquid Height (ft): | 19.00 |
| Volume (gallons): | 30,457.00 |
| Turnovers: | 98.50 |
| Net Throughput(gal/yr): | 3,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-310 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-310 | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3385 | 0.3385 | 0.3385 | 18.0130 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0001 | 0.0009 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9998 | 0.9990 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-310 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 19.4580 |
| Vapor Space Volume (cu ft): | 2,162.9865 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.7446 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 2,162.9865 |
| Tank Diameter (ft): | 12.0000 |
| Vapor Space Outage (ft): | 19.1250 |
| Tank Shell Height (ft): | 38.0000 |
| Average Liquid Height (ft): | 19.0000 |
| Roof Outage (ft): | 0.1250 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.1250 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 6.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0130 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3385 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.7446 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3385 |
| Vapor Space Outage (ft): | 19.1250 |
| Working Losses (lb): | 205.2242 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0130 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Annual Net Throughput (gal/yr.): | 3,000,000.0000 |
| Annual Turnovers: | 98.4995 |
| Turnover Factor: | 0.4712 |
| Maximum Liquid Volume (gal): | 30,457.0000 |
| Maximum Liquid Height (ft): | 38.0000 |
| Tank Diameter (ft): | 12.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 224.6822 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-310 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| T-310 | 205.22 | 19.46 | 224.68 |
| Acetone | 0.18 | 0.02 | 0.20 |
| Methylene chloride | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.02 | 0.00 | 0.02 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 205.01 | 19.44 | 224.45 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-320 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 38.00 |
| Diameter (ft): | 12.00 |
| Liquid Height (ft) : | 38.00 |
| Avg. Liquid Height (ft): | 19.00 |
| Volume (gallons): | 30,457.00 |
| Turnovers: | 98.50 |
| Net Throughput(gal/yr): | 3,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-320 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-320 | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3385 | 0.3385 | 0.3385 | 18.0144 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0010 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0000 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9998 | 0.9989 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-320 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 19.4601 |
| Vapor Space Volume (cu ft): | 2,162.9865 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.7445 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 2,162.9865 |
| Tank Diameter (ft): | 12.0000 |
| Vapor Space Outage (ft): | 19.1250 |
| Tank Shell Height (ft): | 38.0000 |
| Average Liquid Height (ft): | 19.0000 |
| Roof Outage (ft): | 0.1250 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.1250 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 6.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0144 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3385 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.7445 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3385 |
| Vapor Space Outage (ft): | 19.1250 |
| Working Losses (lb): | 205.2464 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0144 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Annual Net Throughput (gal/yr.): | 3,000,000.0000 |
| Annual Turnovers: | 98.4995 |
| Turnover Factor: | 0.4712 |
| Maximum Liquid Volume (gal): | 30,457.0000 |
| Maximum Liquid Height (ft): | 38.0000 |
| Tank Diameter (ft): | 12.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 224.7065 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-320 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| T-320 | 205.25 | 19.46 | 224.71 |
| Acetone | 0.20 | 0.02 | 0.22 |
| Methylene chloride | 0.01 | 0.00 | 0.01 |
| Methyl ethyl ketone | 0.02 | 0.00 | 0.02 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 205.01 | 19.44 | 224.45 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-3001 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 7.00 |
| Diameter (ft): | 5.50 |
| Liquid Height (ft) : | 7.00 |
| Avg. Liquid Height (ft): | 3.50 |
| Volume (gallons): | 1,255.00 |
| Turnovers: | 2,390.44 |
| Net Throughput(gal/yr): | 3,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-3001 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-100 Liquid | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0276 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9996 | 0.9979 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-3001 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 0.9609 |
| Vapor Space Volume (cu ft): | 84.5152 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9400 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 84.5152 |
| Tank Diameter (ft): | 5.5000 |
| Vapor Space Outage (ft): | 3.5573 |
| Tank Shell Height (ft): | 7.0000 |
| Average Liquid Height (ft): | 3.5000 |
| Roof Outage (ft): | 0.0573 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0573 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 2.7500 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0276 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9400 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3386 |
| Vapor Space Outage (ft): | 3.5573 |
| Working Losses (lb): | 78.1326 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0276 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Annual Net Throughput (gal/yr.): | 3,000,000.0000 |
| Annual Turnovers: | 2,390.4382 |
| Turnover Factor: | 0.1792 |
| Maximum Liquid Volume (gal): | 1,255.0000 |
| Maximum Liquid Height (ft): | 7.0000 |
| Tank Diameter (ft): | 5.5000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 79.0936 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3001 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| T-100 Liquid | 78.13 | 0.96 | 79.09 |
| Acetone | 0.12 | 0.00 | 0.12 |
| Methylene chloride | 0.03 | 0.00 | 0.03 |
| Methyl ethyl ketone | 0.01 | 0.00 | 0.01 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 77.97 | 0.96 | 78.92 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-3002 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 5.66 |
| Diameter (ft): | 5.00 |
| Liquid Height (ft) : | 5.66 |
| Avg. Liquid Height (ft): | 2.83 |
| Volume (gallons): | 900.00 |
| Turnovers: | 3,333.33 |
| Net Throughput(gal/yr): | 3,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-3002 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-100 Liquid | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0276 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9996 | 0.9979 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-3002 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 0.6508 |
| Vapor Space Volume (cu ft): | 56.5896 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9508 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 56.5896 |
| Tank Diameter (ft): | 5.0000 |
| Vapor Space Outage (ft): | 2.8821 |
| Tank Shell Height (ft): | 5.6600 |
| Average Liquid Height (ft): | 2.8300 |
| Roof Outage (ft): | 0.0521 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0521 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 2.5000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0276 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9508 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3386 |
| Vapor Space Outage (ft): | 2.8821 |
| Working Losses (lb): | 76.5849 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0276 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Annual Net Throughput (gal/yr.): | 3,000,000.0000 |
| Annual Turnovers: | 3,333.3333 |
| Turnover Factor: | 0.1757 |
| Maximum Liquid Volume (gal): | 900.0000 |
| Maximum Liquid Height (ft): | 5.6600 |
| Tank Diameter (ft): | 5.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 77.2358 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3002 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| T-100 Liquid | 76.58 | 0.65 | 77.24 |
| Acetone | 0.12 | 0.00 | 0.12 |
| Methylene chloride | 0.03 | 0.00 | 0.03 |
| Methyl ethyl ketone | 0.01 | 0.00 | 0.01 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 76.42 | 0.65 | 77.07 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-3003 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 6.50 |
| Diameter (ft): | 5.00 |
| Liquid Height (ft) : | 6.50 |
| Avg. Liquid Height (ft): | 3.25 |
| Volume (gallons): | 954.72 |
| Turnovers: | 3,142.28 |
| Net Throughput(gal/yr): | 3,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-3003 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-100 Liquid | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0276 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9996 | 0.9979 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-3003 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 0.7404 |
| Vapor Space Volume (cu ft): | 64.8363 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9441 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 64.8363 |
| Tank Diameter (ft): | 5.0000 |
| Vapor Space Outage (ft): | 3.3021 |
| Tank Shell Height (ft): | 6.5000 |
| Average Liquid Height (ft): | 3.2500 |
| Roof Outage (ft): | 0.0521 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0521 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 2.5000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0276 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9441 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3386 |
| Vapor Space Outage (ft): | 3.3021 |
| Working Losses (lb): | 76.8235 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0276 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Annual Net Throughput (gal/yr.): | 3,000,000.0000 |
| Annual Turnovers: | 3,142.2795 |
| Turnover Factor: | 0.1762 |
| Maximum Liquid Volume (gal): | 954.7209 |
| Maximum Liquid Height (ft): | 6.5000 |
| Tank Diameter (ft): | 5.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 77.5639 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3003 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| T-100 Liquid | 76.82 | 0.74 | 77.56 |
| Acetone | 0.12 | 0.00 | 0.12 |
| Methylene chloride | 0.03 | 0.00 | 0.03 |
| Methyl ethyl ketone | 0.01 | 0.00 | 0.01 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 76.66 | 0.74 | 77.40 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-3009 rev |
| City: | Buffalo |
| State: | New York |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Horizontal Tank |
| Description: | Horizontal Tank |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 16.00 |
| Diameter (ft): | 8.00 |
| Volume (gallons): | 5,000.00 |
| Turnovers: | 60.00 |
| Net Throughput(gal/yr): | 300,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | Red/Primer |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-3009 rev - Horizontal Tank**
**Buffalo, New York**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tank 3009 | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.3385 | 0.3385 | 0.3386 | 18.0184 | | | 18.00 | |
| Acetone | | | | | | 2.8026 | 2.1379 | 3.6292 | 58.0800 | 0.0002 | 0.0013 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 1.0299 | 0.7577 | 1.3789 | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1998 | 0.1384 | 0.2829 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 5.4129 | 4.2270 | 6.8607 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9998 | 0.9985 | 18.00 | Option 1: VP50 = .3383936375 VP60 = .3383936375 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-3009 rev - Horizontal Tank**
**Buffalo, New York**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 14.2473 |
| Vapor Space Volume (cu ft): | 512.2597 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0744 |
| Vented Vapor Saturation Factor: | 0.9330 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 512.2597 |
| Tank Diameter (ft): | 8.0000 |
| Effective Diameter (ft): | 12.7694 |
| Vapor Space Outage (ft): | 4.0000 |
| Tank Shell Length (ft): | 16.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0184 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 517.9736 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 511.6892 |
| Tank Paint Solar Absorptance (Shell): | 0.8900 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0744 |
| Daily Vapor Temperature Range (deg. R): | 40.7601 |
| Daily Vapor Pressure Range (psia): | 0.0001 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg R): | 517.9736 |
| Daily Min. Liquid Surface Temp. (deg R): | 507.7836 |
| Daily Max. Liquid Surface Temp. (deg R): | 528.1636 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9330 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3385 |
| Vapor Space Outage (ft): | 4.0000 |
| Working Losses (lb): | 29.0457 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0184 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Annual Net Throughput (gal/yr.): | 300,000.0000 |
| Annual Turnovers: | 60.0000 |
| Turnover Factor: | 0.6667 |
| Tank Diameter (ft): | 8.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 43.2930 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3009 rev - Horizontal Tank**
**Buffalo, New York**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Tank 3009 | 29.05 | 14.25 | 43.29 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Water | 29.00 | 14.23 | 43.23 |
| Acetone | 0.04 | 0.02 | 0.05 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.00 | 0.00 | 0.01 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-3011 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 5.00 |
| Diameter (ft): | 4.50 |
| Liquid Height (ft) : | 5.00 |
| Avg. Liquid Height (ft): | 2.50 |
| Volume (gallons): | 594.86 |
| Turnovers: | 5,043.16 |
| Net Throughput(gal/yr): | 3,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-3011 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-3011 | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3385 | 0.3385 | 0.3385 | 18.0144 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0010 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0000 | 0.0001 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0001 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9998 | 0.9989 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-3011 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 0.4681 |
| Vapor Space Volume (cu ft): | 40.5063 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9563 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 40.5063 |
| Tank Diameter (ft): | 4.5000 |
| Vapor Space Outage (ft): | 2.5469 |
| Tank Shell Height (ft): | 5.0000 |
| Average Liquid Height (ft): | 2.5000 |
| Roof Outage (ft): | 0.0469 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0469 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 2.2500 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0144 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3385 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9563 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3385 |
| Vapor Space Outage (ft): | 2.5469 |
| Working Losses (lb): | 75.1826 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0144 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3385 |
| Annual Net Throughput (gal/yr.): | 3,000,000.0000 |
| Annual Turnovers: | 5,043.1646 |
| Turnover Factor: | 0.1726 |
| Maximum Liquid Volume (gal): | 594.8646 |
| Maximum Liquid Height (ft): | 5.0000 |
| Tank Diameter (ft): | 4.5000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 75.6507 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3011 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| T-3011 | 75.18 | 0.47 | 75.65 |
| Acetone | 0.07 | 0.00 | 0.08 |
| Methylene chloride | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone | 0.01 | 0.00 | 0.01 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 75.10 | 0.47 | 75.56 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | T-3012 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | T-100 Processing |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 5.00 |
| Diameter (ft): | 4.00 |
| Liquid Height (ft) : | 5.00 |
| Avg. Liquid Height (ft): | 2.50 |
| Volume (gallons): | 470.02 |
| Turnovers: | 6,382.76 |
| Net Throughput(gal/yr): | 3,000,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.06 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**T-3012 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-100 Liquid | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3386 | 0.3385 | 0.3386 | 18.0276 | | | 18.00 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0015 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0001 | 0.0002 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methyl isobutyl ketone | | | | | | 0.1444 | 0.1229 | 0.1689 | 100.2000 | 0.0000 | 0.0000 | 100.20 | Option 2: A=6.672, B=1168.4, C=191.9 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0000 | 0.0004 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Trichloroethylene | | | | | | 0.5874 | 0.5111 | 0.6729 | 131.4000 | 0.0000 | 0.0000 | 131.40 | Option 2: A=6.518, B=1018.6, C=192.7 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9996 | 0.9979 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |

# TANKS 4.0.9d
# Emissions Report - Detail Format
# Detail Calculations (AP-42)

**T-3012 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 0.3695 |
| Vapor Space Volume (cu ft): | 31.9395 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9564 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 31.9395 |
| Tank Diameter (ft): | 4.0000 |
| Vapor Space Outage (ft): | 2.5417 |
| Tank Shell Height (ft): | 5.0000 |
| Average Liquid Height (ft): | 2.5000 |
| Roof Outage (ft): | 0.0417 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0417 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0625 |
| Shell Radius (ft): | 2.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0276 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0000 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3385 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3386 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9564 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3386 |
| Vapor Space Outage (ft): | 2.5417 |
| Working Losses (lb): | 74.7103 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0276 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3386 |
| Annual Net Throughput (gal/yr.): | 3,000,000.0000 |
| Annual Turnovers: | 6,382.7552 |
| Turnover Factor: | 0.1714 |
| Maximum Liquid Volume (gal): | 470.0165 |
| Maximum Liquid Height (ft): | 5.0000 |
| Tank Diameter (ft): | 4.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 75.0798 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-3012 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| T-100 Liquid | 74.71 | 0.37 | 75.08 |
| Acetone | 0.12 | 0.00 | 0.12 |
| Methylene chloride | 0.03 | 0.00 | 0.03 |
| Methyl ethyl ketone | 0.01 | 0.00 | 0.01 |
| Trichloroethylene | 0.00 | 0.00 | 0.00 |
| Methyl isobutyl ketone | 0.00 | 0.00 | 0.00 |
| Water | 74.55 | 0.37 | 74.92 |

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | Frac Tank #3 |
| City: | Model City |
| State: | NY |
| Company: | CWM Chemical Services, LLC |
| Type of Tank: | Vertical Fixed Roof Tank |
| Description: | SLF-7 Leachate Processing |

**Tank Dimensions**

| | |
|---|---|
| Shell Height (ft): | 11.00 |
| Diameter (ft): | 18.00 |
| Liquid Height (ft) : | 11.00 |
| Avg. Liquid Height (ft): | 5.50 |
| Volume (gallons): | 21,000.00 |
| Turnovers: | 2.38 |
| Net Throughput(gal/yr): | 50,000.00 |
| Is Tank Heated (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |
| Roof Color/Shade: | White/White |
| Roof Condition: | Good |

**Roof Characteristics**

| | |
|---|---|
| Type: | Cone |
| Height (ft) | 0.00 |
| Slope (ft/ft) (Cone Roof) | 0.00 |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**Frac Tank #3 - Vertical Fixed Roof Tank**
**Model City, NY**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLF 7 Leachate | All | 49.26 | 44.94 | 53.57 | 47.70 | 0.3387 | 0.3386 | 0.3387 | 18.0507 | | | 18.01 | |
| Acetone | | | | | | 2.2051 | 1.9598 | 2.4754 | 58.0800 | 0.0002 | 0.0012 | 58.08 | Option 2: A=7.117, B=1210.595, C=229.664 |
| Methyl ethyl ketone | | | | | | 0.7848 | 0.6863 | 0.8948 | 72.1000 | 0.0002 | 0.0004 | 72.10 | Option 2: A=6.8645, B=1150.207, C=209.246 |
| Methylene chloride | | | | | | 4.3481 | 3.9050 | 4.8320 | 84.9400 | 0.0002 | 0.0021 | 84.94 | Option 2: A=7.409, B=1325.9, C=252.6 |
| Toluene | | | | | | 0.2342 | 0.2030 | 0.2694 | 92.1300 | 0.0000 | 0.0000 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Water | | | | | | 0.3384 | 0.3384 | 0.3384 | 18.0000 | 0.9995 | 0.9963 | 18.00 | Option 1: VP40 = .3383936375 VP50 = .3383936375 |
| Xylenes (mixed isomers) | | | | | | 0.0613 | 0.0522 | 0.0718 | 106.1700 | 0.0000 | 0.0000 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**Frac Tank #3 - Vertical Fixed Roof Tank**
**Model City, NY**

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 15.4329 |
| Vapor Space Volume (cu ft): | 1,399.5795 |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Space Expansion Factor: | 0.0297 |
| Vented Vapor Saturation Factor: | 0.9102 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 1,399.5795 |
| Tank Diameter (ft): | 18.0000 |
| Vapor Space Outage (ft): | 5.5000 |
| Tank Shell Height (ft): | 11.0000 |
| Average Liquid Height (ft): | 5.5000 |
| Roof Outage (ft): | 0.0000 |
| Roof Outage (Cone Roof) | |
| Roof Outage (ft): | 0.0000 |
| Roof Height (ft): | 0.0000 |
| Roof Slope (ft/ft): | 0.0000 |
| Shell Radius (ft): | 9.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0011 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0507 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3387 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 508.9255 |
| Daily Average Ambient Temp. (deg. F): | 47.6792 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 507.3692 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Tank Paint Solar Absorptance (Roof): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,165.4120 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0297 |
| Daily Vapor Temperature Range (deg. R): | 17.2654 |
| Daily Vapor Pressure Range (psia): | 0.0001 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3387 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.3386 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.3387 |
| Daily Avg. Liquid Surface Temp. (deg R): | 508.9255 |
| Daily Min. Liquid Surface Temp. (deg R): | 504.6092 |
| Daily Max. Liquid Surface Temp. (deg R): | 513.2419 |
| Daily Ambient Temp. Range (deg. R): | 16.2750 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9102 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.3387 |
| Vapor Space Outage (ft): | 5.5000 |
| Working Losses (lb): | 7.2774 |
| Vapor Molecular Weight (lb/lb-mole): | 18.0507 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.3387 |
| Annual Net Throughput (gal/yr.): | 50,000.0000 |
| Annual Turnovers: | 2.3810 |
| Turnover Factor: | 1.0000 |
| Maximum Liquid Volume (gal): | 21,000.0000 |
| Maximum Liquid Height (ft): | 11.0000 |
| Tank Diameter (ft): | 18.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 22.7103 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**Frac Tank #3 - Vertical Fixed Roof Tank**
**Model City, NY**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| SLF 7 Leachate | 7.28 | 15.43 | 22.71 |
| Methyl ethyl ketone | 0.00 | 0.01 | 0.01 |
| Toluene | 0.00 | 0.00 | 0.00 |
| Xylenes (mixed isomers) | 0.00 | 0.00 | 0.00 |
| Water | 7.25 | 15.38 | 22.63 |
| Acetone | 0.01 | 0.02 | 0.03 |
| Methylene chloride | 0.02 | 0.03 | 0.05 |

# Attachment 12
# Historical Sampling Results for Tanks T-100, T-310 and T320

| T-310 | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chloromethane | Vinyl chloride | Bromomethane | Chloroethane | Trichlorofluoromethane | Diethyl ether | 1,1,2-Trichloro-1,2,2-trifluoroethane | Acetone | 1,1-Dichloroethene | Methylene chloride | Carbon disulfide | trans-1,2-Dichloroethene | 1,1-Dichloroethane | Vinyl acetate | 2-Butanone | Ethyl acetate |
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
| 1304089-03 | 04/19/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1304085-03 | 04/18/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1304080-03 | 04/17/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1304074-03 | 04/16/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1304064-03 | 04/15/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1304063-03 | 04/14/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1304062-03 | 04/13/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1304052-03 | 04/12/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1304045-03 | 04/11/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1304041-03 | 04/10/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1304036-03 | 04/09/13 | T-310 EFFLUENT | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1304022-01 | 04/05/13 | T-310 EFFLUENT | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 | 33400 | <2500 | 3980 | <2500 | <2500 | <2500 | <2500 | 12800 | <2500 |
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| T-310 | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chloromethane | Vinyl chloride | Bromomethane | Chloroethane | Trichlorofluoromethane | Diethyl ether | 1,1,2-Trichloro-1,2,2-trifluoroethane | Acetone | 1,1-Dichloroethene | Methylene chloride | Carbon disulfide | trans-1,2-Dichloroethene | 1,1-Dichloroethane | Vinyl acetate | 2-Butanone | Ethyl acetate |
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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| T-310 | | | | | | | | | | | | | | | | | | | |
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| T-310 | | | | | | | | | | | | | | | | | | |
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| | | | Chloroform | 1,1,1-Trichloroethane | Carbon tetrachloride | 1,2-Dichloroethane d4 | 1,2-Dichloroethane | Benzene | Trichloroethene | 1,2-Dichloropropane | Bromodichloromethane | 2-Chloroethylvinyl ether | 4-Methyl-2-pentanone | cis-1,3-Dichloropropene | Toluene-d8 | Toluene | trans-1,3-Dichloropropene | 1,1,2-Trichloroethane |
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| T-310 | | | | | | | | | | | | | | | | | | |
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| | | | Chloroform | 1,1,1-Trichloroethane | Carbon tetrachloride | 1,2-Dichloroethane d4 | 1,2-Dichloroethane | Benzene | Trichloroethene | 1,2-Dichloropropane | Bromodichloromethane | 2-Chloroethylvinyl ether | 4-Methyl-2-pentanone | cis-1,3-Dichloropropene | Toluene-d8 | Toluene | trans-1,3-Dichloropropene | 1,1,2-Trichloroethane |
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| T-310 | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chloroform | 1,1,1-Trichloroethane | Carbon tetrachloride | 1,2-Dichloroethane d4 | 1,2-Dichloroethane | Benzene | Trichloroethene | 1,2-Dichloropropane | Bromodichloromethane | 2-Chloroethylvinyl ether | 4-Methyl-2-pentanone | cis-1,3-Dichloropropene | Toluene-d8 | Toluene | trans-1,3-Dichloropropene | 1,1,2-Trichloroethane |
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L |
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| T-310 | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chloroform | 1,1,1-Trichloroethane | Carbon tetrachloride | 1,2-Dichloroethane d4 | 1,2-Dichloroethane | Benzene | Trichloroethene | 1,2-Dichloropropane | Bromodichloromethane | 2-Chloroethylvinyl ether | 4-Methyl-2-pentanone | cis-1,3-Dichloropropene | Toluene-d8 | Toluene | trans-1,3-Dichloropropene | 1,1,2-Trichloroethane |
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L |
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| T-310 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4-Bromofluorobenzene | 2-Hexanone | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
| SAMPLE ID | DATE | | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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| 1302025-01 | 02/08/13 | T-310 EFFLUENT | 98.2% | <1000 | <1000 | <1000 | <1000 | <1000 | <3000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |

| T-310 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4-Bromofluorobenzene | 2-Hexanone | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
| SAMPLE ID | DATE | | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
| 1302023-01 | 02/07/13 | T-310 EFFLUENT | 97.3% | <2500 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
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| 1302016-03 | 02/05/13 | T-310 EFFLUENT | 95.7% | <1000 | <1000 | <1000 | <1000 | <1000 | <3000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| T-310 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4-Bromofluorobenzene | 2-Hexanone | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
| SAMPLE ID | DATE | | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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| 1211097-03 | 11/25/12 | T-310 EFFLUENT | 98.1% | <1000 | <1000 | <1000 | <1000 | <1000 | <3000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| T-310 | | | | | | | | | | | | | | | |
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| | | | 4-Bromofluorobenzene | 2-Hexanone | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
| SAMPLE ID | DATE | | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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| T-310 | | | | | | | | | | | | | | | |
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| | | | 4-Bromofluorobenzene | 2-Hexanone | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
| SAMPLE ID | DATE | | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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**T-320**

| SAMPLE ID | DATE | | Chloromethane ug/L | Vinyl chloride ug/L | Bromomethane ug/L | Chloroethane ug/L | Trichlorofluoromethane ug/L | Diethyl ether ug/L | 1,1,2-Trichloro-1,2,2-trifluoroethane ug/L | Acetone ug/L | 1,1-Dichloroethene ug/L | Methylene chloride ug/L | Carbon disulfide ug/L | trans-1,2-Dichloroethene ug/L | 1,1-Dichloroethane ug/L | Vinyl acetate ug/L | 2-Butanone ug/L | Ethyl acetate ug/L | Chloroform ug/L |
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**T-320**

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**T-320**

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**T-320**

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**T-320**

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**T-320**

| SAMPLE ID | DATE | | 1,1,1-Trichloroethane ug/L | Carbon tetrachloride ug/L | 1,2-Dichloroethane d4 [surr] | 1,2-Dichloroethane ug/L | Benzene ug/L | Trichloroethene ug/L | 1,2-Dichloropropane ug/L | Bromodichloromethane ug/L | 2-Chloroethylvinyl ether ug/L | 4-Methyl-2-pentanone ug/L | cis-1,3-Dichloropropene ug/L | Toluene-d8 [surr] | Toluene ug/L | trans-1,3-Dichloropropene ug/L | 1,1,2-Trichloroethane ug/L | 4-Bromofluorobenzene [surr] | 2-Hexanone ug/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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**T-320**

| SAMPLE ID | DATE | | 1,1,1-Trichloroethane ug/L | Carbon tetrachloride ug/L | 1,2-Dichloroethane d4 [surr] | 1,2-Dichloroethane ug/L | Benzene ug/L | Trichloroethene ug/L | 1,2-Dichloropropane ug/L | Bromodichloromethane ug/L | 2-Chloroethylvinyl ether ug/L | 4-Methyl-2-pentanone ug/L | cis-1,3-Dichloropropene ug/L | Toluene-d8 [surr] | Toluene ug/L | trans-1,3-Dichloropropene ug/L | 1,1,2-Trichloroethane ug/L | 4-Bromofluorobenzene [surr] | 2-Hexanone ug/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1302001-04 | 02/01/13 | T-320 EFFLUENT | <1000 | <1000 | 102% | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | 96.6% | <1000 | <1000 | <1000 | 92.9% | <1000 |
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| 1301082-04 | 01/20/13 | T-320 EFFLUENT | <1000 | <1000 | 109% | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | 103% | <1000 | <1000 | <1000 | 99.2% | <1000 |
| 1301081-02 | 01/19/13 | T-320 EFFLUENT | <2500 | <2500 | 106% | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 | 102% | <2500 | <2500 | <2500 | 94.2% | <2500 |
| 1301072-04 | 01/18/13 | T-320 EFFLUENT | <1000 | <1000 | 105% | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | 102% | <1000 | <1000 | <1000 | 93.8% | <1000 |
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**T-320**

| | | | 1,1,1-Trichloroethane | Carbon tetrachloride | 1,2-Dichloroethane d4 | 1,2-Dichloroethane | Benzene | Trichloroethene | 1,2-Dichloropropane | Bromodichloromethane | 2-Chloroethylvinyl ether | 4-Methyl-2-pentanone | cis-1,3-Dichloropropene | Toluene-d8 | Toluene | trans-1,3-Dichloropropene | 1,1,2-Trichloroethane | 4-Bromofluorobenzene | 2-Hexanone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | [surr] | ug/L |
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**T-320**

| SAMPLE ID | DATE | | 1,1,1-Trichloroethane ug/L | Carbon tetrachloride ug/L | 1,2-Dichloroethane d4 [surr] | 1,2-Dichloroethane ug/L | Benzene ug/L | Trichloroethene ug/L | 1,2-Dichloropropane ug/L | Bromodichloromethane ug/L | 2-Chloroethylvinyl ether ug/L | 4-Methyl-2-pentanone ug/L | cis-1,3-Dichloropropene ug/L | Toluene-d8 [surr] | Toluene ug/L | trans-1,3-Dichloropropene ug/L | 1,1,2-Trichloroethane ug/L | 4-Bromofluorobenzene [surr] | 2-Hexanone ug/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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**T-320**

| | | | 1,1,1-Trichloroethane | Carbon tetrachloride | 1,2-Dichloroethane d4 | 1,2-Dichloroethane | Benzene | Trichloroethene | 1,2-Dichloropropane | Bromodichloromethane | 2-Chloroethylvinyl ether | 4-Methyl-2-pentanone | cis-1,3-Dichloropropene | Toluene-d8 | Toluene | trans-1,3-Dichloropropene | 1,1,2-Trichloroethane | 4-Bromofluorobenzene | 2-Hexanone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | [surr] | ug/L |
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**T-320**

| | | | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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**T-320**

| | | | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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**T-320**

| | | | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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**T-320**

| | | | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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**T-320**

| SAMPLE ID | DATE | | Tetrachloroethene ug/L | Dibromochloromethane ug/L | Chlorobenzene ug/L | Ethylbenzene ug/L | Xylenes, total ug/L | Styrene ug/L | Bromoform ug/L | 1,1,2,2-Tetrachloroethane ug/L | 1,3-Dichlorobenzene ug/L | 1,4-Dichlorobenzene ug/L | 1,2-Dichlorobenzene ug/L |
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**T-100**

| SAMPLE ID | DATE | | Chloromethane ug/L | Vinyl chloride ug/L | Bromomethane ug/L | Chloroethane ug/L | Trichlorofluoromethane ug/L | Diethyl ether ug/L | 1,1,2-Trichloro-1,2,2-trifluoroethane ug/L | Acetone ug/L | 1,1-Dichloroethene ug/L | Methylene chloride ug/L | Carbon disulfide ug/L | trans-1,2-Dichloroethene ug/L | 1,1-Dichloroethane ug/L | Vinyl acetate ug/L | 2-Butanone ug/L | Ethyl acetate ug/L | Chloroform ug/L |
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**T-100**

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**T-100**

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**T-100**

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**T-100**

| | | | 1,1,1-Trichloroethane | Carbon tetrachloride | 1,2-Dichloroethane d4 | 1,2-Dichloroethane | Benzene | Trichloroethene | 1,2-Dichloropropane | Bromodichloromethane | 2-Chloroethylvinyl ether | 4-Methyl-2-pentanone | cis-1,3-Dichloropropene | Toluene-d8 | Toluene | trans-1,3-Dichloropropene | 1,1,2-Trichloroethane | 4-Bromofluorobenzene | 2-Hexanone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | [surr] | ug/L |
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**T-100**

| | | | 1,1,1-Trichloroethane | Carbon tetrachloride | 1,2-Dichloroethane d4 | 1,2-Dichloroethane | Benzene | Trichloroethene | 1,2-Dichloropropane | Bromodichloromethane | 2-Chloroethylvinyl ether | 4-Methyl-2-pentanone | cis-1,3-Dichloropropene | Toluene-d8 | Toluene | trans-1,3-Dichloropropene | 1,1,2-Trichloroethane | 4-Bromofluorobenzene | 2-Hexanone |
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| SAMPLE ID | DATE | | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | [surr] | ug/L |
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**T-100**

| | | | 1,1,1-Trichloroethane | Carbon tetrachloride | 1,2-Dichloroethane d4 | 1,2-Dichloroethane | Benzene | Trichloroethene | 1,2-Dichloropropane | Bromodichloromethane | 2-Chloroethylvinyl ether | 4-Methyl-2-pentanone | cis-1,3-Dichloropropene | Toluene-d8 | Toluene | trans-1,3-Dichloropropene | 1,1,2-Trichloroethane | 4-Bromofluorobenzene | 2-Hexanone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | [surr] | ug/L | ug/L | ug/L | [surr] | ug/L |
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**T-100**

| SAMPLE ID | DATE | | 1,1,1-Trichloroethane ug/L | Carbon tetrachloride ug/L | 1,2-Dichloroethane d4 [surr] | 1,2-Dichloroethane ug/L | Benzene ug/L | Trichloroethene ug/L | 1,2-Dichloropropane ug/L | Bromodichloromethane ug/L | 2-Chloroethylvinyl ether ug/L | 4-Methyl-2-pentanone ug/L | cis-1,3-Dichloropropene ug/L | Toluene-d8 [surr] | Toluene ug/L | trans-1,3-Dichloropropene ug/L | 1,1,2-Trichloroethane ug/L | 4-Bromofluorobenzene [surr] | 2-Hexanone ug/L |
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**T-100**

| | | | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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**T-100**

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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**T-100**

| | | | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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**T-100**

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| 1206038-03 | 06/10/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |

**T-100**

| | | | Tetrachloroethene | Dibromochloromethane | Chlorobenzene | Ethylbenzene | Xylenes, total | Styrene | Bromoform | 1,1,2,2-Tetrachloroethane | 1,3-Dichlorobenzene | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID | DATE | | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L | ug/L |
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| 1206024-03 | 06/07/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
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| 1206004-03 | 06/02/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
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| 1205001-05 | 05/01/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
| 1204137-05 | 04/30/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
| 1204136-05 | 04/29/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
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| 1204084-03 | 04/18/12 | T-100 | <5000 | <5000 | <5000 | <5000 | <15000 | <5000 | <5000 | <5000 | <5000 | <5000 | <5000 |
| 1204078-03 | 04/17/12 | T-100 | <5000 | <5000 | <5000 | <5000 | <15000 | <5000 | <5000 | <5000 | <5000 | <5000 | <5000 |
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| 1204044-03 | 04/11/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
| 1204039-03 | 04/10/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
| 1204028-03 | 04/09/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
| 1204027-03 | 04/08/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
| 1204026-03 | 04/07/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
| 1204023-03 | 04/06/12 | T-100 | <2500 | <2500 | <2500 | <2500 | <7500 | <2500 | <2500 | <2500 | <2500 | <2500 | <2500 |
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| 1204016-05 | 04/04/12 | T-100 | <1000 | <1000 | <1000 | <1000 | <3000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1204013-05 | 04/03/12 | T-100 | <1000 | <1000 | <1000 | <1000 | <3000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1204003-03 | 04/02/12 | T-100 | <1000 | <1000 | <1000 | <1000 | <3000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1204002-03 | 04/01/12 | T-100 | <1000 | <1000 | <1000 | <1000 | <3000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1204001-03 | 03/31/12 | T-100 | <1000 | <1000 | <1000 | <1000 | <3000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |

# Attachment 13
# Analytical Report for Biotower Exhaust

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



# ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-34695-1
Client Project/Site: Model City Landfill

For:
CWM Chemical Services Inc
1550 Balmer Road
Model City, New York 14107

Attn: Jonathan Rizzo

*Authorized for release by:*
*3/29/2013 12:41:26 PM*
Lisa Shaffer
Project Manager I
lisa.shaffer@testamericainc.com

Designee for

Candace Fox
Project Manager II
candace.fox@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

*The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Sample Summary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 480-34695-1 | AWT-INFLUENT | Air | 03/16/13 11:17 | 03/20/13 10:20 |
| 480-34695-2 | AWT-MIDPOINT | Air | 03/16/13 11:17 | 03/20/13 10:20 |
| 480-34695-3 | AWT-EFFLUENT | Air | 03/16/13 11:17 | 03/20/13 10:20 |

## Qualifiers

### Air - GC/MS VOA

| Qualifier | Qualifier Description |
|---|---|
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

### Air - GC/MS VOA TICs

| Qualifier | Qualifier Description |
|---|---|
| * | LCS or LCSD exceeds the control limits |
| * | RPD of the LCS and LCSD exceeds the control limits |
| J | Indicates an Estimated Value for TICs |
| N | Presumptive evidence of material. |
| T | Result is  a tentatively identified compound (TIC) and an estimated value. |
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

## Job ID: 480-34695-1

### Laboratory: TestAmerica Buffalo

**Narrative**

**Job Narrative**
**480-34695-1**

**Comments**
No additional comments.

**Receipt**
The samples were received on 3/20/2013 10:20 AM; the samples arrived in good condition, properly preserved and, where required, on ice.

**Air - GC/MS VOA**
No analytical or quality issues were noted.

**Organic Prep**
No analytical or quality issues were noted.

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

**Client Sample ID: AWT-INFLUENT**
**Date Collected: 03/16/13 11:17**
**Date Received: 03/20/13 10:20**
**Sample Container: Summa Canister 1L**

**Lab Sample ID: 480-34695-1**
**Matrix: Air**

**Method: TO-15 - Volatile Organic Compounds in Ambient Air**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **1,1,1-Trichloroethane** | **33** | **J** | 56 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **1,1,2,2-Tetrachloroethane** | **57** | **J** | 75 | 19 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 75 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **1,1,2-Trichloroethane** | **100** | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **1,1-Dichloroethane** | **130** | | 56 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,1-Dichloroethene | ND | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,2,4-Trichlorobenzene | ND | | 470 | 130 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,2,4-Trimethylbenzene | ND | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,2-Dibromoethane (EDB) | ND | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,2-Dichlorobenzene | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **1,2-Dichloroethane** | **330** | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,2-Dichloropropane | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,3,5-Trimethylbenzene | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,3-Dichlorobenzene | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 1,4-Dichlorobenzene | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **2-Butanone (MEK)** | **4500** | | 150 | 75 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 2-Hexanone | ND | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| 4-Ethyltoluene | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **4-Methyl-2-pentanone (MIBK)** | **950** | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **Acetone** | **8500** | | 450 | 230 | ppb v/v | | | 03/26/13 18:34 | 376 |
| **Benzene** | **40** | **J** | 75 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Benzyl chloride | ND | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Bromodichloromethane | ND | | 56 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Bromoform | ND | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **Bromomethane** | **38** | **J** | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **Carbon disulfide** | **200** | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Carbon tetrachloride | ND | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **Chlorobenzene** | **20** | **J** | 56 | 19 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Chloroethane | ND | | 280 | 130 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **Chloroform** | **270** | | 56 | 19 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Chloromethane | ND | | 150 | 75 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **cis-1,2-Dichloroethene** | **200** | | 75 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| cis-1,3-Dichloropropene | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Dibromochloromethane | ND | | 75 | 19 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Dichlorodifluoromethane | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Ethylbenzene | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Hexachlorobutadiene | ND | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **m,p-Xylene** | **75** | **J** | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **Methylene chloride** | **13000** | | 150 | 75 | ppb v/v | | | 03/26/13 18:34 | 376 |
| **o-Xylene** | **42** | **J** | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Styrene | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Tetrachloroethene | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **Toluene** | **140** | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| trans-1,2-Dichloroethene | ND | | 75 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| trans-1,3-Dichloropropene | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| **Trichloroethene** | **270** | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Trichlorofluoromethane | ND | | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

**Client Sample ID: AWT-INFLUENT**
**Date Collected: 03/16/13 11:17**
**Date Received: 03/20/13 10:20**
**Sample Container: Summa Canister 1L**

**Lab Sample ID: 480-34695-1**
**Matrix: Air**

### Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl acetate | ND | | 150 | 38 | ppb v/v | | | 03/25/13 15:08 | 188 |
| Vinyl chloride | 63 | J | 75 | 28 | ppb v/v | | | 03/25/13 15:08 | 188 |

| *Tentatively Identified Compound* | *Est. Result* | *Qualifier* | *Unit* | *D* | *RT* | *CAS No.* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|---|---|---|
| *Propene* | *220* | * | *ppb v/v* | | *4.02* | *115-07-1* | | *03/25/13 15:08* | *188* |
| *Tetrahydrofuran* | *1700* | | *ppb v/v* | | *11.28* | *109-99-9* | | *03/25/13 15:08* | *188* |
| *Octane, 4-methyl-* | *570* | *T J N* | *ppb v/v* | | *16.15* | *2216-34-4* | | *03/26/13 18:34* | *376* |
| *Acetamide, N,N-dimethyl-* | *1700* | *T J N* | *ppb v/v* | | *17.58* | *127-19-5* | | *03/26/13 18:34* | *376* |
| *Decane, 3,6-dimethyl-* | *490* | *T J N* | *ppb v/v* | | *19.65* | *17312-53-7* | | *03/26/13 18:34* | *376* |
| *Decane, 3,7-dimethyl-* | *840* | *T J N* | *ppb v/v* | | *20.38* | *17312-54-8* | | *03/26/13 18:34* | *376* |
| *Dodecane* | *350* | *T J N* | *ppb v/v* | | *21.99* | *112-40-3* | | *03/26/13 18:34* | *376* |
| *Tentatively Identified Compound* | *None* | | *ppb v/v* | | | | | *03/25/13 15:08* | *188* |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *83* | | *70 - 130* | | *03/25/13 15:08* | *188* |
| *1,2-Dichloroethane-d4 (Surr)* | *89* | | *70 - 130* | | *03/26/13 18:34* | *376* |
| *4-Bromofluorobenzene (Surr)* | *94* | | *70 - 130* | | *03/25/13 15:08* | *188* |
| *4-Bromofluorobenzene (Surr)* | *104* | | *70 - 130* | | *03/26/13 18:34* | *376* |
| *Toluene-d8 (Surr)* | *96* | | *70 - 130* | | *03/25/13 15:08* | *188* |
| *Toluene-d8 (Surr)* | *95* | | *70 - 130* | | *03/26/13 18:34* | *376* |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

**Client Sample ID: AWT-MIDPOINT**
**Date Collected: 03/16/13 11:17**
**Date Received: 03/20/13 10:20**
**Sample Container: Summa Canister 1L**

**Lab Sample ID: 480-34695-2**
**Matrix: Air**

**Method: TO-15 - Volatile Organic Compounds in Ambient Air**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | 0.40 | 0.10 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,1,2-Trichloroethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **1,1-Dichloroethane** | **0.16** | **J** | 0.30 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,1-Dichloroethene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,2,4-Trichlorobenzene | ND | | 2.5 | 0.70 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,2,4-Trimethylbenzene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,2-Dibromoethane (EDB) | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,2-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **1,2-Dichloroethane** | **0.34** | **J** | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,2-Dichloropropane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,3,5-Trimethylbenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,3-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 1,4-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **2-Butanone (MEK)** | **7.4** | | 0.80 | 0.40 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 2-Hexanone | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| 4-Ethyltoluene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **4-Methyl-2-pentanone (MIBK)** | **0.57** | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Acetone** | **32** | | 1.2 | 0.60 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Benzene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Benzyl chloride | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Bromodichloromethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Bromoform | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Bromomethane | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Carbon disulfide** | **0.45** | **J** | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Carbon tetrachloride | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Chlorobenzene | ND | | 0.30 | 0.10 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Chloroethane | ND | | 1.5 | 0.70 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Chloroform** | **0.33** | | 0.30 | 0.10 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Chloromethane** | **1.2** | | 0.80 | 0.40 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **cis-1,2-Dichloroethene** | **0.35** | **J** | 0.40 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| cis-1,3-Dichloropropene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Dibromochloromethane | ND | | 0.40 | 0.10 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Dichlorodifluoromethane** | **0.50** | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Ethylbenzene** | **0.16** | **J** | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Hexachlorobutadiene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **m,p-Xylene** | **0.66** | **J** | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Methylene chloride** | **15** | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **o-Xylene** | **0.22** | **J** | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Styrene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| Tetrachloroethene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Toluene** | **0.42** | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| trans-1,2-Dichloroethene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| trans-1,3-Dichloropropene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Trichloroethene** | **0.31** | **J** | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Trichlorofluoromethane** | **0.22** | **J** | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

**Client Sample ID: AWT-MIDPOINT**
**Date Collected: 03/16/13 11:17**
**Date Received: 03/20/13 10:20**
**Sample Container: Summa Canister 1L**

**Lab Sample ID: 480-34695-2**
**Matrix: Air**

**Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl acetate | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 04:12 | 1 |
| **Vinyl chloride** | **0.15** | **J** | 0.40 | 0.15 | ppb v/v | | | 03/25/13 04:12 | 1 |

| *Tentatively Identified Compound* | *Est. Result* | *Qualifier* | *Unit* | *D* | *RT* | *CAS No.* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|---|---|---|
| *Propene* | *6.1* | * | *ppb v/v* | | *4.02* | *115-07-1* | | *03/25/13 04:12* | *1* |
| *Chlorodifluoromethane* | *0.67* | *J* | *ppb v/v* | | *4.04* | *75-45-6* | | *03/25/13 04:12* | *1* |
| *Butane* | *1.5* | | *ppb v/v* | | *4.75* | *106-97-8* | | *03/25/13 04:12* | *1* |
| *Acetaldehyde* | *7.6* | *T J N* | *ppb v/v* | | *4.98* | *75-7-0* | | *03/25/13 04:12* | *1* |
| *Acrolein* | *2.0* | *J* | *ppb v/v* | | *7.20* | *107-02-8* | | *03/25/13 04:12* | *1* |
| *Tetrahydrofuran* | *1.3* | *J* | *ppb v/v* | | *11.28* | *109-99-9* | | *03/25/13 04:12* | *1* |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *97* | | *70 - 130* | | *03/25/13 04:12* | *1* |
| *4-Bromofluorobenzene (Surr)* | *92* | | *70 - 130* | | *03/25/13 04:12* | *1* |
| *Toluene-d8 (Surr)* | *97* | | *70 - 130* | | *03/25/13 04:12* | *1* |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

**Client Sample ID: AWT-EFFLUENT**
**Date Collected: 03/16/13 11:17**
**Date Received: 03/20/13 10:20**
**Sample Container: Summa Canister 1L**

**Lab Sample ID: 480-34695-3**
**Matrix: Air**

**Method: TO-15 - Volatile Organic Compounds in Ambient Air**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | 0.40 | 0.10 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,1,2-Trichloroethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,1-Dichloroethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,1-Dichloroethene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,2,4-Trichlorobenzene | ND | | 2.5 | 0.70 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,2,4-Trimethylbenzene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,2-Dibromoethane (EDB) | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,2-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,2-Dichloroethane | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,2-Dichloropropane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,3,5-Trimethylbenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,3-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 1,4-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 2-Butanone (MEK) | ND | | 0.80 | 0.40 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 2-Hexanone | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 4-Ethyltoluene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| **Acetone** | **1.9** | | 1.2 | 0.60 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Benzene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Benzyl chloride | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Bromodichloromethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Bromoform | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Bromomethane | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| **Carbon disulfide** | **0.31** | **J** | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Carbon tetrachloride | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Chlorobenzene | ND | | 0.30 | 0.10 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Chloroethane | ND | | 1.5 | 0.70 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Chloroform | ND | | 0.30 | 0.10 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Chloromethane | ND | | 0.80 | 0.40 | ppb v/v | | | 03/25/13 05:01 | 1 |
| cis-1,2-Dichloroethene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| cis-1,3-Dichloropropene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Dibromochloromethane | ND | | 0.40 | 0.10 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Dichlorodifluoromethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Ethylbenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Hexachlorobutadiene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| m,p-Xylene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| **Methylene chloride** | **0.27** | **J** | 0.40 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| o-Xylene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Styrene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Tetrachloroethene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Toluene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| trans-1,2-Dichloroethene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| trans-1,3-Dichloropropene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Trichloroethene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Trichlorofluoromethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

**Client Sample ID: AWT-EFFLUENT**
**Date Collected: 03/16/13 11:17**
**Date Received: 03/20/13 10:20**
**Sample Container: Summa Canister 1L**

**Lab Sample ID: 480-34695-3**
**Matrix: Air**

**Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl acetate | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 05:01 | 1 |
| Vinyl chloride | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 05:01 | 1 |

| *Tentatively Identified Compound* | *Est. Result* | *Qualifier* | *Unit* | *D* | *RT* | *CAS No.* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|---|---|---|
| *Propene* | *1.2* | * | *ppb v/v* | | *4.02* | *115-07-1* | | *03/25/13 05:01* | *1* |
| *Butane* | *1.2* | | *ppb v/v* | | *4.97* | *106-97-8* | | *03/25/13 05:01* | *1* |
| *Cyclotetrasiloxane, octamethyl-* | *3.8* | *T J N* | *ppb v/v* | | *17.93* | *556-67-2* | | *03/25/13 05:01* | *1* |
| *Benzeneethanamine, N-[(pentafluorophenyl* | *1.4* | *T J N* | *ppb v/v* | | *20.37* | *55429-85-1* | | *03/25/13 05:01* | *1* |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *94* | | *70 - 130* | | *03/25/13 05:01* | *1* |
| *4-Bromofluorobenzene (Surr)* | *105* | | *70 - 130* | | *03/25/13 05:01* | *1* |
| *Toluene-d8 (Surr)* | *93* | | *70 - 130* | | *03/25/13 05:01* | *1* |

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

## Method: TO-15 - Volatile Organic Compounds in Ambient Air

**Lab Sample ID: MB 340-4388/5**
**Matrix: Air**
**Analysis Batch: 4388**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | 0.40 | 0.10 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 0.40 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,1,2-Trichloroethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,1-Dichloroethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,1-Dichloroethene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,2,4-Trichlorobenzene | ND | | 2.5 | 0.70 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,2,4-Trimethylbenzene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,2-Dibromoethane (EDB) | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,2-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,2-Dichloroethane | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,2-Dichloropropane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,3,5-Trimethylbenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,3-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 1,4-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 2-Butanone (MEK) | ND | | 0.80 | 0.40 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 2-Hexanone | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 4-Ethyltoluene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Acetone | ND | | 1.2 | 0.60 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Benzene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Benzyl chloride | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Bromodichloromethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Bromoform | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Bromomethane | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Carbon disulfide | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Carbon tetrachloride | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Chlorobenzene | ND | | 0.30 | 0.10 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Chloroethane | ND | | 1.5 | 0.70 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Chloroform | ND | | 0.30 | 0.10 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Chloromethane | ND | | 0.80 | 0.40 | ppb v/v | | | 03/24/13 12:49 | 1 |
| cis-1,2-Dichloroethene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| cis-1,3-Dichloropropene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Dibromochloromethane | ND | | 0.40 | 0.10 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Dichlorodifluoromethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Ethylbenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Hexachlorobutadiene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| m,p-Xylene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Methylene chloride | ND | | 0.40 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| o-Xylene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Styrene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Tetrachloroethene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Toluene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| trans-1,2-Dichloroethene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| trans-1,3-Dichloropropene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Trichloroethene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Trichlorofluoromethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: MB 340-4388/5**
**Matrix: Air**
**Analysis Batch: 4388**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl acetate | ND | | 0.80 | 0.20 | ppb v/v | | | 03/24/13 12:49 | 1 |
| Vinyl chloride | ND | | 0.40 | 0.15 | ppb v/v | | | 03/24/13 12:49 | 1 |

| *Tentatively Identified Compound* | *MB Est. Result* | *MB Qualifier* | *Unit* | *D* | *RT* | *CAS No.* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|---|---|---|
| *1,2,3-Trichlorobenzene* | *0.235* | *J* | *ppb v/v* | | *24.55* | *87-61-6* | | *03/24/13 12:49* | *1* |
| *Tentatively Identified Compound* | *None* | | *ppb v/v* | | | | | *03/24/13 12:49* | *1* |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *93* | | *70 - 130* | | *03/24/13 12:49* | *1* |
| *4-Bromofluorobenzene (Surr)* | *89* | | *70 - 130* | | *03/24/13 12:49* | *1* |
| *Toluene-d8 (Surr)* | *91* | | *70 - 130* | | *03/24/13 12:49* | *1* |

**Lab Sample ID: LCS 340-4388/3**
**Matrix: Air**
**Analysis Batch: 4388**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 10.0 | 9.85 | | ppb v/v | | 99 | 70 - 130 |
| 1,1,2,2-Tetrachloroethane | 11.0 | 11.6 | | ppb v/v | | 105 | 70 - 130 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 10.0 | 8.92 | | ppb v/v | | 89 | 70 - 130 |
| 1,1,2-Trichloroethane | 10.9 | 10.5 | | ppb v/v | | 96 | 70 - 130 |
| 1,1-Dichloroethane | 10.0 | 9.66 | | ppb v/v | | 97 | 70 - 130 |
| 1,1-Dichloroethene | 10.0 | 9.25 | | ppb v/v | | 93 | 70 - 130 |
| 1,2,4-Trichlorobenzene | 11.0 | 12.1 | | ppb v/v | | 110 | 70 - 130 |
| 1,2,4-Trimethylbenzene | 10.8 | 11.6 | | ppb v/v | | 108 | 70 - 130 |
| 1,2-Dibromoethane (EDB) | 10.8 | 10.9 | | ppb v/v | | 101 | 70 - 130 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 10.0 | 11.9 | | ppb v/v | | 119 | 70 - 130 |
| 1,2-Dichlorobenzene | 10.9 | 11.5 | | ppb v/v | | 106 | 70 - 130 |
| 1,2-Dichloroethane | 10.8 | 11.7 | | ppb v/v | | 108 | 70 - 130 |
| 1,2-Dichloropropane | 10.8 | 11.3 | | ppb v/v | | 105 | 70 - 130 |
| 1,3,5-Trimethylbenzene | 11.0 | 11.5 | | ppb v/v | | 104 | 70 - 130 |
| 1,3-Dichlorobenzene | 11.0 | 11.6 | | ppb v/v | | 106 | 70 - 130 |
| 1,4-Dichlorobenzene | 10.9 | 11.8 | | ppb v/v | | 109 | 70 - 130 |
| 2-Butanone (MEK) | 10.8 | 10.2 | | ppb v/v | | 95 | 70 - 130 |
| 2-Hexanone | 11.0 | 11.5 | | ppb v/v | | 105 | 70 - 130 |
| 4-Ethyltoluene | 10.8 | 11.5 | | ppb v/v | | 106 | 70 - 130 |
| 4-Methyl-2-pentanone (MIBK) | 10.8 | 13.1 | | ppb v/v | | 122 | 70 - 130 |
| Acetone | 10.0 | 8.71 | | ppb v/v | | 87 | 70 - 130 |
| Benzene | 10.6 | 10.9 | | ppb v/v | | 103 | 70 - 130 |
| Benzyl chloride | 11.0 | 12.6 | | ppb v/v | | 114 | 70 - 130 |
| Bromodichloromethane | 10.9 | 12.5 | | ppb v/v | | 114 | 70 - 130 |
| Bromoform | 10.8 | 11.7 | | ppb v/v | | 109 | 70 - 130 |
| Bromomethane | 10.0 | 10.6 | | ppb v/v | | 106 | 70 - 130 |
| Carbon disulfide | 10.0 | 10.1 | | ppb v/v | | 101 | 70 - 130 |
| Carbon tetrachloride | 10.8 | 11.7 | | ppb v/v | | 109 | 70 - 130 |
| Chlorobenzene | 11.0 | 10.3 | | ppb v/v | | 94 | 70 - 130 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: LCS 340-4388/3**
**Matrix: Air**
**Analysis Batch: 4388**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | | | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloroethane | | | 10.0 | 11.1 | | ppb v/v | | 111 | 70 - 130 | | |
| Chloroform | | | 10.0 | 9.73 | | ppb v/v | | 97 | 70 - 130 | | |
| Chloromethane | | | 10.0 | 11.3 | | ppb v/v | | 113 | 70 - 130 | | |
| cis-1,2-Dichloroethene | | | 10.6 | 10.5 | | ppb v/v | | 99 | 70 - 130 | | |
| cis-1,3-Dichloropropene | | | 10.0 | 12.6 | | ppb v/v | | 126 | 70 - 130 | | |
| Dibromochloromethane | | | 11.0 | 11.5 | | ppb v/v | | 104 | 70 - 130 | | |
| Dichlorodifluoromethane | | | 10.0 | 11.2 | | ppb v/v | | 112 | 70 - 130 | | |
| Ethylbenzene | | | 10.9 | 11.2 | | ppb v/v | | 103 | 70 - 130 | | |
| Hexachlorobutadiene | | | 11.0 | 11.4 | | ppb v/v | | 103 | 70 - 130 | | |
| m,p-Xylene | | | 21.6 | 21.9 | | ppb v/v | | 101 | 70 - 130 | | |
| Methylene chloride | | | 11.0 | 10.4 | | ppb v/v | | 94 | 70 - 130 | | |
| o-Xylene | | | 11.0 | 11.7 | | ppb v/v | | 107 | 70 - 130 | | |
| Styrene | | | 11.0 | 12.0 | | ppb v/v | | 109 | 70 - 130 | | |
| Tetrachloroethene | | | 10.0 | 9.37 | | ppb v/v | | 94 | 70 - 130 | | |
| Toluene | | | 10.9 | 11.9 | | ppb v/v | | 109 | 70 - 130 | | |
| trans-1,2-Dichloroethene | | | 10.0 | 9.80 | | ppb v/v | | 98 | 70 - 130 | | |
| trans-1,3-Dichloropropene | | | 11.0 | 11.1 | | ppb v/v | | 101 | 70 - 130 | | |
| Trichloroethene | | | 10.9 | 12.0 | | ppb v/v | | 110 | 70 - 130 | | |
| Trichlorofluoromethane | | | 10.0 | 9.77 | | ppb v/v | | 98 | 70 - 130 | | |
| Vinyl acetate | | | 11.0 | 12.3 | | ppb v/v | | 112 | 70 - 130 | | |
| Vinyl chloride | | | 10.0 | 11.5 | | ppb v/v | | 115 | 70 - 130 | | |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *106* | | *70 - 130* |
| *4-Bromofluorobenzene (Surr)* | *102* | | *70 - 130* |
| *Toluene-d8 (Surr)* | *112* | | *70 - 130* |

**Lab Sample ID: LCSD 340-4388/4**
**Matrix: Air**
**Analysis Batch: 4388**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**

| Analyte | | | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | | | 10.0 | 9.53 | | ppb v/v | | 95 | 70 - 130 | 3 | 25 |
| 1,1,2,2-Tetrachloroethane | | | 11.0 | 11.6 | | ppb v/v | | 106 | 70 - 130 | 0 | 25 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | | | 10.0 | 8.56 | | ppb v/v | | 86 | 70 - 130 | 4 | 25 |
| 1,1,2-Trichloroethane | | | 10.9 | 10.7 | | ppb v/v | | 98 | 70 - 130 | 2 | 25 |
| 1,1-Dichloroethane | | | 10.0 | 9.39 | | ppb v/v | | 94 | 70 - 130 | 3 | 25 |
| 1,1-Dichloroethene | | | 10.0 | 9.00 | | ppb v/v | | 90 | 70 - 130 | 3 | 25 |
| 1,2,4-Trichlorobenzene | | | 11.0 | 12.0 | | ppb v/v | | 109 | 70 - 130 | 1 | 25 |
| 1,2,4-Trimethylbenzene | | | 10.8 | 11.7 | | ppb v/v | | 108 | 70 - 130 | 1 | 25 |
| 1,2-Dibromoethane (EDB) | | | 10.8 | 11.2 | | ppb v/v | | 104 | 70 - 130 | 3 | 25 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | | | 10.0 | 10.7 | | ppb v/v | | 107 | 70 - 130 | 11 | 25 |
| 1,2-Dichlorobenzene | | | 10.9 | 11.7 | | ppb v/v | | 107 | 70 - 130 | 1 | 25 |
| 1,2-Dichloroethane | | | 10.8 | 11.5 | | ppb v/v | | 107 | 70 - 130 | 1 | 25 |
| 1,2-Dichloropropane | | | 10.8 | 11.6 | | ppb v/v | | 107 | 70 - 130 | 2 | 25 |
| 1,3,5-Trimethylbenzene | | | 11.0 | 11.8 | | ppb v/v | | 107 | 70 - 130 | 2 | 25 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: LCSD 340-4388/4**
**Matrix: Air**
**Analysis Batch: 4388**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| 1,3-Dichlorobenzene | 11.0 | 11.8 | | ppb v/v | | 107 | 70 - 130 | 1 | 25 |
| 1,4-Dichlorobenzene | 10.9 | 12.1 | | ppb v/v | | 111 | 70 - 130 | 2 | 25 |
| 2-Butanone (MEK) | 10.8 | 10.2 | | ppb v/v | | 95 | 70 - 130 | 0 | 25 |
| 2-Hexanone | 11.0 | 11.4 | | ppb v/v | | 104 | 70 - 130 | 1 | 25 |
| 4-Ethyltoluene | 10.8 | 11.6 | | ppb v/v | | 108 | 70 - 130 | 1 | 25 |
| 4-Methyl-2-pentanone (MIBK) | 10.8 | 12.9 | | ppb v/v | | 120 | 70 - 130 | 2 | 25 |
| Acetone | 10.0 | 8.46 | | ppb v/v | | 85 | 70 - 130 | 3 | 25 |
| Benzene | 10.6 | 10.9 | | ppb v/v | | 103 | 70 - 130 | 0 | 25 |
| Benzyl chloride | 11.0 | 12.6 | | ppb v/v | | 115 | 70 - 130 | 0 | 25 |
| Bromodichloromethane | 10.9 | 12.1 | | ppb v/v | | 111 | 70 - 130 | 3 | 25 |
| Bromoform | 10.8 | 11.9 | | ppb v/v | | 111 | 70 - 130 | 2 | 25 |
| Bromomethane | 10.0 | 9.64 | | ppb v/v | | 96 | 70 - 130 | 10 | 25 |
| Carbon disulfide | 10.0 | 9.83 | | ppb v/v | | 98 | 70 - 130 | 3 | 25 |
| Carbon tetrachloride | 10.8 | 11.3 | | ppb v/v | | 105 | 70 - 130 | 4 | 25 |
| Chlorobenzene | 11.0 | 10.4 | | ppb v/v | | 95 | 70 - 130 | 1 | 25 |
| Chloroethane | 10.0 | 9.82 | | ppb v/v | | 98 | 70 - 130 | 12 | 25 |
| Chloroform | 10.0 | 9.41 | | ppb v/v | | 94 | 70 - 130 | 3 | 25 |
| Chloromethane | 10.0 | 10.5 | | ppb v/v | | 105 | 70 - 130 | 8 | 25 |
| cis-1,2-Dichloroethene | 10.6 | 10.2 | | ppb v/v | | 96 | 70 - 130 | 3 | 25 |
| cis-1,3-Dichloropropene | 10.0 | 12.2 | | ppb v/v | | 122 | 70 - 130 | 3 | 25 |
| Dibromochloromethane | 11.0 | 11.8 | | ppb v/v | | 107 | 70 - 130 | 3 | 25 |
| Dichlorodifluoromethane | 10.0 | 9.90 | | ppb v/v | | 99 | 70 - 130 | 12 | 25 |
| Ethylbenzene | 10.9 | 11.5 | | ppb v/v | | 105 | 70 - 130 | 2 | 25 |
| Hexachlorobutadiene | 11.0 | 11.3 | | ppb v/v | | 103 | 70 - 130 | 1 | 25 |
| m,p-Xylene | 21.6 | 22.6 | | ppb v/v | | 104 | 70 - 130 | 3 | 25 |
| Methylene chloride | 11.0 | 10.1 | | ppb v/v | | 92 | 70 - 130 | 3 | 25 |
| o-Xylene | 11.0 | 11.9 | | ppb v/v | | 108 | 70 - 130 | 2 | 25 |
| Styrene | 11.0 | 12.2 | | ppb v/v | | 111 | 70 - 130 | 2 | 25 |
| Tetrachloroethene | 10.0 | 9.68 | | ppb v/v | | 97 | 70 - 130 | 3 | 25 |
| Toluene | 10.9 | 11.7 | | ppb v/v | | 107 | 70 - 130 | 1 | 25 |
| trans-1,2-Dichloroethene | 10.0 | 9.55 | | ppb v/v | | 96 | 70 - 130 | 3 | 25 |
| trans-1,3-Dichloropropene | 11.0 | 11.3 | | ppb v/v | | 103 | 70 - 130 | 2 | 25 |
| Trichloroethene | 10.9 | 11.8 | | ppb v/v | | 108 | 70 - 130 | 2 | 25 |
| Trichlorofluoromethane | 10.0 | 9.26 | | ppb v/v | | 93 | 70 - 130 | 5 | 25 |
| Vinyl acetate | 11.0 | 12.0 | | ppb v/v | | 109 | 70 - 130 | 2 | 25 |
| Vinyl chloride | 10.0 | 10.6 | | ppb v/v | | 106 | 70 - 130 | 8 | 25 |

| *Surrogate* | *LCSD %Recovery* | *LCSD Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *99* | | *70 - 130* |
| *4-Bromofluorobenzene (Surr)* | *104* | | *70 - 130* |
| *Toluene-d8 (Surr)* | *106* | | *70 - 130* |

**Lab Sample ID: MB 340-4392/5**
**Matrix: Air**
**Analysis Batch: 4392**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: MB 340-4392/5**
**Matrix: Air**
**Analysis Batch: 4392**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,2,2-Tetrachloroethane | ND | | 0.40 | 0.10 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,1,2-Trichloroethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,1-Dichloroethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,1-Dichloroethene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,2,4-Trichlorobenzene | ND | | 2.5 | 0.70 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,2,4-Trimethylbenzene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,2-Dibromoethane (EDB) | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,2-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,2-Dichloroethane | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,2-Dichloropropane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,3,5-Trimethylbenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,3-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 1,4-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 2-Butanone (MEK) | ND | | 0.80 | 0.40 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 2-Hexanone | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 4-Ethyltoluene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Acetone | ND | | 1.2 | 0.60 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Benzene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Benzyl chloride | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Bromodichloromethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Bromoform | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Bromomethane | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Carbon disulfide | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Carbon tetrachloride | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Chlorobenzene | ND | | 0.30 | 0.10 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Chloroethane | ND | | 1.5 | 0.70 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Chloroform | ND | | 0.30 | 0.10 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Chloromethane | ND | | 0.80 | 0.40 | ppb v/v | | | 03/25/13 12:46 | 1 |
| cis-1,2-Dichloroethene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| cis-1,3-Dichloropropene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Dibromochloromethane | ND | | 0.40 | 0.10 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Dichlorodifluoromethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Ethylbenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Hexachlorobutadiene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| m,p-Xylene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Methylene chloride | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| o-Xylene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Styrene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Tetrachloroethene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Toluene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| trans-1,2-Dichloroethene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |
| trans-1,3-Dichloropropene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Trichloroethene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Trichlorofluoromethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |
| Vinyl acetate | ND | | 0.80 | 0.20 | ppb v/v | | | 03/25/13 12:46 | 1 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: MB 340-4392/5**
**Matrix: Air**
**Analysis Batch: 4392**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Vinyl chloride | ND | | 0.40 | 0.15 | ppb v/v | | | 03/25/13 12:46 | 1 |

| *Tentatively Identified Compound* | *MB Est. Result* | *MB Qualifier* | *Unit* | *D* | *RT* | *CAS No.* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|---|---|---|
| *1,2,3-Trichlorobenzene* | *0.246* | *J* | *ppb v/v* | | *24.55* | *87-61-6* | | *03/25/13 12:46* | *1* |
| *Tentatively Identified Compound* | *None* | | *ppb v/v* | | | | | *03/25/13 12:46* | *1* |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *87* | | *70 - 130* | | *03/25/13 12:46* | *1* |
| *4-Bromofluorobenzene (Surr)* | *91* | | *70 - 130* | | *03/25/13 12:46* | *1* |
| *Toluene-d8 (Surr)* | *93* | | *70 - 130* | | *03/25/13 12:46* | *1* |

**Lab Sample ID: LCS 340-4392/3**
**Matrix: Air**
**Analysis Batch: 4392**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 10.0 | 9.36 | | ppb v/v | | 94 | 70 - 130 |
| 1,1,2,2-Tetrachloroethane | 11.0 | 11.3 | | ppb v/v | | 103 | 70 - 130 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 10.0 | 8.74 | | ppb v/v | | 87 | 70 - 130 |
| 1,1,2-Trichloroethane | 10.9 | 10.5 | | ppb v/v | | 97 | 70 - 130 |
| 1,1-Dichloroethane | 10.0 | 9.27 | | ppb v/v | | 93 | 70 - 130 |
| 1,1-Dichloroethene | 10.0 | 9.18 | | ppb v/v | | 92 | 70 - 130 |
| 1,2,4-Trichlorobenzene | 11.0 | 12.0 | | ppb v/v | | 109 | 70 - 130 |
| 1,2,4-Trimethylbenzene | 10.8 | 11.0 | | ppb v/v | | 102 | 70 - 130 |
| 1,2-Dibromoethane (EDB) | 10.8 | 11.1 | | ppb v/v | | 103 | 70 - 130 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 10.0 | 9.64 | | ppb v/v | | 96 | 70 - 130 |
| 1,2-Dichlorobenzene | 10.9 | 10.9 | | ppb v/v | | 100 | 70 - 130 |
| 1,2-Dichloroethane | 10.8 | 10.9 | | ppb v/v | | 100 | 70 - 130 |
| 1,2-Dichloropropane | 10.8 | 11.3 | | ppb v/v | | 105 | 70 - 130 |
| 1,3,5-Trimethylbenzene | 11.0 | 10.9 | | ppb v/v | | 99 | 70 - 130 |
| 1,3-Dichlorobenzene | 11.0 | 10.9 | | ppb v/v | | 99 | 70 - 130 |
| 1,4-Dichlorobenzene | 10.9 | 11.3 | | ppb v/v | | 104 | 70 - 130 |
| 2-Butanone (MEK) | 10.8 | 10.1 | | ppb v/v | | 94 | 70 - 130 |
| 2-Hexanone | 11.0 | 12.0 | | ppb v/v | | 109 | 70 - 130 |
| 4-Ethyltoluene | 10.8 | 11.4 | | ppb v/v | | 106 | 70 - 130 |
| 4-Methyl-2-pentanone (MIBK) | 10.8 | 12.6 | | ppb v/v | | 116 | 70 - 130 |
| Acetone | 10.0 | 8.45 | | ppb v/v | | 84 | 70 - 130 |
| Benzene | 10.6 | 10.7 | | ppb v/v | | 100 | 70 - 130 |
| Benzyl chloride | 11.0 | 11.9 | | ppb v/v | | 108 | 70 - 130 |
| Bromodichloromethane | 10.9 | 11.5 | | ppb v/v | | 106 | 70 - 130 |
| Bromoform | 10.8 | 11.6 | | ppb v/v | | 107 | 70 - 130 |
| Bromomethane | 10.0 | 9.77 | | ppb v/v | | 98 | 70 - 130 |
| Carbon disulfide | 10.0 | 10.2 | | ppb v/v | | 102 | 70 - 130 |
| Carbon tetrachloride | 10.8 | 10.7 | | ppb v/v | | 99 | 70 - 130 |
| Chlorobenzene | 11.0 | 10.3 | | ppb v/v | | 94 | 70 - 130 |
| Chloroethane | 10.0 | 10.1 | | ppb v/v | | 101 | 70 - 130 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: LCS 340-4392/3**
**Matrix: Air**
**Analysis Batch: 4392**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Chloroform | 10.0 | 9.35 | | ppb v/v | | 93 | 70 - 130 |
| Chloromethane | 10.0 | 9.08 | | ppb v/v | | 91 | 70 - 130 |
| cis-1,2-Dichloroethene | 10.6 | 10.3 | | ppb v/v | | 97 | 70 - 130 |
| cis-1,3-Dichloropropene | 10.0 | 12.1 | | ppb v/v | | 121 | 70 - 130 |
| Dibromochloromethane | 11.0 | 11.5 | | ppb v/v | | 105 | 70 - 130 |
| Dichlorodifluoromethane | 10.0 | 9.39 | | ppb v/v | | 94 | 70 - 130 |
| Ethylbenzene | 10.9 | 11.1 | | ppb v/v | | 102 | 70 - 130 |
| Hexachlorobutadiene | 11.0 | 10.7 | | ppb v/v | | 97 | 70 - 130 |
| m,p-Xylene | 21.6 | 21.9 | | ppb v/v | | 102 | 70 - 130 |
| Methylene chloride | 11.0 | 10.1 | | ppb v/v | | 92 | 70 - 130 |
| o-Xylene | 11.0 | 11.8 | | ppb v/v | | 107 | 70 - 130 |
| Styrene | 11.0 | 12.0 | | ppb v/v | | 109 | 70 - 130 |
| Tetrachloroethene | 10.0 | 9.84 | | ppb v/v | | 98 | 70 - 130 |
| Toluene | 10.9 | 11.2 | | ppb v/v | | 103 | 70 - 130 |
| trans-1,2-Dichloroethene | 10.0 | 9.77 | | ppb v/v | | 98 | 70 - 130 |
| trans-1,3-Dichloropropene | 11.0 | 11.0 | | ppb v/v | | 100 | 70 - 130 |
| Trichloroethene | 10.9 | 11.6 | | ppb v/v | | 106 | 70 - 130 |
| Trichlorofluoromethane | 10.0 | 8.89 | | ppb v/v | | 89 | 70 - 130 |
| Vinyl acetate | 11.0 | 12.0 | | ppb v/v | | 109 | 70 - 130 |
| Vinyl chloride | 10.0 | 9.17 | | ppb v/v | | 92 | 70 - 130 |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *95* | | *70 - 130* |
| *4-Bromofluorobenzene (Surr)* | *101* | | *70 - 130* |
| *Toluene-d8 (Surr)* | *105* | | *70 - 130* |

**Lab Sample ID: LCSD 340-4392/4**
**Matrix: Air**
**Analysis Batch: 4392**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 10.0 | 8.79 | | ppb v/v | | 88 | 70 - 130 | 6 | 25 |
| 1,1,2,2-Tetrachloroethane | 11.0 | 11.0 | | ppb v/v | | 100 | 70 - 130 | 3 | 25 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 10.0 | 8.05 | | ppb v/v | | 80 | 70 - 130 | 8 | 25 |
| 1,1,2-Trichloroethane | 10.9 | 10.2 | | ppb v/v | | 93 | 70 - 130 | 4 | 25 |
| 1,1-Dichloroethane | 10.0 | 9.05 | | ppb v/v | | 91 | 70 - 130 | 2 | 25 |
| 1,1-Dichloroethene | 10.0 | 8.83 | | ppb v/v | | 88 | 70 - 130 | 4 | 25 |
| 1,2,4-Trichlorobenzene | 11.0 | 11.1 | | ppb v/v | | 101 | 70 - 130 | 7 | 25 |
| 1,2,4-Trimethylbenzene | 10.8 | 10.5 | | ppb v/v | | 97 | 70 - 130 | 5 | 25 |
| 1,2-Dibromoethane (EDB) | 10.8 | 10.8 | | ppb v/v | | 100 | 70 - 130 | 3 | 25 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 10.0 | 8.78 | | ppb v/v | | 88 | 70 - 130 | 9 | 25 |
| 1,2-Dichlorobenzene | 10.9 | 10.2 | | ppb v/v | | 94 | 70 - 130 | 6 | 25 |
| 1,2-Dichloroethane | 10.8 | 9.96 | | ppb v/v | | 92 | 70 - 130 | 9 | 25 |
| 1,2-Dichloropropane | 10.8 | 10.8 | | ppb v/v | | 100 | 70 - 130 | 5 | 25 |
| 1,3,5-Trimethylbenzene | 11.0 | 10.5 | | ppb v/v | | 95 | 70 - 130 | 4 | 25 |
| 1,3-Dichlorobenzene | 11.0 | 10.5 | | ppb v/v | | 95 | 70 - 130 | 4 | 25 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: LCSD 340-4392/4**
**Matrix: Air**
**Analysis Batch: 4392**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**

| Analyte | | | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,4-Dichlorobenzene | | | 10.9 | 10.7 | | ppb v/v | | 98 | 70 - 130 | 5 | 25 |
| 2-Butanone (MEK) | | | 10.8 | 10.4 | | ppb v/v | | 96 | 70 - 130 | 2 | 25 |
| 2-Hexanone | | | 11.0 | 11.6 | | ppb v/v | | 106 | 70 - 130 | 3 | 25 |
| 4-Ethyltoluene | | | 10.8 | 10.9 | | ppb v/v | | 101 | 70 - 130 | 5 | 25 |
| 4-Methyl-2-pentanone (MIBK) | | | 10.8 | 11.9 | | ppb v/v | | 111 | 70 - 130 | 5 | 25 |
| Acetone | | | 10.0 | 8.12 | | ppb v/v | | 81 | 70 - 130 | 4 | 25 |
| Benzene | | | 10.6 | 10.1 | | ppb v/v | | 95 | 70 - 130 | 5 | 25 |
| Benzyl chloride | | | 11.0 | 11.4 | | ppb v/v | | 104 | 70 - 130 | 4 | 25 |
| Bromodichloromethane | | | 10.9 | 10.5 | | ppb v/v | | 96 | 70 - 130 | 9 | 25 |
| Bromoform | | | 10.8 | 11.1 | | ppb v/v | | 103 | 70 - 130 | 4 | 25 |
| Bromomethane | | | 10.0 | 9.23 | | ppb v/v | | 92 | 70 - 130 | 6 | 25 |
| Carbon disulfide | | | 10.0 | 9.83 | | ppb v/v | | 98 | 70 - 130 | 3 | 25 |
| Carbon tetrachloride | | | 10.8 | 9.51 | | ppb v/v | | 88 | 70 - 130 | 12 | 25 |
| Chlorobenzene | | | 11.0 | 10.4 | | ppb v/v | | 95 | 70 - 130 | 1 | 25 |
| Chloroethane | | | 10.0 | 9.66 | | ppb v/v | | 97 | 70 - 130 | 4 | 25 |
| Chloroform | | | 10.0 | 8.80 | | ppb v/v | | 88 | 70 - 130 | 6 | 25 |
| Chloromethane | | | 10.0 | 7.23 | | ppb v/v | | 72 | 70 - 130 | 23 | 25 |
| cis-1,2-Dichloroethene | | | 10.6 | 10.0 | | ppb v/v | | 95 | 70 - 130 | 3 | 25 |
| cis-1,3-Dichloropropene | | | 10.0 | 11.3 | | ppb v/v | | 113 | 70 - 130 | 7 | 25 |
| Dibromochloromethane | | | 11.0 | 11.0 | | ppb v/v | | 100 | 70 - 130 | 5 | 25 |
| Dichlorodifluoromethane | | | 10.0 | 8.30 | | ppb v/v | | 83 | 70 - 130 | 12 | 25 |
| Ethylbenzene | | | 10.9 | 10.9 | | ppb v/v | | 100 | 70 - 130 | 2 | 25 |
| Hexachlorobutadiene | | | 11.0 | 9.92 | | ppb v/v | | 90 | 70 - 130 | 7 | 25 |
| m,p-Xylene | | | 21.6 | 21.3 | | ppb v/v | | 98 | 70 - 130 | 3 | 25 |
| Methylene chloride | | | 11.0 | 9.63 | | ppb v/v | | 88 | 70 - 130 | 4 | 25 |
| o-Xylene | | | 11.0 | 11.3 | | ppb v/v | | 103 | 70 - 130 | 4 | 25 |
| Styrene | | | 11.0 | 11.7 | | ppb v/v | | 106 | 70 - 130 | 3 | 25 |
| Tetrachloroethene | | | 10.0 | 9.46 | | ppb v/v | | 95 | 70 - 130 | 4 | 25 |
| Toluene | | | 10.9 | 10.4 | | ppb v/v | | 96 | 70 - 130 | 7 | 25 |
| trans-1,2-Dichloroethene | | | 10.0 | 9.42 | | ppb v/v | | 94 | 70 - 130 | 4 | 25 |
| trans-1,3-Dichloropropene | | | 11.0 | 10.7 | | ppb v/v | | 97 | 70 - 130 | 3 | 25 |
| Trichloroethene | | | 10.9 | 10.9 | | ppb v/v | | 100 | 70 - 130 | 6 | 25 |
| Trichlorofluoromethane | | | 10.0 | 8.17 | | ppb v/v | | 82 | 70 - 130 | 8 | 25 |
| Vinyl acetate | | | 11.0 | 11.8 | | ppb v/v | | 107 | 70 - 130 | 2 | 25 |
| Vinyl chloride | | | 10.0 | 7.68 | | ppb v/v | | 77 | 70 - 130 | 18 | 25 |

| *Surrogate* | *LCSD %Recovery* | *LCSD Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *92* | | *70 - 130* |
| *4-Bromofluorobenzene (Surr)* | *102* | | *70 - 130* |
| *Toluene-d8 (Surr)* | *102* | | *70 - 130* |

**Lab Sample ID: MB 340-4402/9**
**Matrix: Air**
**Analysis Batch: 4402**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | 0.40 | 0.10 | ppb v/v | | | 03/26/13 16:19 | 1 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: MB 340-4402/9**
**Matrix: Air**
**Analysis Batch: 4402**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | | 0.40 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,1,2-Trichloroethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,1-Dichloroethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,1-Dichloroethene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,2,4-Trichlorobenzene | ND | | 2.5 | 0.70 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,2,4-Trimethylbenzene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,2-Dibromoethane (EDB) | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,2-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,2-Dichloroethane | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,2-Dichloropropane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,3,5-Trimethylbenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,3-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 1,4-Dichlorobenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 2-Butanone (MEK) | ND | | 0.80 | 0.40 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 2-Hexanone | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 4-Ethyltoluene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| 4-Methyl-2-pentanone (MIBK) | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Acetone | ND | | 1.2 | 0.60 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Benzene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Benzyl chloride | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Bromodichloromethane | ND | | 0.30 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Bromoform | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Bromomethane | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Carbon disulfide | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Carbon tetrachloride | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Chlorobenzene | ND | | 0.30 | 0.10 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Chloroethane | ND | | 1.5 | 0.70 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Chloroform | ND | | 0.30 | 0.10 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Chloromethane | ND | | 0.80 | 0.40 | ppb v/v | | | 03/26/13 16:19 | 1 |
| cis-1,2-Dichloroethene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| cis-1,3-Dichloropropene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Dibromochloromethane | ND | | 0.40 | 0.10 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Dichlorodifluoromethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Ethylbenzene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Hexachlorobutadiene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| m,p-Xylene | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Methylene chloride | ND | | 0.40 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| o-Xylene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Styrene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Tetrachloroethene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Toluene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| trans-1,2-Dichloroethene | ND | | 0.40 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| trans-1,3-Dichloropropene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Trichloroethene | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Trichlorofluoromethane | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Vinyl acetate | ND | | 0.80 | 0.20 | ppb v/v | | | 03/26/13 16:19 | 1 |
| Vinyl chloride | ND | | 0.40 | 0.15 | ppb v/v | | | 03/26/13 16:19 | 1 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: MB 340-4402/9**
**Matrix: Air**
**Analysis Batch: 4402**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**

| Tentatively Identified Compound | MB Est. Result | MB Qualifier | Unit | D | RT | CAS No. | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Tentatively Identified Compound | None | | ppb v/v | | | | | 03/26/13 16:19 | 1 |

| Surrogate | MB %Recovery | MB Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 (Surr) | 93 | | 70 - 130 | | 03/26/13 16:19 | 1 |
| 4-Bromofluorobenzene (Surr) | 88 | | 70 - 130 | | 03/26/13 16:19 | 1 |
| Toluene-d8 (Surr) | 89 | | 70 - 130 | | 03/26/13 16:19 | 1 |

**Lab Sample ID: LCS 340-4402/7**
**Matrix: Air**
**Analysis Batch: 4402**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 10.0 | 9.44 | | ppb v/v | | 94 | 70 - 130 |
| 1,1,2,2-Tetrachloroethane | 11.0 | 11.4 | | ppb v/v | | 104 | 70 - 130 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 10.0 | 8.90 | | ppb v/v | | 89 | 70 - 130 |
| 1,1,2-Trichloroethane | 10.9 | 10.5 | | ppb v/v | | 97 | 70 - 130 |
| 1,1-Dichloroethane | 10.0 | 9.31 | | ppb v/v | | 93 | 70 - 130 |
| 1,1-Dichloroethene | 10.0 | 9.54 | | ppb v/v | | 95 | 70 - 130 |
| 1,2,4-Trichlorobenzene | 11.0 | 12.0 | | ppb v/v | | 109 | 70 - 130 |
| 1,2,4-Trimethylbenzene | 10.8 | 11.4 | | ppb v/v | | 105 | 70 - 130 |
| 1,2-Dibromoethane (EDB) | 10.8 | 11.1 | | ppb v/v | | 102 | 70 - 130 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 10.0 | 9.97 | | ppb v/v | | 100 | 70 - 130 |
| 1,2-Dichlorobenzene | 10.9 | 11.4 | | ppb v/v | | 105 | 70 - 130 |
| 1,2-Dichloroethane | 10.8 | 10.9 | | ppb v/v | | 101 | 70 - 130 |
| 1,2-Dichloropropane | 10.8 | 10.8 | | ppb v/v | | 100 | 70 - 130 |
| 1,3,5-Trimethylbenzene | 11.0 | 11.5 | | ppb v/v | | 105 | 70 - 130 |
| 1,3-Dichlorobenzene | 11.0 | 11.5 | | ppb v/v | | 105 | 70 - 130 |
| 1,4-Dichlorobenzene | 10.9 | 12.0 | | ppb v/v | | 110 | 70 - 130 |
| 2-Butanone (MEK) | 10.8 | 10.5 | | ppb v/v | | 97 | 70 - 130 |
| 2-Hexanone | 11.0 | 11.7 | | ppb v/v | | 106 | 70 - 130 |
| 4-Ethyltoluene | 10.8 | 11.3 | | ppb v/v | | 105 | 70 - 130 |
| 4-Methyl-2-pentanone (MIBK) | 10.8 | 12.2 | | ppb v/v | | 113 | 70 - 130 |
| Acetone | 10.0 | 8.86 | | ppb v/v | | 89 | 70 - 130 |
| Benzene | 10.6 | 10.7 | | ppb v/v | | 101 | 70 - 130 |
| Benzyl chloride | 11.0 | 12.3 | | ppb v/v | | 112 | 70 - 130 |
| Bromodichloromethane | 10.9 | 11.4 | | ppb v/v | | 105 | 70 - 130 |
| Bromoform | 10.8 | 11.7 | | ppb v/v | | 108 | 70 - 130 |
| Bromomethane | 10.0 | 8.90 | | ppb v/v | | 89 | 70 - 130 |
| Carbon disulfide | 10.0 | 10.1 | | ppb v/v | | 101 | 70 - 130 |
| Carbon tetrachloride | 10.8 | 10.7 | | ppb v/v | | 99 | 70 - 130 |
| Chlorobenzene | 11.0 | 10.5 | | ppb v/v | | 95 | 70 - 130 |
| Chloroethane | 10.0 | 9.43 | | ppb v/v | | 94 | 70 - 130 |
| Chloroform | 10.0 | 9.44 | | ppb v/v | | 94 | 70 - 130 |
| Chloromethane | 10.0 | 10.1 | | ppb v/v | | 101 | 70 - 130 |
| cis-1,2-Dichloroethene | 10.6 | 10.3 | | ppb v/v | | 97 | 70 - 130 |
| cis-1,3-Dichloropropene | 10.0 | 12.0 | | ppb v/v | | 120 | 70 - 130 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: LCS 340-4402/7**
**Matrix: Air**
**Analysis Batch: 4402**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Dibromochloromethane | 11.0 | 11.7 | | ppb v/v | | 107 | 70 - 130 |
| Dichlorodifluoromethane | 10.0 | 10.1 | | ppb v/v | | 101 | 70 - 130 |
| Ethylbenzene | 10.9 | 11.4 | | ppb v/v | | 105 | 70 - 130 |
| Hexachlorobutadiene | 11.0 | 11.2 | | ppb v/v | | 101 | 70 - 130 |
| m,p-Xylene | 21.6 | 22.3 | | ppb v/v | | 103 | 70 - 130 |
| Methylene chloride | 11.0 | 10.1 | | ppb v/v | | 92 | 70 - 130 |
| o-Xylene | 11.0 | 11.9 | | ppb v/v | | 108 | 70 - 130 |
| Styrene | 11.0 | 12.2 | | ppb v/v | | 111 | 70 - 130 |
| Tetrachloroethene | 10.0 | 9.76 | | ppb v/v | | 98 | 70 - 130 |
| Toluene | 10.9 | 11.2 | | ppb v/v | | 102 | 70 - 130 |
| trans-1,2-Dichloroethene | 10.0 | 9.71 | | ppb v/v | | 97 | 70 - 130 |
| trans-1,3-Dichloropropene | 11.0 | 10.9 | | ppb v/v | | 99 | 70 - 130 |
| Trichloroethene | 10.9 | 11.5 | | ppb v/v | | 106 | 70 - 130 |
| Trichlorofluoromethane | 10.0 | 9.39 | | ppb v/v | | 94 | 70 - 130 |
| Vinyl acetate | 11.0 | 12.0 | | ppb v/v | | 109 | 70 - 130 |
| Vinyl chloride | 10.0 | 10.1 | | ppb v/v | | 101 | 70 - 130 |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *96* | | *70 - 130* |
| *4-Bromofluorobenzene (Surr)* | *102* | | *70 - 130* |
| *Toluene-d8 (Surr)* | *103* | | *70 - 130* |

**Lab Sample ID: LCSD 340-4402/8**
**Matrix: Air**
**Analysis Batch: 4402**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 10.0 | 9.42 | | ppb v/v | | 94 | 70 - 130 | 0 | 25 |
| 1,1,2,2-Tetrachloroethane | 11.0 | 11.1 | | ppb v/v | | 101 | 70 - 130 | 3 | 25 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 10.0 | 8.64 | | ppb v/v | | 86 | 70 - 130 | 3 | 25 |
| 1,1,2-Trichloroethane | 10.9 | 10.2 | | ppb v/v | | 94 | 70 - 130 | 3 | 25 |
| 1,1-Dichloroethane | 10.0 | 9.31 | | ppb v/v | | 93 | 70 - 130 | 0 | 25 |
| 1,1-Dichloroethene | 10.0 | 9.07 | | ppb v/v | | 91 | 70 - 130 | 5 | 25 |
| 1,2,4-Trichlorobenzene | 11.0 | 11.6 | | ppb v/v | | 105 | 70 - 130 | 4 | 25 |
| 1,2,4-Trimethylbenzene | 10.8 | 10.8 | | ppb v/v | | 100 | 70 - 130 | 5 | 25 |
| 1,2-Dibromoethane (EDB) | 10.8 | 10.7 | | ppb v/v | | 99 | 70 - 130 | 3 | 25 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 10.0 | 9.75 | | ppb v/v | | 98 | 70 - 130 | 2 | 25 |
| 1,2-Dichlorobenzene | 10.9 | 10.9 | | ppb v/v | | 100 | 70 - 130 | 5 | 25 |
| 1,2-Dichloroethane | 10.8 | 10.6 | | ppb v/v | | 98 | 70 - 130 | 3 | 25 |
| 1,2-Dichloropropane | 10.8 | 11.0 | | ppb v/v | | 102 | 70 - 130 | 2 | 25 |
| 1,3,5-Trimethylbenzene | 11.0 | 10.9 | | ppb v/v | | 99 | 70 - 130 | 6 | 25 |
| 1,3-Dichlorobenzene | 11.0 | 10.9 | | ppb v/v | | 99 | 70 - 130 | 5 | 25 |
| 1,4-Dichlorobenzene | 10.9 | 11.2 | | ppb v/v | | 103 | 70 - 130 | 6 | 25 |
| 2-Butanone (MEK) | 10.8 | 10.6 | | ppb v/v | | 98 | 70 - 130 | 1 | 25 |
| 2-Hexanone | 11.0 | 11.1 | | ppb v/v | | 101 | 70 - 130 | 5 | 25 |
| 4-Ethyltoluene | 10.8 | 10.9 | | ppb v/v | | 101 | 70 - 130 | 3 | 25 |

## Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

**Lab Sample ID: LCSD 340-4402/8**
**Matrix: Air**
**Analysis Batch: 4402**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**

| Analyte | | | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-Methyl-2-pentanone (MIBK) | | | 10.8 | 12.2 | | ppb v/v | | 113 | 70 - 130 | 1 | 25 |
| Acetone | | | 10.0 | 8.70 | | ppb v/v | | 87 | 70 - 130 | 2 | 25 |
| Benzene | | | 10.6 | 10.4 | | ppb v/v | | 98 | 70 - 130 | 2 | 25 |
| Benzyl chloride | | | 11.0 | 11.5 | | ppb v/v | | 104 | 70 - 130 | 7 | 25 |
| Bromodichloromethane | | | 10.9 | 11.2 | | ppb v/v | | 103 | 70 - 130 | 2 | 25 |
| Bromoform | | | 10.8 | 11.3 | | ppb v/v | | 105 | 70 - 130 | 3 | 25 |
| Bromomethane | | | 10.0 | 8.76 | | ppb v/v | | 88 | 70 - 130 | 2 | 25 |
| Carbon disulfide | | | 10.0 | 10.0 | | ppb v/v | | 100 | 70 - 130 | 1 | 25 |
| Carbon tetrachloride | | | 10.8 | 10.5 | | ppb v/v | | 97 | 70 - 130 | 2 | 25 |
| Chlorobenzene | | | 11.0 | 10.0 | | ppb v/v | | 91 | 70 - 130 | 4 | 25 |
| Chloroethane | | | 10.0 | 9.57 | | ppb v/v | | 96 | 70 - 130 | 1 | 25 |
| Chloroform | | | 10.0 | 9.40 | | ppb v/v | | 94 | 70 - 130 | 0 | 25 |
| Chloromethane | | | 10.0 | 9.97 | | ppb v/v | | 100 | 70 - 130 | 1 | 25 |
| cis-1,2-Dichloroethene | | | 10.6 | 10.3 | | ppb v/v | | 97 | 70 - 130 | 1 | 25 |
| cis-1,3-Dichloropropene | | | 10.0 | 11.7 | | ppb v/v | | 117 | 70 - 130 | 2 | 25 |
| Dibromochloromethane | | | 11.0 | 11.3 | | ppb v/v | | 102 | 70 - 130 | 4 | 25 |
| Dichlorodifluoromethane | | | 10.0 | 9.74 | | ppb v/v | | 97 | 70 - 130 | 3 | 25 |
| Ethylbenzene | | | 10.9 | 10.8 | | ppb v/v | | 99 | 70 - 130 | 5 | 25 |
| Hexachlorobutadiene | | | 11.0 | 10.6 | | ppb v/v | | 97 | 70 - 130 | 5 | 25 |
| m,p-Xylene | | | 21.6 | 21.3 | | ppb v/v | | 99 | 70 - 130 | 4 | 25 |
| Methylene chloride | | | 11.0 | 9.98 | | ppb v/v | | 91 | 70 - 130 | 1 | 25 |
| o-Xylene | | | 11.0 | 11.4 | | ppb v/v | | 104 | 70 - 130 | 4 | 25 |
| Styrene | | | 11.0 | 11.7 | | ppb v/v | | 106 | 70 - 130 | 5 | 25 |
| Tetrachloroethene | | | 10.0 | 9.31 | | ppb v/v | | 93 | 70 - 130 | 5 | 25 |
| Toluene | | | 10.9 | 10.9 | | ppb v/v | | 100 | 70 - 130 | 2 | 25 |
| trans-1,2-Dichloroethene | | | 10.0 | 9.71 | | ppb v/v | | 97 | 70 - 130 | 0 | 25 |
| trans-1,3-Dichloropropene | | | 11.0 | 10.3 | | ppb v/v | | 94 | 70 - 130 | 6 | 25 |
| Trichloroethene | | | 10.9 | 11.4 | | ppb v/v | | 104 | 70 - 130 | 1 | 25 |
| Trichlorofluoromethane | | | 10.0 | 8.91 | | ppb v/v | | 89 | 70 - 130 | 5 | 25 |
| Vinyl acetate | | | 11.0 | 12.0 | | ppb v/v | | 109 | 70 - 130 | 0 | 25 |
| Vinyl chloride | | | 10.0 | 9.87 | | ppb v/v | | 99 | 70 - 130 | 3 | 25 |

| *Surrogate* | *LCSD %Recovery* | *LCSD Qualifier* | *Limits* |
|---|---|---|---|
| *1,2-Dichloroethane-d4 (Surr)* | *99* | | *70 - 130* |
| *4-Bromofluorobenzene (Surr)* | *104* | | *70 - 130* |
| *Toluene-d8 (Surr)* | *104* | | *70 - 130* |

# Lab Chronicle

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

## Client Sample ID: AWT-INFLUENT

**Lab Sample ID: 480-34695-1**

**Date Collected: 03/16/13 11:17**

**Matrix: Air**

**Date Received: 03/20/13 10:20**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | TO-15 | | 188 | 4392 | 03/25/13 15:08 | DLK | TAL LA |
| Total/NA | Analysis | TO-15 | | 376 | 4402 | 03/26/13 18:34 | DLK | TAL LA |

## Client Sample ID: AWT-MIDPOINT

**Lab Sample ID: 480-34695-2**

**Date Collected: 03/16/13 11:17**

**Matrix: Air**

**Date Received: 03/20/13 10:20**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | TO-15 | | 1 | 4388 | 03/25/13 04:12 | DLK | TAL LA |

## Client Sample ID: AWT-EFFLUENT

**Lab Sample ID: 480-34695-3**

**Date Collected: 03/16/13 11:17**

**Matrix: Air**

**Date Received: 03/20/13 10:20**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | TO-15 | | 1 | 4388 | 03/25/13 05:01 | DLK | TAL LA |

**Laboratory References:**

TAL LA = TestAmerica Costa Mesa, 3585 Cadillac Ave, Suite A, Costa Mesa, CA 92626, TEL (714)258-8610

# Certification Summary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

## Laboratory: TestAmerica Buffalo

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Arkansas DEQ | State Program | 6 | 88-0686 | 07-06-13 |
| California | NELAP | 9 | 1169CA | 09-30-13 |
| Connecticut | State Program | 1 | PH-0568 | 09-30-14 |
| Florida | NELAP | 4 | E87672 | 06-30-13 |
| Georgia | State Program | 4 | N/A | 03-31-13 |
| Georgia | State Program | 4 | 956 | 06-30-13 |
| Georgia | State Program | 4 | 956 | 06-30-13 |
| Illinois | NELAP | 5 | 200003 | 09-30-13 |
| Iowa | State Program | 7 | 374 | 03-01-13 |
| Kansas | NELAP | 7 | E-10187 | 01-31-14 |
| Kentucky | State Program | 4 | 90029 | 12-31-13 |
| Kentucky (UST) | State Program | 4 | 30 | 04-01-13 |
| Louisiana | NELAP | 6 | 02031 | 06-30-13 |
| Maine | State Program | 1 | NY00044 | 12-04-13 |
| Maryland | State Program | 3 | 294 | 03-31-13 |
| Massachusetts | State Program | 1 | M-NY044 | 06-30-13 |
| Michigan | State Program | 5 | 9937 | 04-01-13 |
| Minnesota | NELAP | 5 | 036-999-337 | 12-31-13 |
| New Hampshire | NELAP | 1 | 2973 | 09-11-13 |
| New Hampshire | NELAP | 1 | 2337 | 11-17-13 |
| New Jersey | NELAP | 2 | NY455 | 06-30-13 |
| New York | NELAP | 2 | 10026 | 03-31-13 |
| North Dakota | State Program | 8 | R-176 | 03-31-13 |
| Oklahoma | State Program | 6 | 9421 | 08-31-13 |
| Oregon | NELAP | 10 | NY200003 | 06-09-13 |
| Pennsylvania | NELAP | 3 | 68-00281 | 07-31-13 |
| Rhode Island | State Program | 1 | LAO00328 | 12-31-13 |
| Tennessee | State Program | 4 | TN02970 | 04-01-13 |
| Texas | NELAP | 6 | T104704412-11-2 | 07-31-13 |
| USDA | Federal | | P330-11-00386 | 11-22-14 |
| Virginia | NELAP | 3 | 460185 | 09-14-13 |
| Washington | State Program | 10 | C784 | 02-10-14 |
| West Virginia DEP | State Program | 3 | 252 | 09-30-13 |
| Wisconsin | State Program | 5 | 998310390 | 08-31-13 |

## Laboratory: TestAmerica Costa Mesa

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Arizona | State Program | 9 | AZ0727 | 02-09-14 |
| Florida | NELAP | 4 | E87652 | 06-30-13 |
| L-A-B | DoD ELAP | | L2273 | 11-09-13 |
| Louisiana | NELAP | 6 | 01948 | 06-30-13 |
| New York | NELAP | 2 | 11851 | 04-01-13 |
| Oregon | NELAP | 10 | CA200013 | 07-19-13 |
| Utah | NELAP | 8 | CA000032012-1 | 06-30-13 |
| Washington | State Program | 10 | C579 | 11-29-13 |

# Method Summary

Client: CWM Chemical Services Inc
Project/Site: Model City Landfill

TestAmerica Job ID: 480-34695-1

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| TO-15 | Volatile Organic Compounds in Ambient Air | EPA | TAL LA |

**Protocol References:**

EPA = US Environmental Protection Agency

**Laboratory References:**

TAL LA = TestAmerica Costa Mesa, 3585 Cadillac Ave, Suite A, Costa Mesa, CA 92626, TEL (714)258-8610

**TestAmerica Los Angeles**
3585 Cadillac Drive
Suite A
Costa Mesa, California
phone 714-258-8610

# Canister Samples Chain of Custody Record

| Client Contact Information | Project Manager: Jonathan Rizzo | Samples Collected By: | 1 of 1 COCs |
|---|---|---|---|
| Company: CWM Model City | Phone: 716-286-0246 | Ed Murphy | |
| Address: 1550 Balmer Road | Email: jrizzo@golder.com | | |
| City/State/Zip Model City, NY 14107 | | | |
| Phone: 716-286-0246 | Site Contact: Ed Murphy | | |
| FAX: | TA Contact: Candace Fox | | |
| Project Name: AWT Effluent Sampling | **Analysis Turnaround Time** | | |
| Site: CWM Model City | Standard (Specify) X | | |
| PO # | Rush (Specify) | | |

| Sample Identification | Sample Date(s) | Time Start | Time Stop | Canister Vacuum in Field, "Hg (Start) | Canister Vacuum in Field, "Hg (Stop) | Flow Controller ID | Canister ID | TO-15 | MA-APH | EPA 3C | EPA 25C | ASTM D-1946 | Other (Please specify in notes section) | Sample Type | Indoor Air | Ambient Air | Soil Gas | Landfill Gas | Other (Please specify in notes section) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AWT - INFLUENT | 3/16/2013 | 1133 | 1117 | 27 | 0 | 24055 | 34001573 | X | | | | | | | | | | | X |
| AWT - MIDPOINT | 3/16/2013 | 1440 | 1117 | 22 | 0 | 24053 | 34001410 | X | | | | | | | | | | | X |
| AWT - EFFLUENT | 3/16/2013 | 1133 | 1117 | 30 | 4 | 24262 | 34001578 | X | | | | | | | | | | | X |
| AWT - MIDPOINT (SPARE) | 3/15/2013 | 1133 | 1432 | 28 | 0 | 24123 | 34001242 | X | | | | | | | | | | | X |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

| Temperature (Fahrenheit) | | | |
|---|---|---|---|
| | Interior | Ambient | |
| Start | | | |
| Stop | | | |

| Pressure (inches of Hg) | | | |
|---|---|---|---|
| | Interior | Ambient | |
| Start | | | |
| Stop | | | |

**Special Instructions/QC Requirements & Comments:** HOLD SAMPLE AWT-MIDPOINT (SPARE). SAMPLE RECOLLECTED DUE TO CAN BEING CONSUMED IN UNDER 3 HOURS. SAMPLES HAVE BETWEEN 700-850 PPM VOCs PER FID READING. THREE OF FOUR CANS WENT FLAT EARLY, LIKELY DUE TO TEMPERATURE EFFECTS AND POSITIVE PRESSURE FROM SAMPLE. ONE REGULATOR 34124 HAD TOP BREAK OFF FILTER UNDER NORMAL HAND TIGHTENING DUE TO METAL FATIGUE.

| | | |
|---|---|---|
| Samples Shipped by: EDWARD M. MURPHY | Date/Time: 3/16/13 1315 | Samples Received by: 3/20/13 10:20 |
| Samples Relinquished by: | Date/Time: | Received by: |
| Relinquished by: | Date/Time: | Received by: |

**Lab Use Only** **Shipper Name:** **Opened by:** **Condition:**

# Attachment 14
# Tanks Software Model Output for Petroleum Storage Tanks

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

| **Identification** | |
|---|---|
| *User Identification* | T-27 |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

| **Tank Dimensions** | | |
|---|---|---|
| *Shell Length (ft)* | 24.00 | |
| *Diameter (ft)* | 12.00 | |
| *Volume (gal)* | 20,000 | |
| *Turnovers* | 33.22 | 10.00 |
| *Net Throughput (gal/yr)* | 200,000 | |
| *Is tank heated (y/n)* | N | |
| *Is tank underground (y/n)* | N | |

| **Paint Characteristics** | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

| **Breather Vent Settings** | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**T-27 - Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Distillate Fuel Oil #2* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.0062 | 0.0042 | 0.0086 | 130.0000 | 1 | 1 | 188.00 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**T-27 - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 6.7897 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | | $V_V$ = | 1728.8765 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | | $W_V$ = | 0.0001 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | | $K_E$ = | 0.0748 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | | $K_S$ = | 0.9980 | | | | |
| *Tank Vapor Space Volume* | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 1728.8765 | cu ft | | | |
| D = Tank Diameter (ft) | | | | | | | |
| $D_E$ = Effective Diameter (ft) | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 19.1541 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 6.0000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | | | | | | | |
| *Vapor Density* | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0001 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 130.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | | | 10.7310 | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

As per sources listed on page 6-5 of TANKS user manual:

| | | | | | | |
|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0748 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | | delta $P_V$ = | 0.0044 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | |
|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9980 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | |
| Vapor Space Outage (ft) | | | | | | |

*Working Losses (lb)*

| | | | | | | |
|---|---|---|---|---|---|---|
| | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 3.8136 | lbs | | |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 130.0000 | lb/lb-mole | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | 0.0000 | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 | |
| Q = Annual Net Throughput (gal/yr) | 1 bbl/yr = 42 US gal/yr | Q = | 4,761.90 | bbl/yr | for turnovers >36, $K_N = (180 + N)/6N$ | |
| Annual Turnovers | | N = | 10.00 | | for turnovers <36, $K_N = 1$ | |
| $K_N$ = Turnover Factor | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | $K_P$ = working loss product factor, dimensionless | |
| Tank Diameter (ft) | | | | | for crude oils $K_P = 0.75$ | |
| Working Loss Product Factor | | $K_P$ = | 1.00 | | for all other organic liquids, $K_P = 1$ | |
| Total Losses (lb) | | $L_T$ = | 10.6034 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**T-27 - Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| Losses (lbs) | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 3.81364 | 6.78972 | 10.60336 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

| **Identification** | |
|---|---|
| *User Identification* | 275 gallon Kerosene Tank |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

| **Tank Dimensions** | | |
|---|---|---|
| *Shell Length (ft)* | 5.25 | |
| *Diameter (ft)* | 3.00 | |
| *Volume (gal)* | 275 | |
| *Turnovers* | 33.22 | 3.64 |
| *Net Throughput (gal/yr)* | 1,000 | |
| *Is tank heated (y/n)* | N | |
| *Is tank underground (y/n)* | N | |

| **Paint Characteristics** | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

| **Breather Vent Settings** | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**275 gallon Kerosene Tank - Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Distillate Fuel Oil #2* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.0062 | 0.0042 | 0.0086 | 130.0000 | 1 | 1 | 188.00 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**275 gallon Kerosene Tank - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.0930 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | | $V_V$ = | 23.6370 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | | $W_V$ = | 0.0001 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | | $K_E$ = | 0.0748 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | | $K_S$ = | 0.9995 | | | | |
| *Tank Vapor Space Volume* | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 23.6370 | cu ft | | | |
| D = Tank Diameter (ft) | | | | | | | |
| $D_E$ = Effective Diameter (ft) | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 4.4793 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 1.5000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | | | | | | | |
| *Vapor Density* | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0001 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 130.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | | | 10.7310 | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

As per sources listed on page 6-5 of TANKS user manual:

| | | | | | | |
|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0748 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | | delta $P_V$ = | 0.0044 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | |
|---|---|---|---|---|
| Vented Vapor Saturation Factor | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9995 | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | |
| Vapor Space Outage (ft) | | | | |

*Working Losses (lb)*

| | | | | | |
|---|---|---|---|---|---|
| | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 0.0191 | lbs | |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 130.0000 | lb/lb-mole | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | 0.0000 | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput (gal/yr) | 1 bbl/yr = 42 US gal/yr | Q = | 23.81 | bbl/yr | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | | N = | 3.64 | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | $K_P$ = working loss product factor, dimensionless |
| Tank Diameter (ft) | | | | | for crude oils $K_P = 0.75$ |
| Working Loss Product Factor | | $K_P$ = | 1.00 | | for all other organic liquids, $K_P = 1$ |
| Total Losses (lb) | | $L_T$ = | 0.1120 | lbs | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**275 gallon Kerosene Tank - Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| **Losses (lbs)** | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 0.01907 | 0.09296 | 0.11203 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

| **Identification** | | |
|---|---|---|
| *User Identification* | 1,000 gallon Fuel Oil Tank | |
| *City* | Buffalo | |
| *State* | New York | |
| *Company* | CWM Chemical Services, LLC | |
| *Type of Tank* | Horizontal Tank | |
| *Description* | Horizontal Tank | |
| **Tank Dimensions** | | |
| *Shell Length (ft)* | 9.00 | |
| *Diameter (ft)* | 4.50 | |
| *Volume (gal)* | 1,000 | |
| *Turnovers* | 33.22 | 10.00 |
| *Net Throughput (gal/yr)* | 10,000 | |
| *Is tank heated (y/n)* | N | |
| *Is tank underground (y/n)* | N | |
| **Paint Characteristics** | | |
| *Shell Color/Shade* | Red/Primer | |
| *Shell Condition* | Good | |
| **Breather Vent Settings** | | |
| *Vacuum Settings (psig)* | -0.03 | |
| *Pressure Settings (psig)* | 0.03 | |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**1,000 gallon Fuel Oil Tank - Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Distillate Fuel Oil #2* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.0062 | 0.0042 | 0.0086 | 130.0000 | 1 | 1 | 188.00 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**1,000 gallon Fuel Oil Tank - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.3585 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | | $V_V$ = | 91.1712 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | | $W_V$ = | 0.0001 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | | $K_E$ = | 0.0748 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | | $K_S$ = | 0.9993 | | | | |
| *Tank Vapor Space Volume* | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 91.1712 | cu ft | | | |
| D = Tank Diameter (ft) | | | | | | | |
| $D_E$ = Effective Diameter (ft) | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 7.1828 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 2.2500 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | | | | | | | |
| *Vapor Density* | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0001 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 130.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | | | 10.7310 | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

As per sources listed on page 6-5 of TANKS user manual:

| | | | | | | |
|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0748 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | | delta $P_V$ = | 0.0044 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | |
|---|---|---|---|---|
| Vented Vapor Saturation Factor | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9993 | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | |
| Vapor Space Outage (ft) | | | | |

*Working Losses (lb)*

| | | | | | |
|---|---|---|---|---|---|
| | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 0.1907 | lbs | |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 130.0000 | lb/lb-mole | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | 0.0000 | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput (gal/yr) | 1 bbl/yr = 42 US gal/yr | Q = | 238.10 | bbl/yr | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | | N = | 10.00 | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | $K_P$ = working loss product factor, dimensionless |
| Tank Diameter (ft) | | | | | for crude oils $K_P = 0.75$ |
| Working Loss Product Factor | | $K_P$ = | 1.00 | | for all other organic liquids, $K_P = 1$ |
| Total Losses (lb) | | $L_T$ = | 0.5492 | lbs | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**1,000 gallon Fuel Oil Tank - Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| **Losses (lbs)** | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 0.19068 | 0.35849 | 0.54917 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

| **Identification** | |
|---|---|
| *User Identification* | 117 gallon Diesel Fuel Tank |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

| **Tank Dimensions** | | |
|---|---|---|
| *Shell Length (ft)* | 5.00 | |
| *Diameter (ft)* | 3.00 | |
| *Volume (gal)* | 117 | |
| *Turnovers* | 33.22 | 2.14 |
| *Net Throughput (gal/yr)* | 250 | |
| *Is tank heated (y/n)* | N | |
| *Is tank underground (y/n)* | N | |

| **Paint Characteristics** | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

| **Breather Vent Settings** | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**117 gallon Diesel Fuel Tank -**
**Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Distillate Fuel Oil #2* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.0062 | 0.0042 | 0.0086 | 130.0000 | 1 | 1 | 188.00 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**117 gallon Diesel Fuel Tank - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.0885 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | | $V_V$ = | 22.5114 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | | $W_V$ = | 0.0001 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | | $K_E$ = | 0.0748 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | | $K_S$ = | 0.9995 | | | | |
| *Tank Vapor Space Volume* | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 22.5114 | cu ft | | | |
| D = Tank Diameter (ft) | | | | | | | |
| $D_E$ = Effective Diameter (ft) | $D_E = (L * D/(pi/4))^{1/2}$ | $D_E$ = | 4.3713 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 1.5000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | | | | | | | |
| *Vapor Density* | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0001 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 130.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | | | 10.7310 | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

As per sources listed on page 6-5 of TANKS user manual:

| | | | | | | |
|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0748 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | | delta $P_V$ = | 0.0044 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | |
|---|---|---|---|---|
| Vented Vapor Saturation Factor | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9995 | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | |
| Vapor Space Outage (ft) | | | | |

*Working Losses (lb)*

| | | | | | |
|---|---|---|---|---|---|
| | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 0.0048 | lbs | |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 130.0000 | lb/lb-mole | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | 0.0000 | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput (gal/yr) | 1 bbl/yr = 42 US gal/yr | Q = | 5.95 | bbl/yr | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | | N = | 2.14 | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | $K_P$ = working loss product factor, dimensionless |
| Tank Diameter (ft) | | | | | for crude oils $K_P = 0.75$ |
| Working Loss Product Factor | | $K_P$ = | 1.00 | | for all other organic liquids, $K_P = 1$ |
| Total Losses (lb) | | $L_T$ = | 0.0933 | lbs | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**117 gallon Diesel Fuel Tank -**
**Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| **Losses (lbs)** | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 0.00477 | 0.08854 | 0.09330 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

| **Identification** | |
|---|---|
| *User Identification* | 1,000 gallon Gasoline Tank |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

| **Tank Dimensions** | |
|---|---|
| *Shell Length (ft)* | 8.50 |
| *Diameter (ft)* | 4.50 |
| *Volume (gal)* | 1,000 |
| *Turnovers* | 2.00 |
| *Net Throughput (gal/yr)* | 2,000 |
| *Is tank heated (y/n)* | N |
| *Is tank underground (y/n)* | N |

| **Paint Characteristics** | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

| **Breather Vent Settings** | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**1,000 gallon Gasoline Tank -**
**Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Gasoline (RVP 6)* | All | 58.30 | 48.11 | 68.49 | 52.02 | 2.8326 | 2.2788 | 3.4914 | 69.0000 | 1 | 1 | 92.00 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**1,000 gallon Gasoline Tank - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 147.5343 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | | $V_V$ = | 86.1062 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | | $W_V$ = | 0.0352 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | | $K_E$ = | 0.1786 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | | $K_S$ = | 0.7475 | | | | |
| *Tank Vapor Space Volume* | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 86.1062 | cu ft | | | |
| D = Tank Diameter (ft) | | | | | | | |
| $D_E$ = Effective Diameter (ft) | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 6.9804 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 2.2500 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | | | | | | | |
| *Vapor Density* | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0352 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 69.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | | | 10.7310 | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

As per sources listed on page 6-5 of TANKS user manual:

| | | | | | | |
|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.1786 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | | delta $P_V$ = | 1.2126 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | |
|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.7475 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | 2.8326 | | | |
| Vapor Space Outage (ft) | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Working Losses (lb)* | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 9.3071 | lbs | | |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 69.0000 | lb/lb-mole | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | 0.0000 | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 | |
| Q = Annual Net Throughput (gal/yr) | 1 bbl/yr = 42 US gal/yr | Q = | 47.62 | bbl/yr | for turnovers >36, $K_N = (180 + N)/6N$ | |
| Annual Turnovers | | N = | 2.00 | | for turnovers <36, $K_N = 1$ | |
| $K_N$ = Turnover Factor | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | $K_P$ = working loss product factor, dimensionless | |
| Tank Diameter (ft) | | | | | for crude oils $K_P = 0.75$ | |
| Working Loss Product Factor | | $K_P$ = | 1.00 | | for all other organic liquids, $K_P = 1$ | |
| Total Losses (lb) | | $L_T$ = | 156.8414 | lbs | | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**1,000 gallon Gasoline Tank -**
**Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| **Losses (lbs)** | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 9.30711 | 147.53426 | 156.84137 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

| **Identification** | | |
|---|---|---|
| *User Identification* | 1,500 gallon Fuel Oil Tank | |
| *City* | Buffalo | |
| *State* | New York | |
| *Company* | CWM Chemical Services, LLC | |
| *Type of Tank* | Horizontal Tank | |
| *Description* | Horizontal Tank | |
| **Tank Dimensions** | | |
| *Shell Length (ft)* | 10.25 | |
| *Diameter (ft)* | 5.00 | |
| *Volume (gal)* | 1,500 | |
| *Turnovers* | 33.22 | 6.67 |
| *Net Throughput (gal/yr)* | 10,000 | |
| *Is tank heated (y/n)* | N | |
| *Is tank underground (y/n)* | N | |
| **Paint Characteristics** | | |
| *Shell Color/Shade* | Red/Primer | |
| *Shell Condition* | Good | |
| **Breather Vent Settings** | | |
| *Vacuum Settings (psig)* | -0.03 | |
| *Pressure Settings (psig)* | 0.03 | |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**1,500 gallon Fuel Oil Tank - Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Distillate Fuel Oil #2* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.0062 | 0.0042 | 0.0086 | 130.0000 | 1 | 1 | 188.00 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**1,500 gallon Fuel Oil Tank - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.5040 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | | $V_V$ = | 128.1900 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | | $W_V$ = | 0.0001 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | | $K_E$ = | 0.0748 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | | $K_S$ = | 0.9992 | | | | |
| *Tank Vapor Space Volume* | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 128.1900 | cu ft | | | |
| D = Tank Diameter (ft) | | | | | | | |
| $D_E$ = Effective Diameter (ft) | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 8.0800 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 2.5000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | | | | | | | |
| *Vapor Density* | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0001 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 130.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | | | 10.7310 | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

As per sources listed on page 6-5 of TANKS user manual:

| | | | | | | |
|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0748 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | | delta $P_V$ = | 0.0044 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | |
|---|---|---|---|---|
| Vented Vapor Saturation Factor | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 0.9992 | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | |
| Vapor Space Outage (ft) | | | | |

*Working Losses (lb)*

| | | | | |
|---|---|---|---|---|
| | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 0.1907 | lbs |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 130.0000 | lb/lb-mole |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | 0.0000 | |
| Q = Annual Net Throughput (gal/yr) | 1 bbl/yr = 42 US gal/yr | Q = | 238.10 | bbl/yr |
| Annual Turnovers | | N = | 6.67 | |
| $K_N$ = Turnover Factor | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | |
| Tank Diameter (ft) | | | | |
| Working Loss Product Factor | | $K_P$ = | 1.00 | |
| Total Losses (lb) | | $L_T$ = | 0.6947 | lbs |

Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr

$K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18

for turnovers >36, $K_N = (180 + N)/6N$

for turnovers <36, $K_N = 1$

$K_P$ = working loss product factor, dimensionless

for crude oils $K_P = 0.75$

for all other organic liquids, $K_P = 1$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**1,500 gallon Fuel Oil Tank - Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| **Losses (lbs)** | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 0.19068 | 0.50401 | 0.69469 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

| **Identification** | |
|---|---|
| *User Identification* | 325 gallon Engine Oil Tank |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

| **Tank Dimensions** | |
|---|---|
| *Shell Length (ft)* | 6.50 |
| *Diameter (ft)* | 3.00 |
| *Volume (gal)* | 270 |
| *Turnovers* | 37.04 |
| *Net Throughput (gal/yr)* | 10,000 |
| *Is tank heated (y/n)* | N |
| *Is tank underground (y/n)* | N |

| **Paint Characteristics** | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

| **Breather Vent Settings** | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**325 gallon Engine Oil Tank -**
**Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Residual Oil No. 6* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.0000 | 3E-05 | 0.00006 | 190.0000 | 1 | 1 | 387.00 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**325 gallon Engine Oil Tank - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.0011 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | | $V_V$ = | 29.2648 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | | $W_V$ = | 0.0000 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | | $K_E$ = | 0.0745 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | | $K_S$ = | 1.0000 | | | | |
| *Tank Vapor Space Volume* | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 29.2648 | cu ft | | | |
| D = Tank Diameter (ft) | | | | | | | |
| $D_E$ = Effective Diameter (ft) | $D_E = (L * D/(pi/4))^{\wedge}1/2$ | $D_E$ = | 4.9841 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 1.5000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | | | | | | | |
| *Vapor Density* | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0000 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 190.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | | | 10.7310 | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

As per sources listed on page 6-5 of TANKS user manual:

| | | | | | | |
|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0745 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | | |
|---|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 1.0000 | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | |
| Vapor Space Outage (ft) | | | | | | |

*Working Losses (lb)*

$L_W = 0.0010 M_V P_{VA} Q K_N K_P$

| | | | | | |
|---|---|---|---|---|---|
| $L_W$ = | 0.0018 | lbs | | | |
| $M_V$ = Vapor Molecular Weight | $M_V$ = | 190.0000 | lb/lb-mole | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr | |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | 0.0000 | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 | |
| Q = Annual Net Throughput (gal/yr) | Q = | 238.10 | bbl/yr | for turnovers >36, $K_N = (180 + N)/6N$ | |
| Annual Turnovers | N = | 37.04 | | for turnovers <36, $K_N = 1$ | |
| $K_N$ = Turnover Factor | $K_N$ = | 1.00 | | $K_P$ = working loss product factor, dimensionless | |
| Tank Diameter (ft) | | | | for crude oils $K_P = 0.75$ | |
| Working Loss Product Factor | $K_P$ = | 1.00 | | for all other organic liquids, $K_P = 1$ | |
| Total Losses (lb) | $L_T$ = | 0.0029 | lbs | | |

1 bbl/yr = 42 US gal/yr

$K_N = (180 + N)/6N$

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**325 gallon Engine Oil Tank -**
**Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| **Losses (lbs)** | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 0.00181 | 0.00109 | 0.00290 |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Tank Indentification and Physical Characteristics**

| **Identification** | |
|---|---|
| *User Identification* | 270 gallon Engine Oil Tank |
| *City* | Buffalo |
| *State* | New York |
| *Company* | CWM Chemical Services, LLC |
| *Type of Tank* | Horizontal Tank |
| *Description* | Horizontal Tank |

| **Tank Dimensions** | |
|---|---|
| *Shell Length (ft)* | 5.50 |
| *Diameter (ft)* | 3.00 |
| *Volume (gal)* | 270 |
| *Turnovers* | 37.04 |
| *Net Throughput (gal/yr)* | 10,000 |
| *Is tank heated (y/n)* | N |
| *Is tank underground (y/n)* | N |

| **Paint Characteristics** | |
|---|---|
| *Shell Color/Shade* | Red/Primer |
| *Shell Condition* | Good |

| **Breather Vent Settings** | |
|---|---|
| *Vacuum Settings (psig)* | -0.03 |
| *Pressure Settings (psig)* | 0.03 |

Meterological Data used in Emissions Calculations: Buffalo, New York (Avg Atmospheric Pressure = 14.37 psia)

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Liquid Contents of Storage Tank**

**270 gallon Engine Oil Tank -**
**Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min | Max | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min | Max | Vapor Mol Weight g/mol | Liquid Mass Fraction | Vapor Mass Fraction | Mol Weight g/mol | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Residual Oil No. 6* | All | 58.30 | 48.11 | 68.49 | 52.02 | 0.0000 | 0.00003 | 0.00006 | 190.0000 | 1 | 1 | 387.00 | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Detail Calculations (AP-42)**

**270 gallon Engine Oil Tank - Horizontal Tank**
**Buffalo, New York**

| **Annual Emission Calculations** | **AP-42 EQUATIONS** | **CALCULATIONS** | | | | | |
|---|---|---|---|---|---|---|---|
| *Standing Losses (lb)* | $L_S = 365\ V_V\ W_V\ K_E\ K_S$ | $L_S$ = | 0.0009 | lbs | | | |
| $V_V$ = Vapor Space Volume (cu ft) | | $V_V$ = | 24.7626 | cu ft | | | |
| $W_V$ = Vapor Density (lb/cu ft) | | $W_V$ = | 0.0000 | lb / cu ft | | | |
| $K_E$ = Vapor Space Expansion Factor | | $K_E$ = | 0.0745 | | | | |
| $K_S$ = Vented Vapor Saturation Factor | | $K_S$ = | 1.0000 | | | | |
| *Tank Vapor Space Volume* | | | | | | | |
| $V_V$ = Vapor Space Volume (cu ft) | $V_V = [(Pi/4)\ D_E^2]\ H_{VO}$ | $V_V$ = | 24.7626 | cu ft | | | |
| D = Tank Diameter (ft) | | | | | | | |
| $D_E$ = Effective Diameter (ft) | $D_E = (L * D/(pi/4))^{1/2}$ | $D_E$ = | 4.5847 | ft | | | |
| $H_{VO}$ = Vapor Space Outage (ft) | $H_{VO} = H_E/2$ for horizontal tank | $H_{VO}$ = | 1.5000 | ft | | | Vertical Tank: $H_{VO} = H_S - H_L + H_{RO}$ |
| Hs = Tank Shell Length (ft) | | | | | | | |
| *Vapor Density* | | | | | | | |
| $W_V$ = Vapor Density (lb/cu ft) | $W_V = M_v\ P_{VA} / R\ T_{LA}$ | $W_V$ = | 0.0000 | lb / cu ft | | | 0 deg F = 459.67 R |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 190.0000 | lb/lb-mole | | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | | |
| $T_{LA}$ = Daily Avg. Liquid Surface Temp. (deg. R) | $T_{LA} = 0.44\ T_{AA} + 0.56\ T_B + 0.0079*alpha*I$ | $T_{LA}$ = | 517.9736 | R = | 14.61 | deg C | |
| $T_{AA}$ = Daily Average Ambient Temp. (deg. F) | $T_{AA} = T_{AX}+T_{AN} / 2$ | $T_{AA}$ = | 47.6792 | deg F = | 507.35 | R | |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)) | | | 10.7310 | | | | |
| $T_B$ = Liquid Bulk Temperature (deg. R) | $T_B = T_{AA} + 6\ alpha - 1$ | $T_B$ = | 511.6892 | | | | |
| Tank Paint Solar Absorptance (Shell) | | | 0.89 | | | | As per Table 7.1-6: Red/Primer = .89 |
| I = Daily Total Solar Insulation Factor (Btu/sqft day) | | | 1,165.412 | Btu/sqft d | | | $I_{AVG}$ = 1,165 Btu/ft$^2$-d as per sources mentioned on page 6-5 of TANKS user manual |

*Vapor Space Expansion Factor*

As per sources listed on page 6-5 of TANKS user manual:

| | | | | | | |
|---|---|---|---|---|---|---|
| $K_E$ = Vapor Space Expansion Factor | $K_E = [\text{delta } T_V/T_{LA}]+ [(\text{delta}P_V-\text{delta } P_B)/(P_A-P_{VA})]$ | $K_E$ = | 0.0745 | | $T_{AX}$ = | 515.4867 |
| delta $T_V$ = Daily Vapor Temperature Range (deg. R) | $\text{delta } T_V = 0.72(T_{AX}-T_{AN})+0.028*\text{alpha}*I]$ | delta $T_V$ = | 40.7601 | R | $T_{AN}$ = | 499.2117 |
| delta $P_V$ = Daily Vapor Pressure Range (psia) | | delta $P_V$ = | 0.0000 | psia | | |
| delta $P_B$ = Breather Vent Press. Setting Range (psia) | | delta $P_B$ = | 0.06 | psia | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia) | | | | | | |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia) | | | | | | |
| Daily Avg. Liquid Surface Temp. (deg R) | | | 517.9736 | R | | |
| Daily Min. Liquid Surface Temp. (deg R) | $T_{LN} = T_{LA} - 0.25 \text{ delta } T_V$ | $T_{LN}$ = | 507.783595 | R | | |
| Daily Max. Liquid Surface Temp. (deg R) | $T_{LX} = T_{LA} + 0.25 \text{ delta } T_V$ | $T_{LX}$ = | 528.1636 | R | | |
| delta $T_A$ = Daily Ambient Temp. Range (deg. R) | | delta $T_A$ = | 16.2750 | R | | |

*Vented Vapor Saturation Factor*

| | | | | | |
|---|---|---|---|---|---|
| Vented Vapor Saturation Factor | $K_S = 1/[1+ (.053*P_{VA}*H_{VO})]$ | $K_S$ = | 1.0000 | | |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | | | |
| Vapor Space Outage (ft) | | | | | |

*Working Losses (lb)*

| | | | | | |
|---|---|---|---|---|---|
| | $L_W = 0.0010 M_V P_{VA} Q K_N K_P$ | $L_W$ = | 0.0018 | lbs | |
| $M_V$ = Vapor Molecular Weight | | $M_V$ = | 190.0000 | lb/lb-mole | Q = annual net throughput = tank capacity [bbl] * annual turnover rate, bbl/yr |
| $P_{VA}$ = Vapor Pressure at Daily Average Liquid Surface Temperature (psia) | | | 0.0000 | | $K_N$ = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18 |
| Q = Annual Net Throughput (gal/yr) | 1 bbl/yr = 42 US gal/yr | Q = | 238.10 | bbl/yr | for turnovers >36, $K_N = (180 + N)/6N$ |
| Annual Turnovers | | N = | 37.04 | | for turnovers <36, $K_N = 1$ |
| $K_N$ = Turnover Factor | $K_N = (180 + N)/6N$ | $K_N$ = | 1.00 | | $K_P$ = working loss product factor, dimensionless |
| Tank Diameter (ft) | | | | | for crude oils $K_P = 0.75$ |
| Working Loss Product Factor | | $K_P$ = | 1.00 | | for all other organic liquids, $K_P = 1$ |
| Total Losses (lb) | | $L_T$ = | 0.0027 | lbs | |

**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**270 gallon Engine Oil Tank -**
**Horizontal Tank**
**Buffalo, New York**

**CALCULATED VALUES**

| **Losses (lbs)** | | |
|---|---|---|
| *Working Loss* | *Breathing Loss* | *Total Emissions* |
| 0.00181 | 0.00092 | 0.00273 |

# Attachment 15
# Estimated Emissions:  Drum Storage Building

## Drum Storage Building (DSB)

1) Sampling

The drum storage building currently processes 36,000 drums annually, but DSB supervisors believe they can process a sustained capacity of 4,000 drums per month, or 48,000 drums annually.

Each drum's bung is opened and the contents are sampled. A 0.10 pint sample is extracted from each 55 gallon drum and take to the laboratory in a closed, marked jar. A small portion of this sample is used for the laboratory analysis, with the remainder being returned to the drum. It is conservatively estimated that 10% of the material, or 0.01 pint, is consumed in the analysis procedure.

Each drum's bung is removed for less than one minute to return unused sample material. These drums are sampled after they have been in the Drum Storage Building long enough to reach equilibrium temperature and "settle out."

The amount of VOC emissions is overestimated by assuming that all of the analyzed volume evaporates, since only a small fraction of the drums are filled with VOCs[1]. Thus, annual emissions may be conservatively estimated to be:

$$\text{VOC emissions} = \frac{(48{,}000 \text{ drums})}{\text{yr}} \frac{(0.01 \text{ pint})}{\text{drum}} \frac{(1 \text{ gal})}{8 \text{ pint}} \frac{(7.00 \text{ lb})}{\text{gal}} \frac{(1 \text{ ton})}{2000 \text{ lb}} = 0.21 \text{ ton/yr}$$

The density of 7.00 lb/gal coincides closely with distillate fuels; most solvents are closer to 6.00 lb/gal. This estimate is probably at least one order of magnitude over actual emissions when these conservative factors are taken into account. Regardless of how greatly this emissions level is overestimated, the calculated value already establishes this activity to be a very minimal source of VOC emissions.

---

[1] Currently only 2,400 drums annually contain waste fuel

2) Waste Fuel Transfer

After sampling and analysis activities have been completed, any waste fuel is transferred from 55 gallon drums to tank trucks. The fuel transferred from the 55 gallon drums in a separate, isolated room in the DSB. The room is ventilated directly to the atmosphere. The waste fuel drums are pumped out with no vapor recovery apparatus. It is assumed that splash loading occurs inside the truck. The physical properties of gasoline and fuel oil have been averaged to establish a representative composite fuel profile for emissions estimation purposes.

The properties of gasoline (RVP = 13) and #2 fuel oil were taken from AP-42, Table 4.3-2 for determination of this composite profile. The resultant values for fuel loading VOC emissions are used below:

$$L_L = 12.46 \frac{SPM}{T} = \frac{(12.46)(1.45)(3.4537)(96)}{(460 + 55.8)}$$

$$= 11.61 \text{ lb VOC}/10^3 \text{ gal of fuel loaded}$$

where:

| | | |
|---|---|---|
| S | = | Saturation factor for splash loading (Table 4.4-1 of AP-42) |
| P | = | True vapor pressure of liquid loaded, psia |
| M | = | Molecular weight of vapor, lb/lb-mole |
| T | = | Temperature of bulk liquid loaded, °R (Table 12.3-6 of AP-42) |

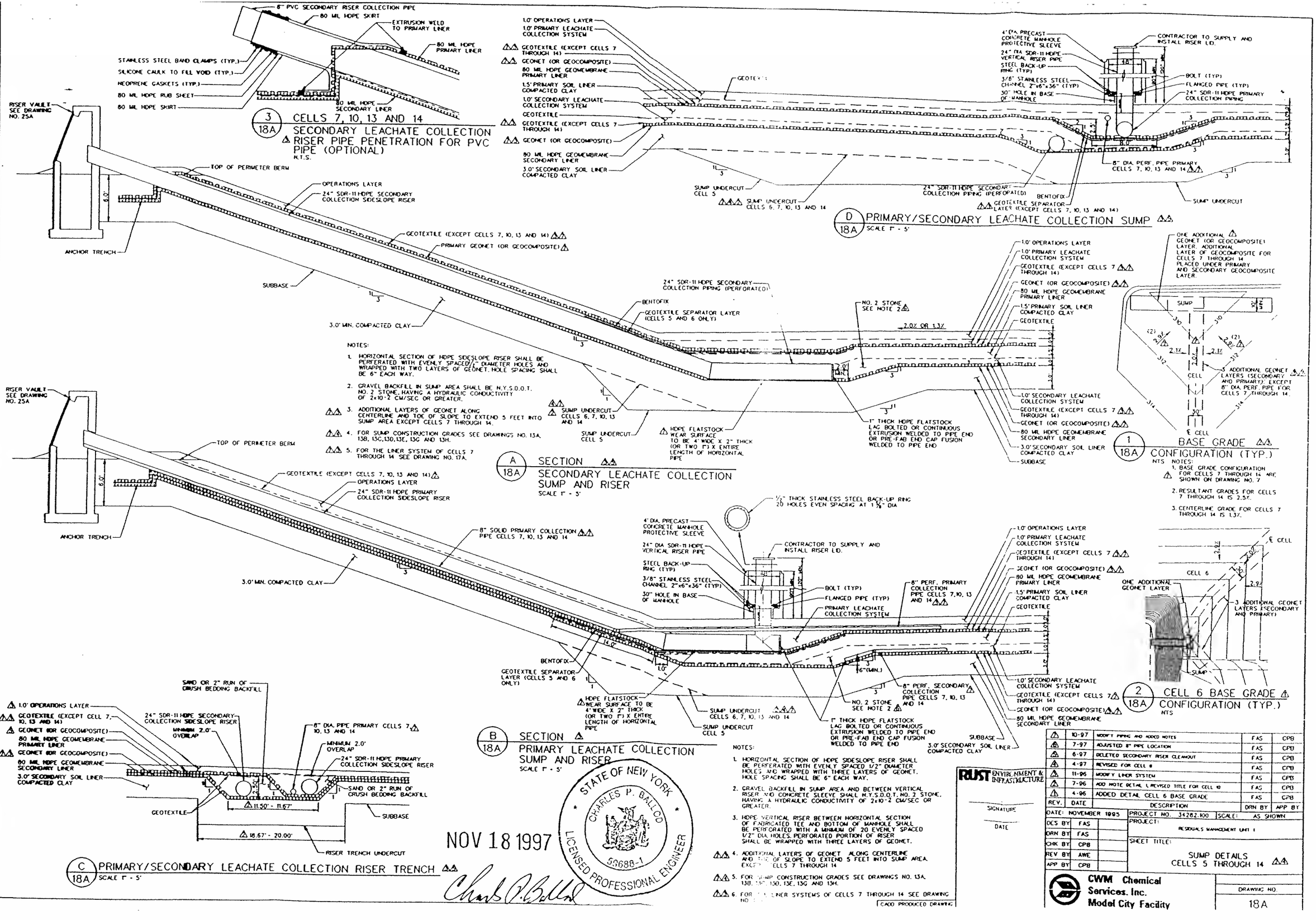
Since the maximum fuel transfer capacity is 5,000 drums per year, the maximum potential emissions are:

$$\frac{(5{,}000 \text{ drums})}{\text{yr}} \frac{(55 \text{ gal})}{\text{drum}} \frac{(11.61 \text{ lb VOC})}{1000 \text{ gal}} \frac{(1 \text{ ton})}{2000 \text{ lb}} = 1.60 \text{ ton VOC/yr}$$

The current annual emissions are less than one-half of the potential for this operation. The current level of emissions is:

$$\frac{(2{,}400 \text{ drums})}{\text{yr}} \frac{(55 \text{ gal})}{\text{drum}} \frac{(11.61 \text{ lb VOC})}{1000 \text{ gal}} \frac{(1 \text{ ton})}{2000 \text{ lb}} = 0.77 \text{ ton VOC/yr}$$

# Attachment 16
# Select Drawings of Landfills


8" PVC SECONDARY RISER COLLECTION PIPE
80 MIL HDPE SKIRT
EXTRUSION WELD TO PRIMARY LINER
80 MIL HDPE PRIMARY LINER
STAINLESS STEEL BAND CLAMPS (TYP.)
SILICONE CAULK TO FILL VOID (TYP.)
NEOPRENE GASKETS (TYP.)
80 MIL HDPE RUB SHEET
80 MIL HDPE SKIRT
80 MIL HDPE SECONDARY LINER
3 / 18A CELLS 7, 10, 13 AND 14 SECONDARY LEACHATE COLLECTION RISER PIPE PENETRATION FOR PVC PIPE (OPTIONAL) N.T.S.
RISER VAULT SEE DRAWING NO. 25A
TOP OF PERIMETER BERM
6.0'
OPERATIONS LAYER
24" SDR-11 HDPE SECONDARY COLLECTION SIDESLOPE RISER
ANCHOR TRENCH
GEOTEXTILE (EXCEPT CELLS 7, 10, 13 AND 14) △△
PRIMARY GEONET (OR GEOCOMPOSITE) △
SUBBASE
3.0' MIN. COMPACTED CLAY
1L/3
1.0' OPERATIONS LAYER
1.0' PRIMARY LEACHATE COLLECTION SYSTEM
GEOTEXTILE (EXCEPT CELLS 7 THROUGH 14) △△
GEONET (OR GEOCOMPOSITE) △△
80 MIL HDPE GEOMEMBRANE PRIMARY LINER
1.5' PRIMARY SOIL LINER COMPACTED CLAY
1.0' SECONDARY LEACHATE COLLECTION SYSTEM
GEOTEXTILE
GEOTEXTILE (EXCEPT CELLS 7 THROUGH 14) △△
GEONET (OR GEOCOMPOSITE) △△
80 MIL HDPE GEOMEMBRANE SECONDARY LINER
3.0' SECONDARY SOIL LINER COMPACTED CLAY
SUMP UNDERCUT CELL 5
SUMP UNDERCUT CELLS 6, 7, 10, 13 AND 14 △△△
24" SDR-11 HDPE SECONDARY COLLECTION PIPING (PERFORATED)
BENTOFIX
GEOTEXTILE SEPARATOR LAYER (CELLS 5 AND 6 ONLY)
△△△ GEOTEXTILE SEPARATOR LAYER (EXCEPT CELLS 7, 10, 13 AND 14)
8" DIA. PERF. PIPE PRIMARY CELLS 7, 10, 13 AND 14 △△
4' DIA. PRECAST CONCRETE MANHOLE PROTECTIVE SLEEVE
24" DIA SDR-11 HDPE VERTICAL RISER PIPE
STEEL BACK-UP RING (TYP)
3/8" STAINLESS STEEL CHANNEL 2"x6"x36" (TYP)
30" HOLE IN BASE OF MANHOLE
CONTRACTOR TO SUPPLY AND INSTALL RISER LID.
BOLT (TYP)
FLANGED PIPE (TYP)
24" SDR-11 HDPE PRIMARY COLLECTION PIPING
D / 18A PRIMARY/SECONDARY LEACHATE COLLECTION SUMP △△ SCALE 1" = 5'
NO. 2 STONE SEE NOTE 2 △
2.0% OR 1.3%
HDPE FLATSTOCK WEAR SURFACE TO BE 4" WIDE X 2" THICK (OR TWO 1") X ENTIRE LENGTH OF HORIZONTAL PIPE
1" THICK HDPE FLATSTOCK LAG BOLTED OR CONTINUOUS EXTRUSION WELDED TO PIPE END OR PRE-FAB END CAP FUSION WELDED TO PIPE END
NOTES:
1. HORIZONTAL SECTION OF HDPE SIDESLOPE RISER SHALL BE PERFERATED WITH EVENLY SPACED 1/2" DIAMETER HOLES AND WRAPPED WITH TWO LAYERS OF GEONET. HOLE SPACING SHALL BE 6" EACH WAY.
2. GRAVEL BACKFILL IN SUMP AREA SHALL BE N.Y.S.D.O.T. NO. 2 STONE, HAVING A HYDRAULIC CONDUCTIVITY OF 2x10-2 CM/SEC OR GREATER.
△△ 3. ADDITIONAL LAYERS OF GEONET ALONG CENTERLINE AND TOE OF SLOPE TO EXTEND 5 FEET INTO SUMP AREA EXCEPT CELLS 7 THROUGH 14.
△△△ 4. FOR SUMP CONSTRUCTION GRADES SEE DRAWINGS NO. 13A, 13B, 13C, 13D, 13E, 13G AND 13H.
△△ 5. FOR THE LINER SYSTEM OF CELLS 7 THROUGH 14 SEE DRAWING NO. 17A.
A / 18A SECTION △△ SECONDARY LEACHATE COLLECTION SUMP AND RISER SCALE 1" = 5'
ONE ADDITIONAL △ GEONET (OR GEOCOMPOSITE) LAYER. ADDITIONAL LAYER OF GEOCOMPOSITE FOR CELLS 7 THROUGH 14 PLACED UNDER PRIMARY AND SECONDARY GEOCOMPOSITE LAYER.
SUMP
CELL
5 ADDITIONAL GEONET △△ LAYERS (SECONDARY AND PRIMARY) EXCEPT 8" DIA. PERF. PIPE FOR CELLS 7 THROUGH 14.
℄ CELL
1 / 18A BASE GRADE △△ CONFIGURATION (TYP.)
NTS NOTES:
1. BASE GRADE CONFIGURATION FOR CELLS 7 THROUGH 14 ARE △ SHOWN ON DRAWING NO. 7
2. RESULTANT GRADES FOR CELLS 7 THROUGH 14 IS 2.5%.
3. CENTERLINE GRADE FOR CELLS 7 THROUGH 14 IS 1.3%.
RISER VAULT SEE DRAWING NO. 25A
TOP OF PERIMETER BERM
6.0'
GEOTEXTILE (EXCEPT CELLS 7, 10, 13 AND 14) △
OPERATIONS LAYER
24" SDR-11 HDPE PRIMARY COLLECTION SIDESLOPE RISER
ANCHOR TRENCH
8" SOLID PRIMARY COLLECTION PIPE CELLS 7, 10, 13 AND 14 △△
3.0' MIN. COMPACTED CLAY
1L/3
BENTOFIX
GEOTEXTILE SEPARATOR LAYER (CELLS 5 AND 6 ONLY)
HDPE FLATSTOCK WEAR SURFACE TO BE 4" WIDE X 2" THICK (OR TWO 1") X ENTIRE LENGTH OF HORIZONTAL PIPE
SUMP UNDERCUT CELLS 6, 7, 10, 13 AND 14 △△△
SUMP UNDERCUT CELL 5
NO. 2 STONE SEE NOTE 2 △
1" THICK HDPE FLATSTOCK LAG BOLTED OR CONTINUOUS EXTRUSION WELDED TO PIPE END OR PRE-FAB END CAP FUSION WELDED TO PIPE END
8" PERF. SECONDARY COLLECTION PIPE CELLS 7, 10, 13 AND 14 △△
1/2" THICK STAINLESS STEEL BACK-UP RING 20 HOLES EVEN SPACING AT 1 7/8" DIA
4' DIA. PRECAST CONCRETE MANHOLE PROTECTIVE SLEEVE
24" DIA SDR-11 HDPE VERTICAL RISER PIPE
STEEL BACK-UP RING (TYP)
3/8" STAINLESS STEEL CHANNEL 2"x6"x36" (TYP)
30" HOLE IN BASE OF MANHOLE
CONTRACTOR TO SUPPLY AND INSTALL RISER LID.
BOLT (TYP)
FLANGED PIPE (TYP)
PRIMARY LEACHATE COLLECTION SYSTEM
1.0' OPERATIONS LAYER
1.0' PRIMARY LEACHATE COLLECTION SYSTEM
GEOTEXTILE (EXCEPT CELLS 7 THROUGH 14) △△
GEONET (OR GEOCOMPOSITE) △△
80 MIL HDPE GEOMEMBRANE PRIMARY LINER
1.5' PRIMARY SOIL LINER COMPACTED CLAY
GEOTEXTILE
1.0' SECONDARY LEACHATE COLLECTION SYSTEM
GEOTEXTILE (EXCEPT CELLS 7 THROUGH 14) △
GEONET (OR GEOCOMPOSITE) △△
80 MIL HDPE GEOMEMBRANE SECONDARY LINER
3.0' SECONDARY SOIL LINER COMPACTED CLAY
SUBBASE
NOTES:
1. HORIZONTAL SECTION OF HDPE SIDESLOPE RISER SHALL BE PERFERATED WITH EVENLY SPACED 1/2" DIAMETER HOLES AND WRAPPED WITH THREE LAYERS OF GEONET. HOLE SPACING SHALL BE 6" EACH WAY.
2. GRAVEL BACKFILL IN SUMP AREA AND BETWEEN VERTICAL RISER AND CONCRETE SLEEVE SHALL N.Y.S.D.O.T. NO. 2 STONE, HAVING A HYDRAULIC CONDUCTIVITY OF 2x10-2 CM/SEC OR GREATER.
3. HDPE VERTICAL RISER BETWEEN HORIZONTAL SECTION OF FABRICATED TEE AND BOTTOM OF MANHOLE SHALL BE PERFORATED WITH A MINIMUM OF 20 EVENLY SPACED 1/2" DIA. HOLES. PERFORATED PORTION OF RISER SHALL BE WRAPPED WITH THREE LAYERS OF GEONET.
△△ 4. ADDITIONAL LAYERS OF GEONET ALONG CENTERLINE AND TOE OF SLOPE TO EXTEND 5 FEET INTO SUMP AREA EXCEPT CELLS 7 THROUGH 14
△△ 5. FOR SUMP CONSTRUCTION GRADES SEE DRAWINGS NO. 13A, 13B, 13C, 13D, 13E, 13G AND 13H.
△△ 6. FOR THE LINER SYSTEMS OF CELLS 7 THROUGH 14 SEE DRAWING NO. 17A.
B / 18A SECTION △ PRIMARY LEACHATE COLLECTION SUMP AND RISER SCALE 1" = 5'
CELL 6
ONE ADDITIONAL GEONET LAYER
3 ADDITIONAL GEONET LAYERS (SECONDARY AND PRIMARY)
SUMP
2 / 18A CELL 6 BASE GRADE △ CONFIGURATION (TYP.) NTS
SAND OR 2" RUN OF CRUSH BEDDING BACKFILL
1.0' OPERATIONS LAYER
GEOTEXTILE (EXCEPT CELL 7, 10, 13 AND 14) △△
GEONET (OR GEOCOMPOSITE) △
80 MIL HDPE GEOMEMBRANE PRIMARY LINER
GEONET (OR GEOCOMPOSITE) △△
80 MIL HDPE GEOMEMBRANE SECONDARY LINER
3.0' SECONDARY SOIL LINER COMPACTED CLAY
24" SDR-11 HDPE SECONDARY COLLECTION SIDESLOPE RISER
MINIMUM 2.0' OVERLAP
8" DIA. PIPE PRIMARY CELLS 7, 10, 13 AND 14 △
MINIMUM 2.0' OVERLAP
24" SDR-11 HDPE PRIMARY COLLECTION SIDESLOPE RISER
SAND OR 2" RUN OF CRUSH BEDDING BACKFILL
GEOTEXTILE
11.50' - 11.67' △
18.67' - 20.00' △
SUBBASE
RISER TRENCH UNDERCUT
C / 18A PRIMARY/SECONDARY LEACHATE COLLECTION RISER TRENCH △△ SCALE 1" = 5'
STATE OF NEW YORK
CHARLES P. BALLOD
LICENSED PROFESSIONAL ENGINEER
59688-1
NOV 18 1997
CADD PRODUCED DRAWING
RUST ENVIRONMENT & INFRASTRUCTURE
SIGNATURE
DATE
△ 10-97 MODIFY PIPING AND ADDED NOTES FAS CPB
△ 7-97 ADJUSTED 8" PIPE LOCATION FAS CPB
△ 6-97 DELETED SECONDARY RISER CLEANOUT FAS CPB
△ 4-97 REVISED FOR CELL 8 FAS CPB
△ 11-96 MODIFY LINER SYSTEM FAS CPB
△ 7-96 ADD NOTE DETAIL 1, REVISED TITLE FOR CELL 10 FAS CPB
△ 4-96 ADDED DETAIL CELL 6 BASE GRADE FAS CPB
REV. DATE DESCRIPTION DRN BY APP BY
DATE: NOVEMBER 1995
PROJECT NO. 34282.100
SCALE: AS SHOWN
DES BY FAS
DRN BY FAS
CHK BY CPB
REV BY AWE
APP BY CPB
PROJECT: RESIDUALS MANAGEMENT UNIT 1
SHEET TITLE: SUMP DETAILS CELLS 5 THROUGH 14 △△
CWM Chemical Services, Inc. Model City Facility
DRAWING NO. 18A




LEGEND

- 300 — EXISTING CONTOURS
- x318.9 EXISTING SPOT ELEVATIONS
- ROADS
- FENCE LINES
- TREES-WOODED AREAS
- TRAILS
- STREAMS, BODIES OF WATER
- BUILDINGS
- TP 3 TEST PIT LOCATION AND NUMBER
- B 1 TEST BORING LOCATION AND NUMBER
- WELL NO.3 EXISTING GROUND-WATER MONITORING WELL LOCATION NUMBER
- R-1 SURFACE WATER SAMPLING STATION

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: RH
Checked by:
Date: OCT. 30, 1979

Scales: 1" = 300'

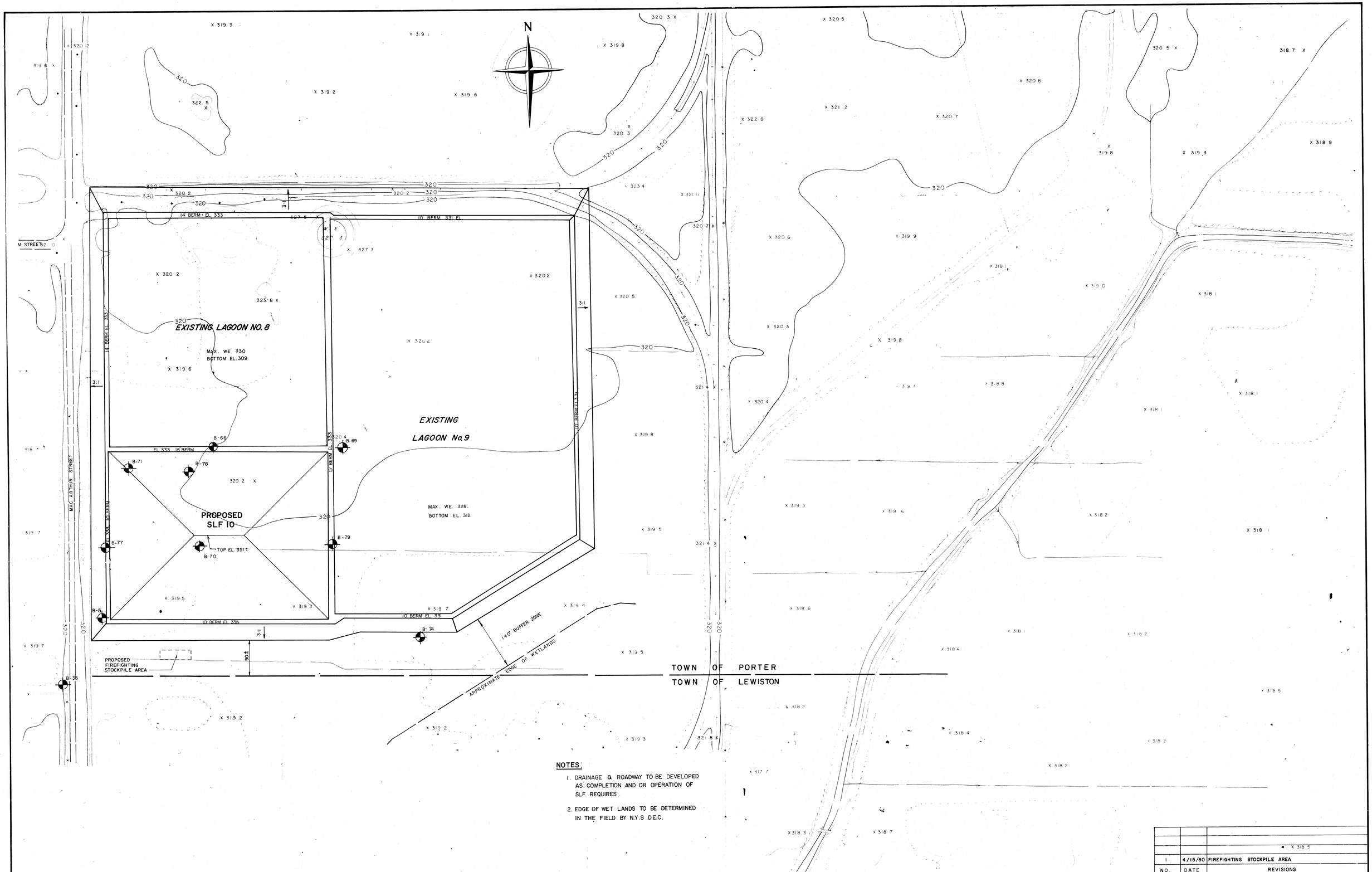
SALVATORE V. ARLOTTA, JR., P.E.
N.Y. P.E. No. 53679 Date:

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

SCIENTIFIC LANDFILL No. 10
# FACILITY PLAN

Sheet 1 of 13
Project No. 01368157

Tech-Repro Inc. N44901




NOTES:

1. DRAINAGE & ROADWAY TO BE DEVELOPED AS COMPLETION AND OR OPERATION OF SLF REQUIRES.
2. EDGE OF WET LANDS TO BE DETERMINED IN THE FIELD BY N.Y.S D.E.C.

| NO. | DATE | REVISIONS |
|---|---|---|
| 1 | 4/15/80 | FIREFIGHTING STOCKPILE AREA |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn: FWD
Checked:
Date: OCT. 30, 1979

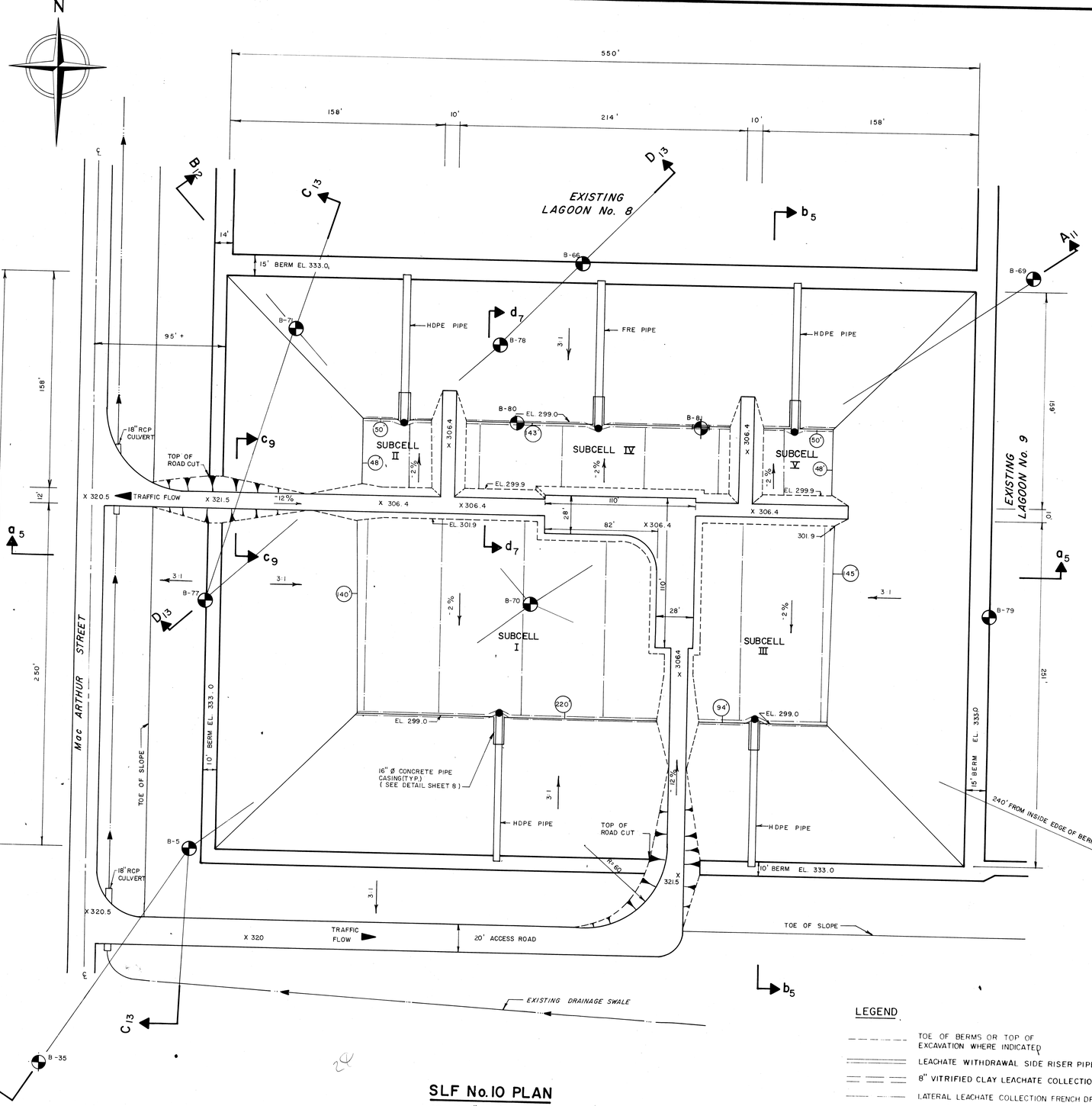
Scale: 1" = 100

SALVATORE V. ARLOTTA, JR., P.E.
N.Y.P.E. No. DATE

SCA CHEMICAL WASTE SERVICES, INC
MODEL CITY, NIAGARA COUNTY, NEW YORK

# SCIENTIFIC LANDFILL No. 10
# SITE LOCATION PLAN

Sheet 2 of 13
Project No 01368157




## SLF No. 10 PLAN

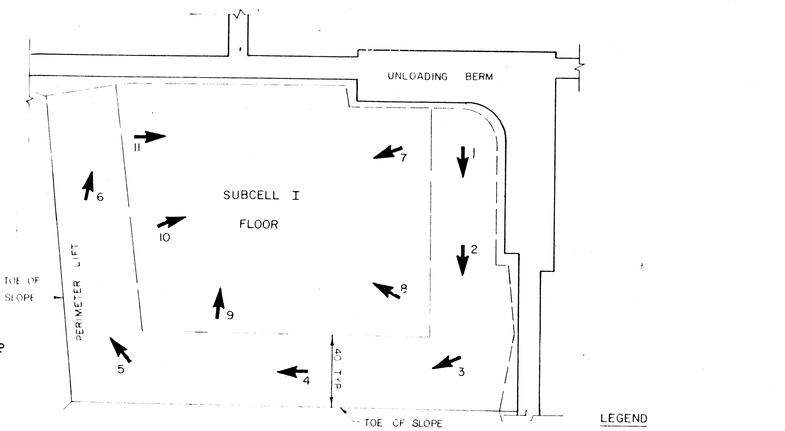
SCALE: 1"= 40'

OPERATION PLAN

| Subcell | Waste Material | Location in SLF # 10 | % of SLF Volume | Approx. No. of Lifts | Waste Capacity (cy) | Fill and Cover Material (cy) | Total Capacity (cy) |
|---|---|---|---|---|---|---|---|
| Subcell I | Heavy Metals | Southwest Corner | 40 41 % | 13 | 49,800 | 26,700 | 76,500 |
| Subcell II | Pseudo Metals | Northwest Corner | 20 24 % | 12 | 12,100 | 6,600 | 18,700 |
| Subcell III | General Wastes | Southeast Corner | 25 10 % | 13 | 29,100 | 15,700 | 44,800 |
| Subcell IV | Halogenated wastes | North Center | 15 15 % | 12 | 18,200 | 9,800 | 28,000 |
| Subcell V | Flammable Wastes | Northeast Corner | 10 % | 12 | 12,100 | 6,600 | 18,700 |
| | | | | TOTAL | 121,300 | 65,400 | 186,700 |

NOTES:

1. SEE SHEET 4 FOR CONSTRUCTION NOTES
2. $b_5$ REFFERS TO SECTION b ON SHEET 5
3. $B_{12}$ REFFERS TO GEOLOGIC SECTION B ON SHEET 12




LEGEND

I ORDER OF FILLING
DIRECTION OF FILLING

## TYPICAL OPERATIONAL SEQUENCE

N. T. S.

WASTE SHALL BE PLACED INITIALLY AS A PERIMETER LIFT ALONG THE TOE OF SLOPE OF THE OUTSIDE CELL WALLS. FILLING SHOULD START AT A LOCATION THAT WILL PROVIDE EASY ACCESS FOR THE PLACEMENT OF COVER MATERIAL. ONCE THE PERIMETER LIFT IS COMPLETED, FILLING SHALL PROCEED AS SHOWN. THIS PROCEDURE IS TO BE FOLLOWED FOR EACH LIFT.

LEGEND

- TOE OF BERMS OR TOP OF EXCAVATION WHERE INDICATED
- LEACHATE WITHDRAWAL SIDE RISER PIPE
- 8" VITRIFIED CLAY LEACHATE COLLECTION PIPE
- LATERAL LEACHATE COLLECTION FRENCH DRAIN
- VERTICAL RISER PIPE
- X 321.5 SPOT ELEVATION, TOP OF 2' CLAY LINER OR ACCESS BERMS
- (125) CELL BOTTOM DIMENSIONS
- B-74 BORING LOCATION

| NO. | Date | REVISIONS |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| 1 | 4/15/80 | FRENCH DRAIN SUBCELLS II AND V |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: F.W. DG.
Checked by:
Date: 1/30/80

Scales: 1"= 40'

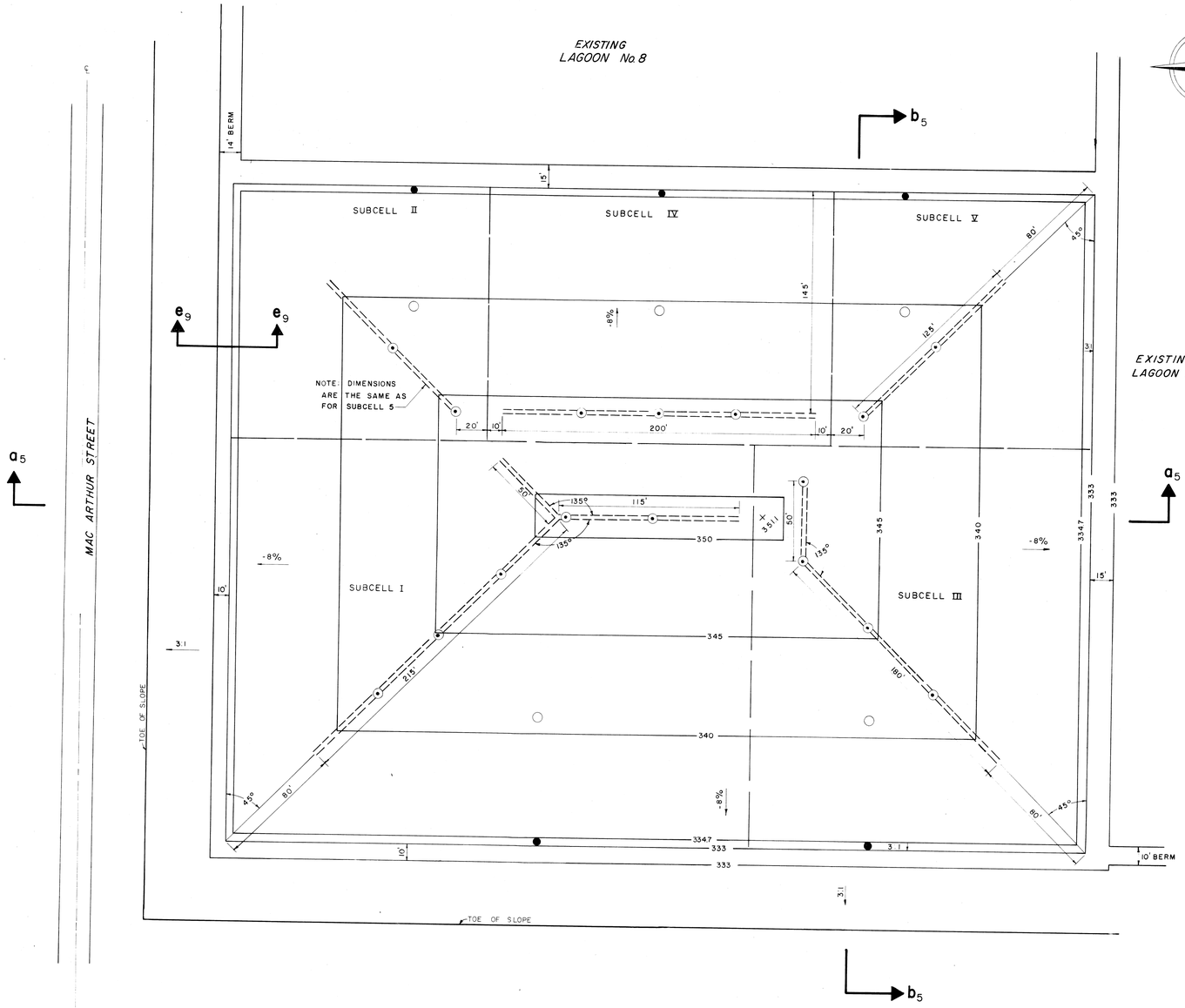
SALVATORE V. ARLOTTA, JR., P.E.
Salvatore V Arlotta Jr 4 Feb 80
N.Y. P.E. No. 53679 Date

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

SCIENTIFIC LANDFILL No. 10
PLAN

Sheet 3 of 13
Project No. 01368157

Tech-Repro, Inc. 37934




TOWN OF PORTER
TOWN OF LEWISTON

## FINAL GRADING PLAN

SCALE: 1"=40'

NOTES:

1. EXCAVATION AND FINAL GRADING PLANS REFLECT TOPOGRAPHY AS IT SHOULD EXIST AT THE RESPECTIVE TIMES OF EXCAVATION AND CAPPING OF THE LANDFILL.
2. EXCAVATION PLAN DOES NOT REFLECT STRIPPING 1½ FEET OF MATERIAL OFF THE SOUTH BERM OF LAGOON No.8 FOR PLACEMENT OF HYPALON LINER.

## EXCAVATION PLAN

SCALE: 1"= 60'

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: A.K.
Checked by:
Date: 10/30/79

Scales: AS SHOWN

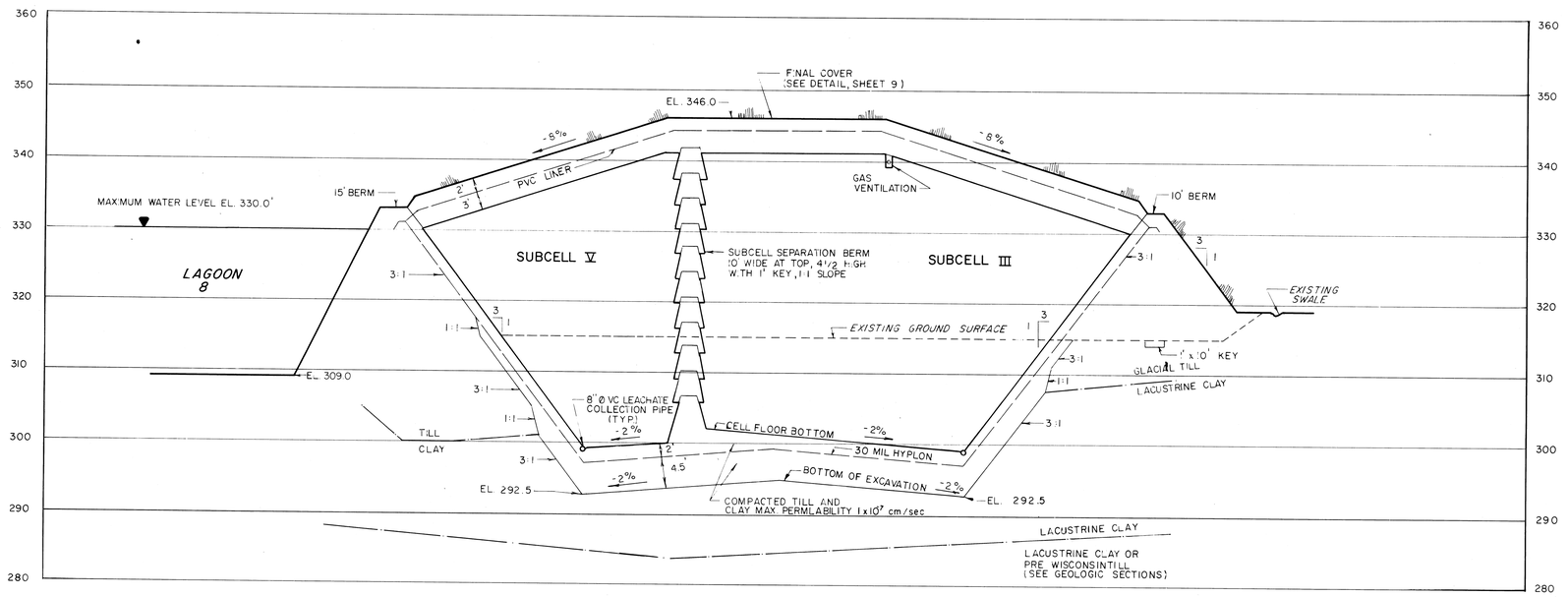
SALVATORE V. ARLOTTA, JR., P.E.
N.Y. P.E. No. 53679 Date

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

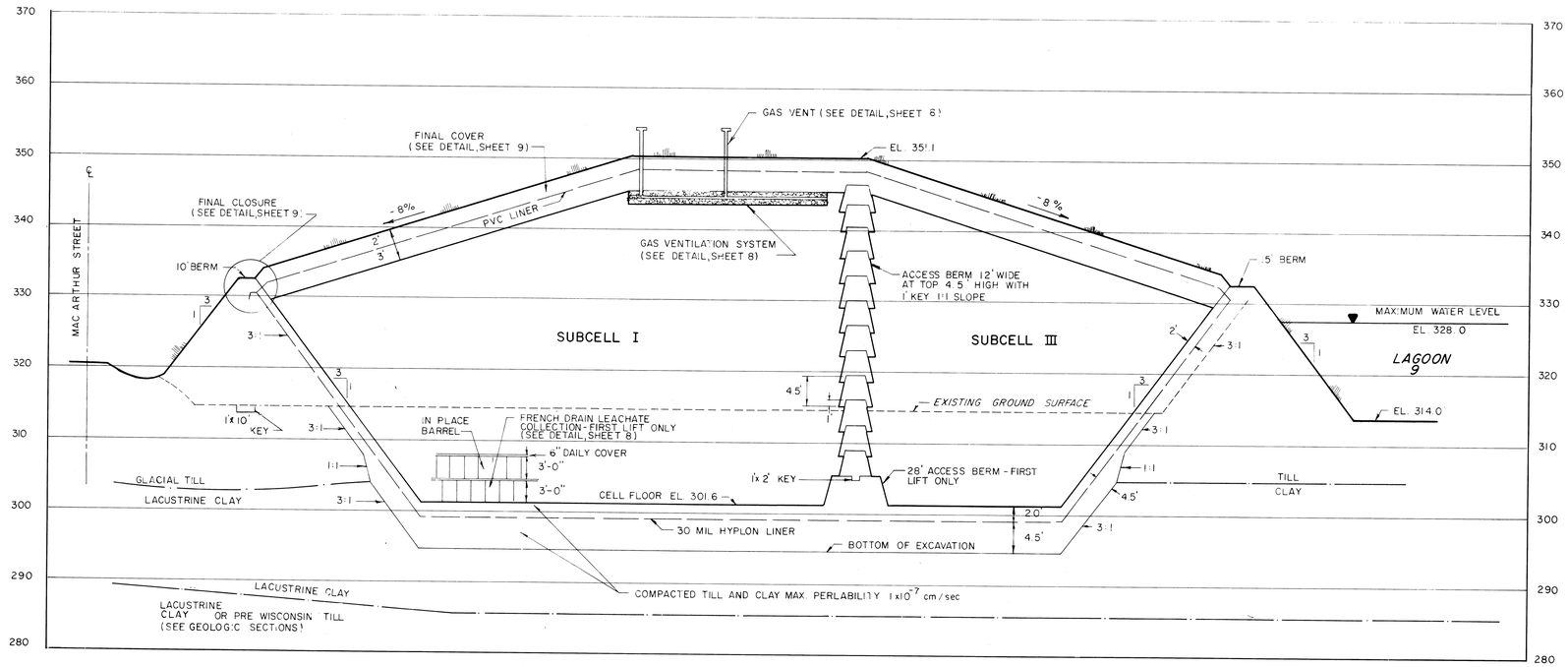
SCIENTIFIC LANDFILL No. 10
FINAL GRADING PLAN
EXCAVATION PLAN

Sheet 4 of 13
Project No. 01368157

Tech-Repro Inc. N44901




## SECTION b-b3,4




## SECTION a-a3,4

### CONSTRUCTION NOTES

1. CONTRACTOR IS TO VERIFY ALL DIMENSIONS IN FIELD PRIOR TO START OF CONSTRUCTION.

2. THE LANDFILL SHALL BE PROTECTED ON ITS BOTTOM AND EXTERIOR SIDE BY A DOUBLE LINER CONSISTING OF 2 FEET OF COMPACTED CLAY OVER A HYPALON LINER. THE CLAY SHALL BE COMPACTED TO A MAXIMUM PERMEABILITY OF 10-7 CM/SEC. AND 90% MODIFIED PROCTOR DENSITY. 30 MIL HYPALON WITH A 10 x 10 SCRIM SHALL BE USED AND PANELS JOINED WITH BEAD BOND CEMENT. THE HYPALON SHALL BE PLACED PER MANUFACTURER'S SPECIFICATIONS. ALL SHARP OBJECTS, STICKS, STONES, AND TRASH SHALL BE REMOVED FROM THE AREA UNDER THE LINER. A LINER BASE CONSISTING OF A MINIMUM 4 1/2 FT. OF COMPACTED GLACIAL TILL SHALL BE PLACED UNDER THE HYPALON WHERE EXCAVATION ENTERS THE LACUSTRINE CLAY. THE LINER BASE SHALL THEN BE ROLLED SMOOTH PRIOR TO HYPALON PLACEMENT.

3. THE SUBCELLS IN SLF NO. 10 SHALL BE SEGREGATED BY COMPACTED SOIL BERMS TO PROVIDE A MINIMUM OF TEN FEET OF SEPARATION BETWEEN WASTES IN ADJACENT CELLS. CLAYEY SOILS EXCAVATED DURING THE CONSTRUCTION OF SLF NO. 10 SHALL BE USED FOR BERM CONSTRUCTION. EACH BERM SHALL BE APPROXIMATELY 4'-6" IN HEIGHT, WITH THE HEIGHT OF THE FINAL STAGE VARIABLE TO ACHIEVE A GRADE OF ONE FOOT HIGHER THAN THE LANDFILLED WASTE. THE BERMS SHALL BE CONSTRUCTED IN SIX-INCH LAYERS AND COMPACTED WITH A SHEEPSFOOT ROLLER TO 90% MODIFIED PROCTOR DENSITY.

4. SUBCELL IV (HALOGENATED WASTES) WILL HAVE A SYNTHETIC MEMBRANE LINER, AS SPECIFIED BY SCA CHEMICAL WASTE SERVICES, INC., PLACED ON ONE FOOT BASE OF COMPACTED AND ROLLED CLAY ABOVE THE HYPALON, AND ALONG THE SIDE WALLS TO A HEIGHT OF 5 TO 7 FEET ABOVE THE SUBCELL FLOOR. ONE FOOT OF COMPACTED CLAY SHALL BE PLACED ABOVE THE SYNTHETIC MEMBRANE LINER. (SEE SECTION $d_3$-$d_3$). ALL CLAYS ARE TO BE COMPACTED TO A MAXIMUM PERMEABILITY OF 10-7 CM/SEC.

5. INTERNAL LEACHATE MONITORING SYSTEMS SHALL BE INSTALLED IN EACH SUBCELL OF SLF NO. 10 AND LOCATED AS SHOWN ON THE PLAN. FOR LEACHATE MONITORING AND PUMPING. THE BOTTOM OF EACH SUBCELL SHALL BE GRADED AS NECESSARY TO PROVIDE A MINIMUM 2% SLOPE TO THE LEACHATE COLLECTION PIPES. THE COLLECTION PIPES SHALL BE EIGHT-INCH DIAMETER VITRIFIED CLAY PIPE. THE MINIMUM CRUSHING STRENGTH OF THE EIGHT-INCH PIPE SHALL BE "EXTRA STRENGTH" STANDARDS 2200 LBS/LINEAR FOOT. THE STRENGTH, MATERIAL, AND WORKMANSHIP OF THE CLAY PIPE SHALL CONFORM TO THE A.S.T.M. C-700. INSTALLATION OF THE VITRIFIED CLAY PIPE SHALL BE IN ACCORDANCE WITH A.S.T.M. C-12. A TEN INCH OBSERVATION PIPE SHALL BE INSTALLED FOR LEACHATE MONITORING AND PUMPING DURING THE OPERATIONAL STAGES OF THE LANDFILL, EXCEPT IN SUBCELL IV, WHERE FIBERGLASS REINFORCED EPOXY PIPE SHALL BE USED. MATERIALS OF CONSTRUCTION SHALL CONFORM TO ASTM CITING FOR THE HDPE PIPE AND HAVE A MINIMUM HYDROSTATIC DESIGN STRESS OF 730 PSI.

   MATERIALS OF CONSTRUCTION FOR THE FIBERGLASS REINFORCED EPOXY PIPE SHALL CONFORM TO ASTM D2310 AND ASTM D2996. PIPE SHALL BE DESIGNED FOR THE ACTUAL LOADS IMPOSED. WHERE CLASS "A" BEDDING IS REQUIRED, REINFORCED CONCRETE PIPE SHALL BE USED AS INDICATED ON THE PLANS. CONCRETE PIPE SHALL CONFORM TO ASTM C-76.

   A STEEL PIPE DESIGN MAY BE SUBSTITUTED FOR CONCRETE PIPE FOR ENCASEMENT OF THE RISER. PRESTRESSED CONCRETE CYLINDER PIPE WITH HARNESSED JOINTS (SPS AS MANUFACTURED BY INTERPACE OR EQUIV.) SHALL BE USED AS THE VERTICAL LEACHATE COLLECTION RISER PIPE AND SUMP WITH A CAST IN PLACE BASE AS SHOWN IN THE DETAILS. PIPE SHALL CONFORM WITH AWWA C-301-72.

6. THE CONSTRUCTION OF SLF NO. 10 SHALL BE INSPECTED BY A PROFESSIONAL ENGINEER AFTER EXCAVATION IS COMPLETED BUT PRIOR TO INSTALLATION OF LINER. PERMEABILITY SAMPLES SHALL BE TAKEN AND LABORATORY TESTED, FROM THE BOTTOM AND SIDES OF SLF NO. 10, TO ASSURE COMPLIANCE WITH THE SPECIFICATIONS SET FORTH IN NOTE 2. ONE PERMEABILITY SAMPLE PER SUBCELL IS REQUIRED.

7. THE PERIMETER BERMS SHALL BE SET AT ELEVATION 333.0.

8. ALL DIMENSIONS TO BE VERIFIED AND APPROVED BY THE ENGINEER OR HIS REPRESENTATIVE IN THE FIELD.

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: FWP
Checked by:
Date: NOV. 30, 1979

Scales
1" = 40' HORIZONTAL
1" = 10' VERTICAL

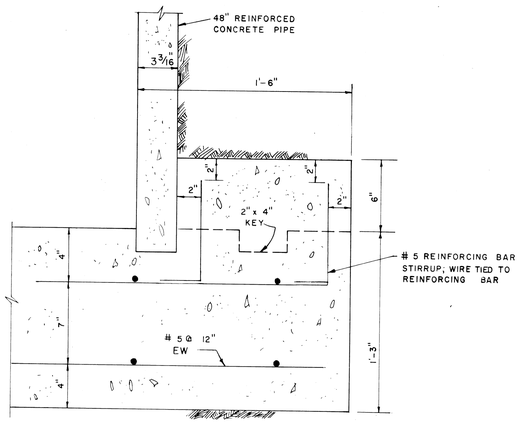
SALVATORE V. ARLOTTA, JR., P.E.
N.Y.P.E. No. 53679

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

SCIENTIFIC LANDFILL No. 10
SECTIONS

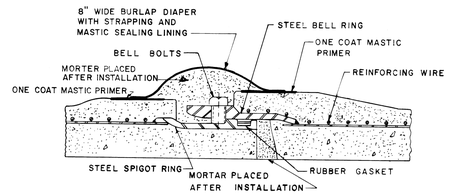
Sheet 5 of 13
Project No. 01368157

Tech-Repro Inc. N44901




## BASE REINFORCING RING DETAIL

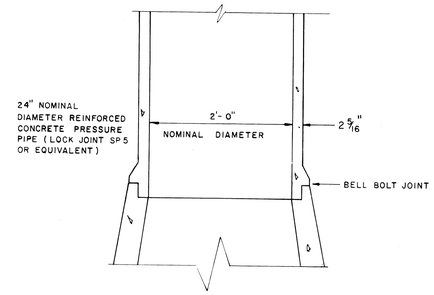
SCALE: 2"= 1'-0"

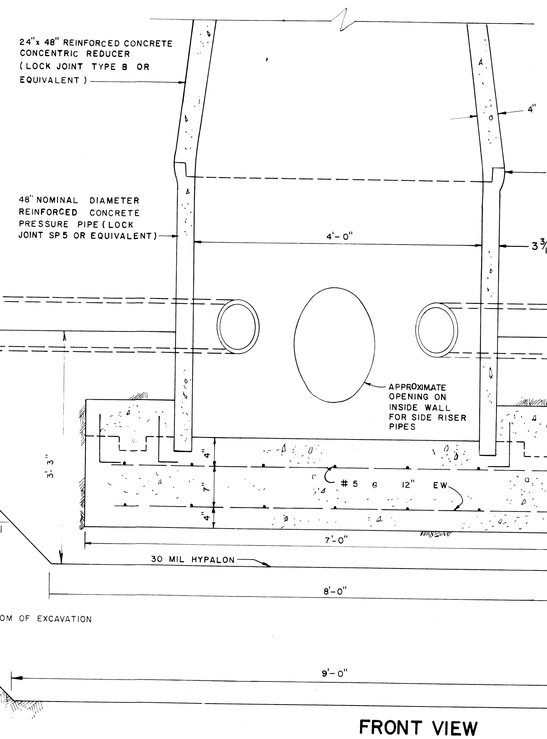



## BELL BOLT JOINT DETAIL

NOTES

1. LEACHATE SUMP BASE TO BE POURED IN PLACE. CONCRETE REINFORCED WITH NO. 5 REINFORCING BARS ON 12" CENTERS IN BOTH DIRECTIONS AS SHOWN.
2. VERTICAL RISER SECTIONS TO BE REINFORCED CONCRETE PRESSURE PIPE WITH MECHANICAL JOINTS.
3. 48" NOMINAL DIAMETER CONCRETE PIPE TO BE PRESSED INTO POURED CONCRETE BASE TO A MINIMUM DEPTH OF 2 INCHES. PIPE THAN TO BE REMOVED, GROOVE CLEANED, AND REINSTALLED AFTER BASE SETS UP. STABILIZATION. RING WILL THEN BE POURED IN PLACE.
4. ALL EXPOSED CONCRETE SURFACES TO BE COATED WITH EPOXY (KOPPERS NO. 300 OR EQUIVALENT) FOR CORROSION PROTECTION
5. MINIMUM 1' OF GRAVEL TO BE PLACED AROUND VERTICAL RISER PIPES AND BASES FOR FULL DEPTH OF CELL.
6. SIDE RISER PIPE TO BE 12" DIA. HDPE WITH A MINIMUM WALL THICKNESS OF .4", EXCEPT IN THE HALOGENATED WASTES CELL WHERE THE PIPE MATERIAL IS TO BE FIBERGLASS REINFORCED EPOXY.
7. A 16" DIA RCP SHALL ENCASE THE RISER PIPE FOR A LENGTH OF 20' UP THE SIDE WALLS. (CLASS "A" BEDDING)
8. A MIN. OF 18" OF PROTECTIVE SOIL LAYER SHALL BE PLACED ABOVE THE RISER PIPES ALL THE WAY UP THE SLOPE.
9. BOTTOM OF RISER PIPE IS TO BE BEVELED TO REST ON BOTTOM OF MANHOLE.

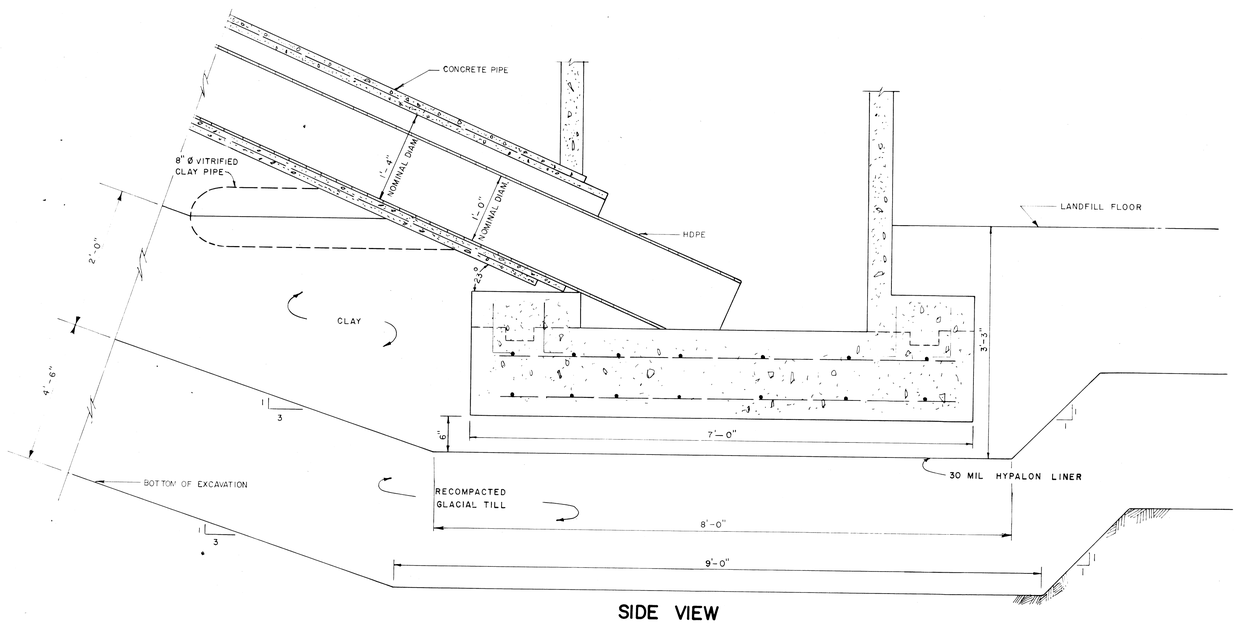



NOTE: FOR SUBCELL SUMP WILL BE RAISED 1 FOOT TO ALLOW PLACEMENT OF SECOND SYNTHETIC LINER (SEE SIDE VIEW SHEET 7)

## FRONT VIEW
## LEACHATE COLLECTION AND REMOVAL SUMP

SCALE: 1" = 1'




## SIDE VIEW
## LEACHATE COLLECTION AND REMOVAL SUMP

SCALE: 1" = 1'

(NOT FOR SUBCELL IV)

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: A.K.
Checked by:
Date:

Scales: AS SHOWN

SALVATORE V. ARLOTTA, JR., P.E.
N.Y. P.E. No. 53619 Date:

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

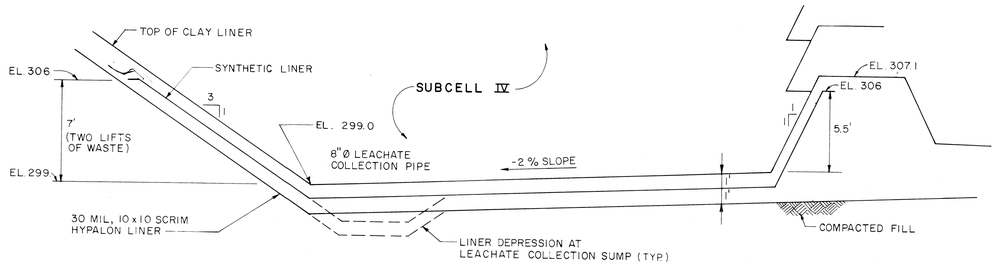
SCIENTIFIC LANDFILL No 10
DETAILS

Sheet 6 of 13
Project No. 01368157

Tech-Repro Inc. N44901

## NOTES

1. LEACHATE COLLECTION PIPE TO BE 8" EXTRA STRENGTH NON-PERFORATED VITRIFIED CLAY PIPE. PIPE IS TO BE LAID WITH OPEN JOINTS. JOINTS ARE TO BE WRAPPED AROUND THE CIRCUMFERENCE OF THE PIPES WITH FILTER FABRIC (8101M C-22 OR EQUIV.) FOR A MINIMUM OF ONE FOOT ON EITHER SIDE OF THE JOINT TO PREVENT CLOGGING. PIPES WILL BE COVERED WITH WELL GRADED GRAVEL FOR A MINIMUM DEPTH OF 18" ABOVE THE TOP OF THE PIPE.
2. ALL PIPE CONNECTIONS TO LEACHATE COLLECTION SUMP WILL BE SEALED WITH NON-SHRINK GROUT.
3. BEDDING FOR PIPE SHALL BE AS SHOWN IN DETAIL ON SHEET 8.
4. THE CLAY PIPE SHALL BE MANUFACTURED FROM FIRE CLAY, SHALE, SURFACE CLAY OR A COMBINATION OF THESE MATERIALS AND FIRED TO SUITABLE TEMPERATURES WHICH YIELDS A STRONG DURABLE PIPE. THE MINIMUM CRUSHING STRENGTH FOR 8" PIPE SHALL BE 2,200 LBS/LINEAR FOOT. THE PIPE SHALL MEET A.S.T.M. C-700 STANDARDS.

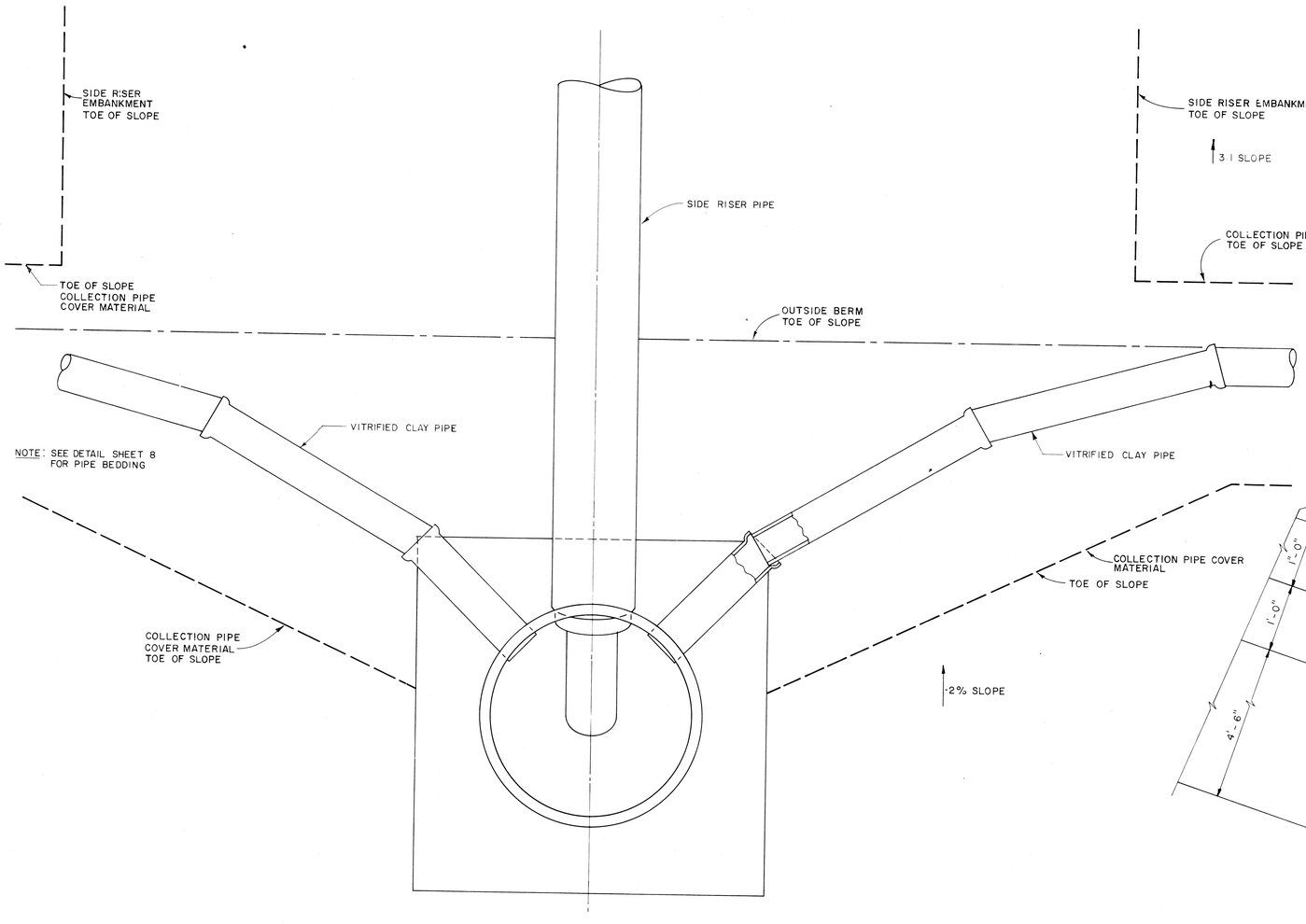



SECTION $d_3$-$d_3$

HALOGENATED WASTE SUBCELL DETAIL

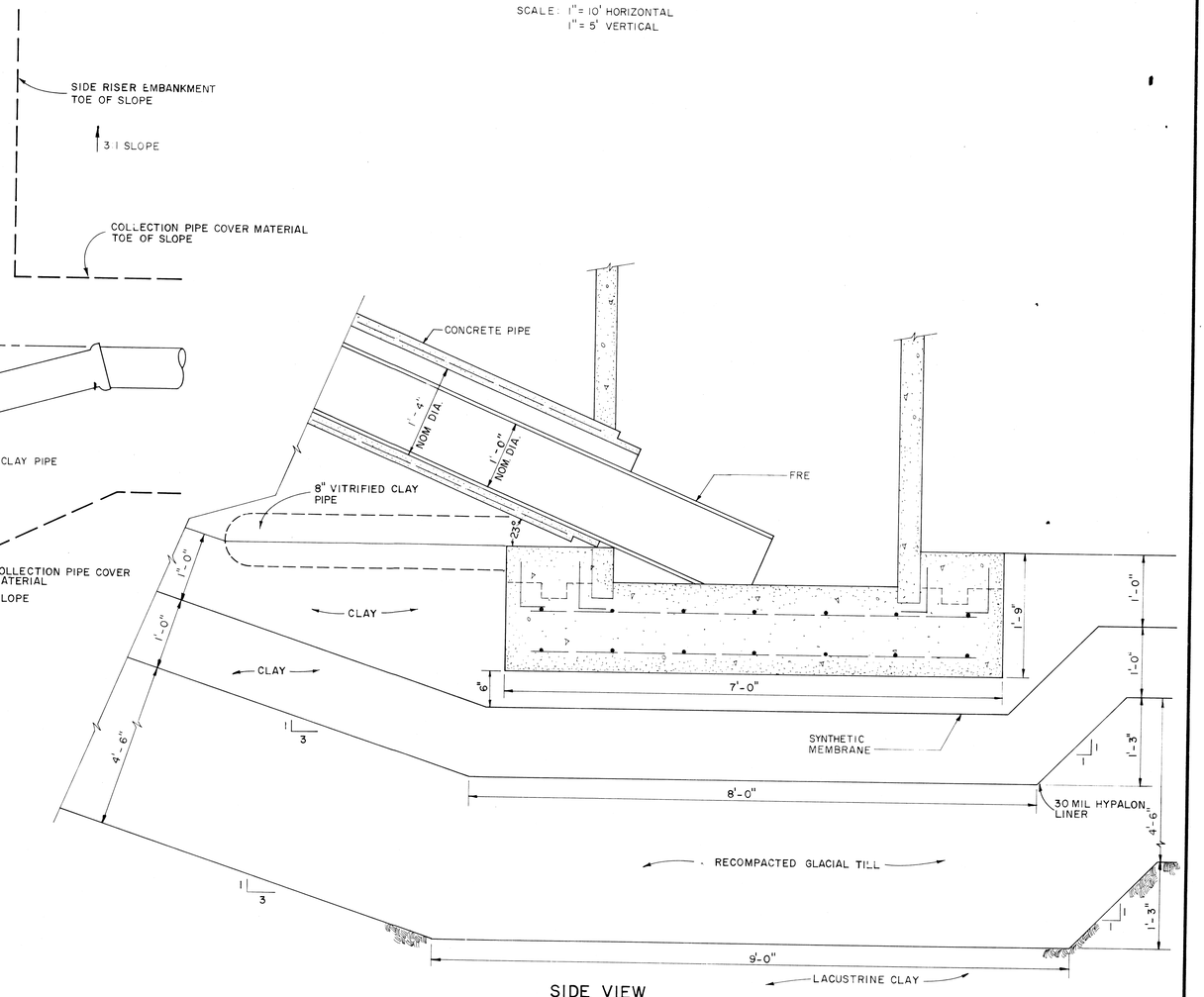
(SUBCELL IV)

SCALE: 1" = 10' HORIZONTAL
1" = 5' VERTICAL




LEACHATE COLLECTION AND REMOVAL SUMP PLAN

SCALE: 3/4" = 1'-0"




SIDE VIEW
LEACHATE SUMP IN SUBCELL IV

SCALE 1" = 1'

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: R.H.
Checked by:
Date: 10/30/79

Scales: AS SHOWN

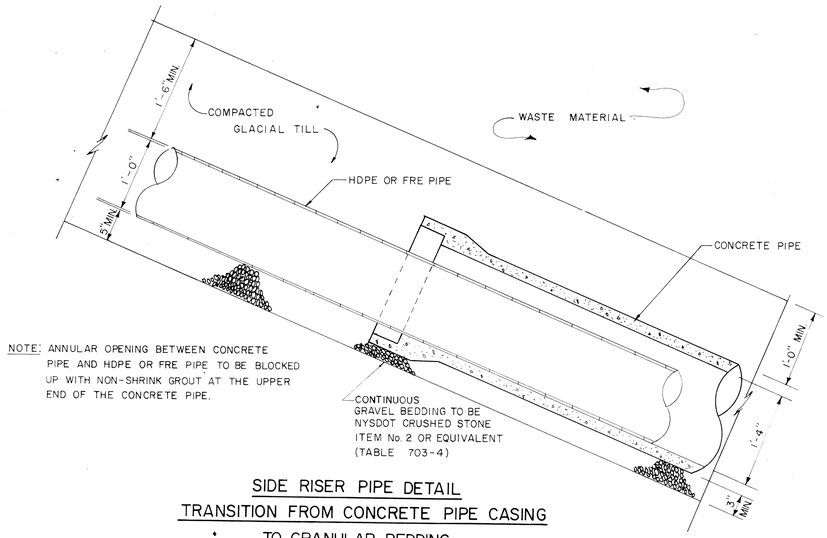
SALVATORE V. ARLOTTA JR., P.E.
N.Y. P.E. No. 53679 Date:

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

SCIENTIFIC LANDFILL No. 10
DETAILS

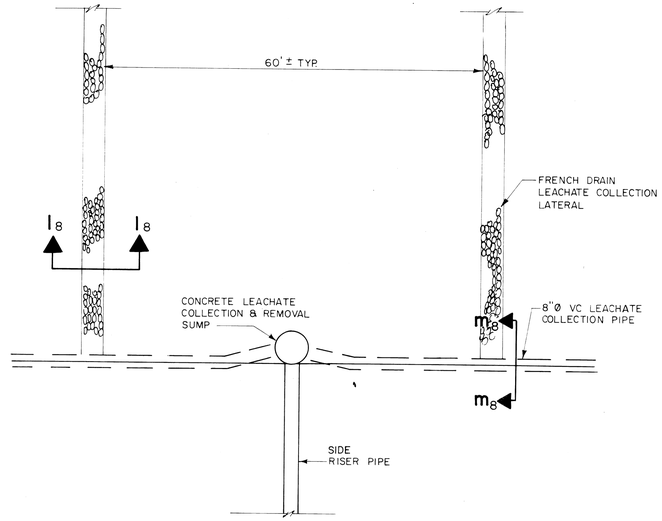
Sheet 7 of 13
Project No. 01368157

Tech-Repro Inc. 1-800-631

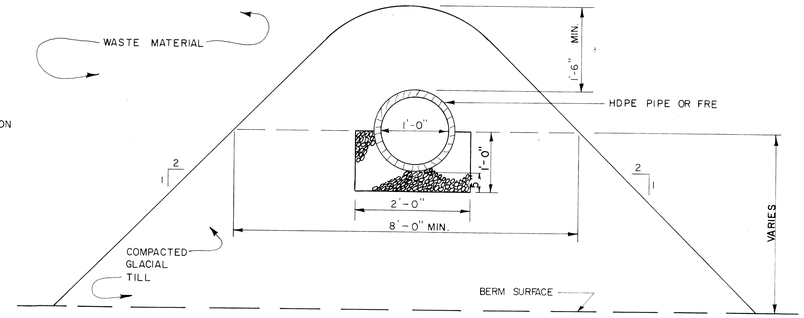



NOTE: ANNULAR OPENING BETWEEN CONCRETE PIPE AND HDPE OR FRE PIPE TO BE BLOCKED UP WITH NON-SHRINK GROUT AT THE UPPER END OF THE CONCRETE PIPE.

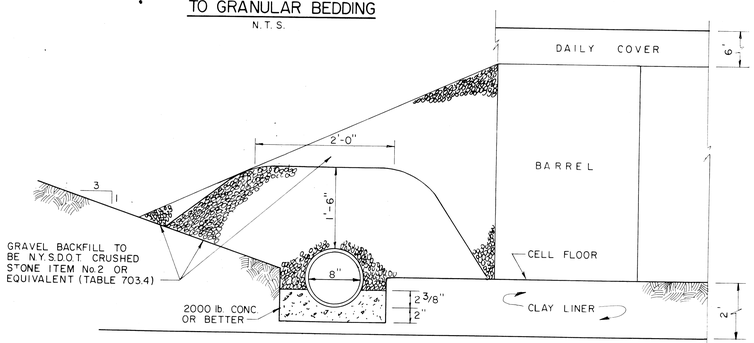
## SIDE RISER PIPE DETAIL
## TRANSITION FROM CONCRETE PIPE CASING TO GRANULAR BEDDING
N.T.S.



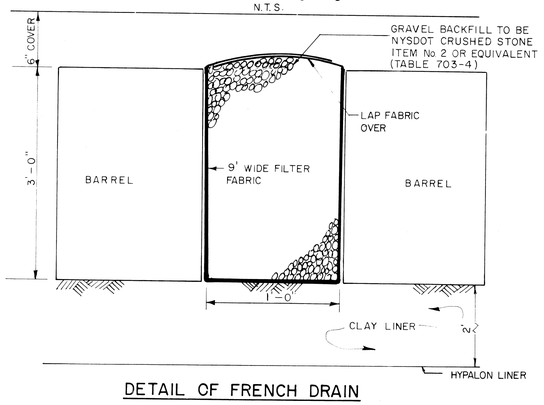

## LEACHATE COLLECTION SYSTEM DETAIL
N.T.S.



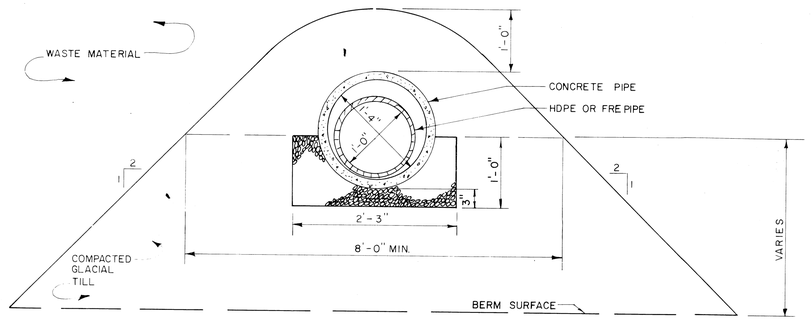

## SIDE RISER PIPE BEDDING DETAIL
## WITHOUT CONCRETE CASING
N.T.S.



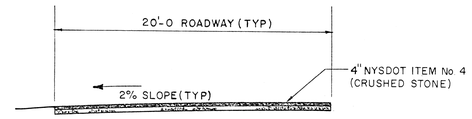

## INTERSECTION OF FRENCHDRAIN AND VITRIFIED CLAY LEACHATE COLLECTION SYSTEM
## SECTION $m_8$ - $m_8$
N.T.S.



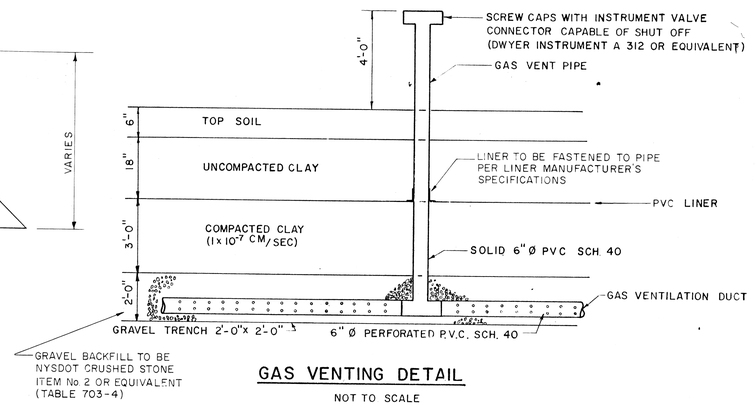

## DETAIL OF FRENCH DRAIN LEACHATE COLLECTION LATERAL
## SECTION $l_8$ - $l_8$
N.T.S.




## SIDE RISER PIPE BEDDING DETAIL
## WITH CONCRETE PIPE CASING
N.T.S.




## TYPICAL ROADWAY DETAIL
N.T.S.




## GAS VENTING DETAIL
NOT TO SCALE

| NO | DATE | REVISIONS |
|---|---|---|
| | | |
| | | |
| | | |
| 1 | 4/15/80 | FRENCH DRAIN-VITRIFIED CLAY COLLECTION SYSTEM |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: MSL
Checked by: DC, WD
Date: OCT. 30, 1979

Scales: AS SHOWN

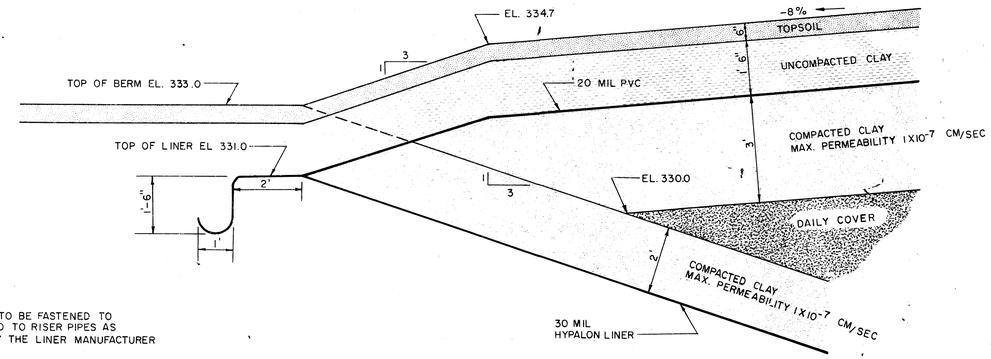
SALVATORE V. ARLOTTA, JR., P.E.
N.Y. P.E. No. 53679 Date:

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

SCIENTIFIC LANDFILL No. 10
DETAILS

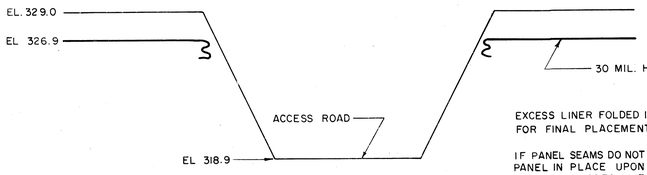
Sheet 8 of 13
Project No. 01368157

Tech-Repro Inc. N44901




NOTE:
PVC LINER TO BE FASTENED TO HYPALON AND TO RISER PIPES AS SPECIFIED BY THE LINER MANUFACTURER

## SECTION $e_4 - e_4$
## FINAL COVER DETAIL
SCALE: 1" = 2'




## SECTION $c_3 - c_3$
1" = 10' HORIZONTAL
1" = 5' VERTICAL

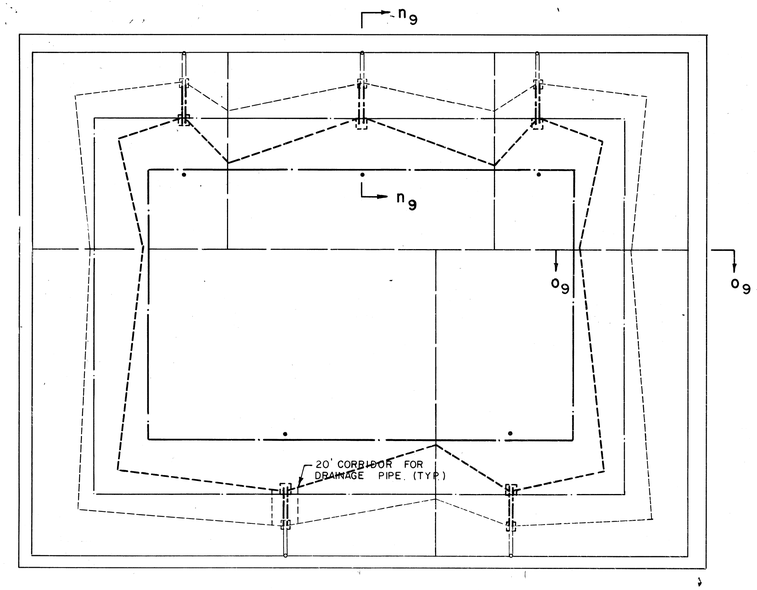
EXCESS LINER FOLDED IN TWO FOOT WIDE SECTIONS AND BURIED IN BANK FOR FINAL PLACEMENT UPON COMPLETION

IF PANEL SEAMS DO NOT FALL ON ACCESS CUT IN BERM SPLICE AN ADDITIONAL PANEL IN PLACE UPON BERM COMPLETION BERM AND LINER MUST BE COMPLETED TO FINAL GRADES WHEN WASTE PLACEMENT REACHES AN ELEVETION ON 315.0 (1' BELOW BREAK IN LINER AT ACCESS BERMS)

FINAL CLOSURE COVER

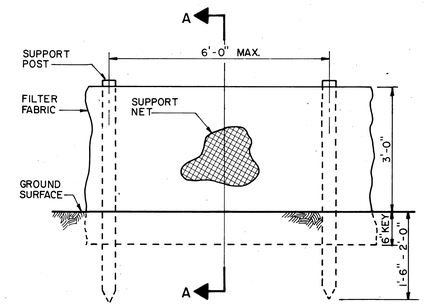
CONSTRUCTION SEQUENCE

1. WHEN THE TOP OF LANDFILL WASTE REACHES TO WITHIN 1 FOOT OF THE TOP OF SYNTHETIC LINER (I.E. 3 FEET BELOW TOP OF BERM), INSTALL THE 6 INCH DIAMETER ADS PIPE AT THE LOCATIONS SHOWN. CONNECT THE 6 INCH PIPE TO THE 12 INCH DIAMETER HDPE SIDE RISER PIPE.
2. CONSTRUCT A MINIMUM 3 FOOT THICK CLAY COVER OVER THE WASTE AND EXTENDING AT LEAST 25 FEET FROM THE INTERIOR TOP OF BERM. THE CLAY WILL BE COMPACTED TO ACHIEVE A MAXIMUM PERMEABILITY OF 1 X $10^{-7}$ CM/SEC AND SLOPE AT AN 8% GRADE AS SHOWN.
3. THE FIRST LIFT OF MOUNDED WASTE CAN BE PLACED IN THE LANDFILL AS SHOWN.
4. EXTEND THE 6 INCH DIAMETER ADS PIPE AS SHOWN.
5. EXTEND THE 3 FOOT THICK COMPACTED CLAY COVER OVER THE LANDFILL AS SHOWN.
6. PLACE THE NEXT LIFT OF MOUNDED WASTE AS SHOWN.
7. REPEAT STEPS 4 THROUGH 6 FOR SUCCEEDING LIFTS OF WASTE UNTIL THE LANDFILL AREA IS COMPLETELY COVERED.

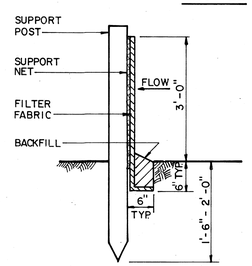



## PLAN VIEW—RUNOFF CONTROL BERMS
SCALE 1"= 60'

LEGEND
- OUTER LIMIT OF LIFT
- SIDE RISER PIPE
- VERTICAL RISER PIPE
- CENTERLINE OF INTERIOR BERMS
- LIMIT OF COVER MATERIAL—RUNOFF CONTROL BERMS
- INDICATES MATERIAL PLACED PRIOR TO OR DURING 1st LIFT OF MOUNDED WASTE
- (PLAN) INDICATES MATERIAL PLACED PRIOR TO OR DURING 2nd LIFT OF MOUNDED WASTE BUT AFTER THE 1st LIFT
- SILT FENCING



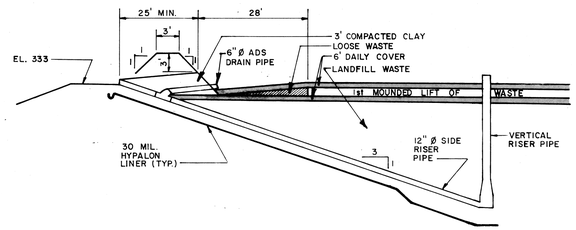

## PROFILE



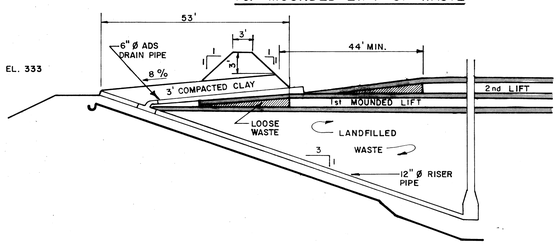

## SECTION A-A

NOTES:
1) SUPPORT POSTS MAY BE WOOD OR METAL SUCH AS A 4"x4" TREATED CONSTRUCTION TIMBER OR ANGLE IRON.
2. SUPPORT NET MAY BE GALVANIZED WIRE MESH OR WOOD SLATS SPACED IN A MAXIMUM 6"x6" PATTERN.
3) FILTER FABRIC: BIDIM C-125 OR C-34 OR EQUIVALENT.
4) THE MAXIMUM SIZE FOR THE SILT FENCE SHOULD BE 4' WIDE BY 6' LONG BOX COMPLETELY SURROUNDING THE CORRUGATED POLYETHYLENE INLET PIPE.
5. PIPE SHALL PROTRUDE THROUGH SUPPORT NET AND FILTER FABRIC SHALL BE FASTENED TO PIPE WITH STAINLESS STEEL CLAMPS AND SCREWS.

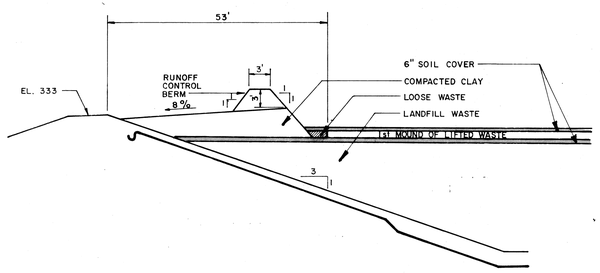
## TYPICAL SILT FENCE DETAILS
N.T.S.



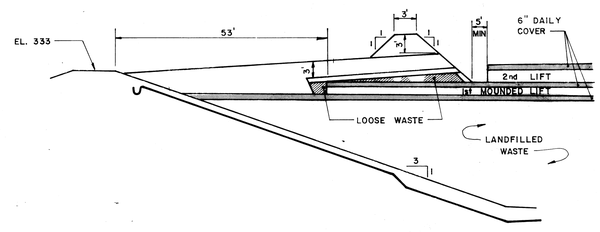

## SECTION $n_9 - n_9$
1st MOUNDED LIFT OF WASTE




## SECTION $n_9 - n_9$
2nd MOUNDED LIFT OF WASTE




## SECTION $o_9 - o_9$
1st MOUNDED LIFT OF WASTE




## SECTION $o_9 - o_9$
2nd MOUNDED LIFT OF WASTE

## SECTION VIEW-RUNOFF CONTROL BERMS
N.T.S.

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |
| | | |
| | | |
| 1 | 6/80 | REVISE RUNOFF CONTROL BERM |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: A.K.
Checked by:
Date:

Scales: AS SHOWN

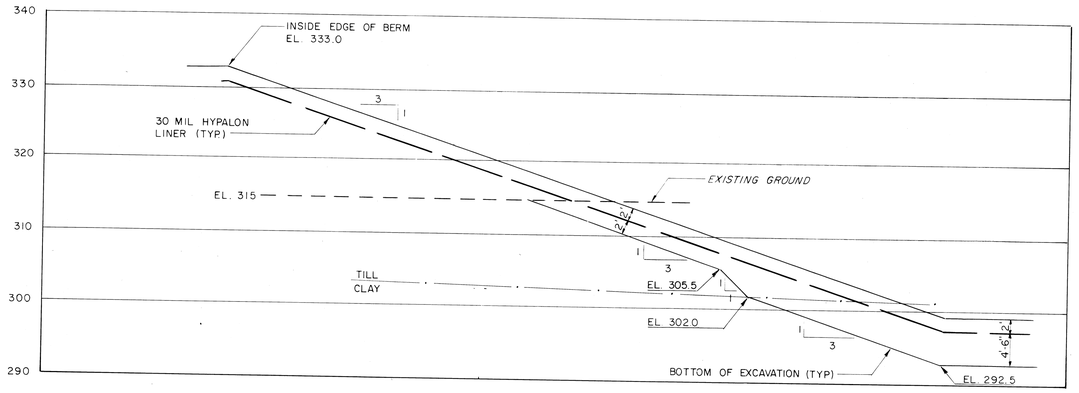
SALVATORE V. ARLOTTA, JR., P.E.
N.Y. P.E. Lic. No. 53679 Date

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

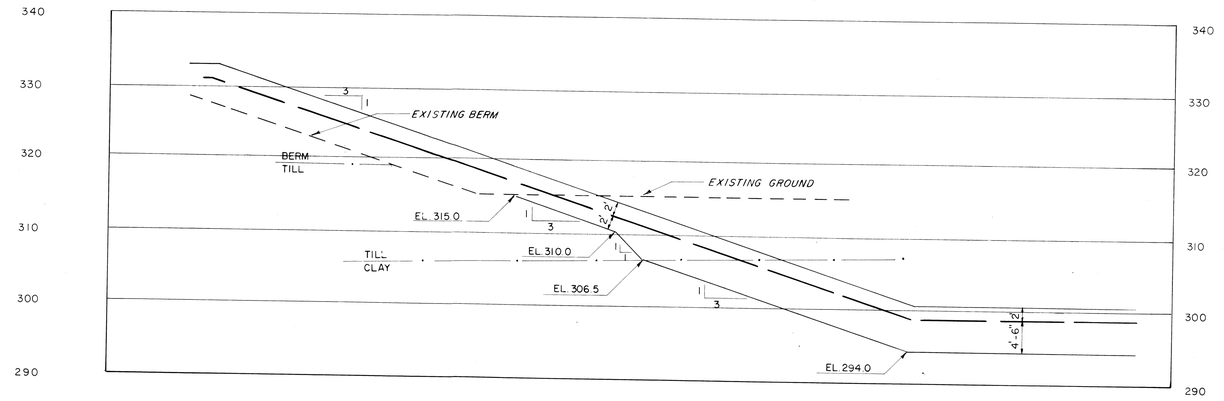
SCIENTIFIC LANDFILL No. 10
DETAILS

Sheet 9 of 13
Project No. 01368157

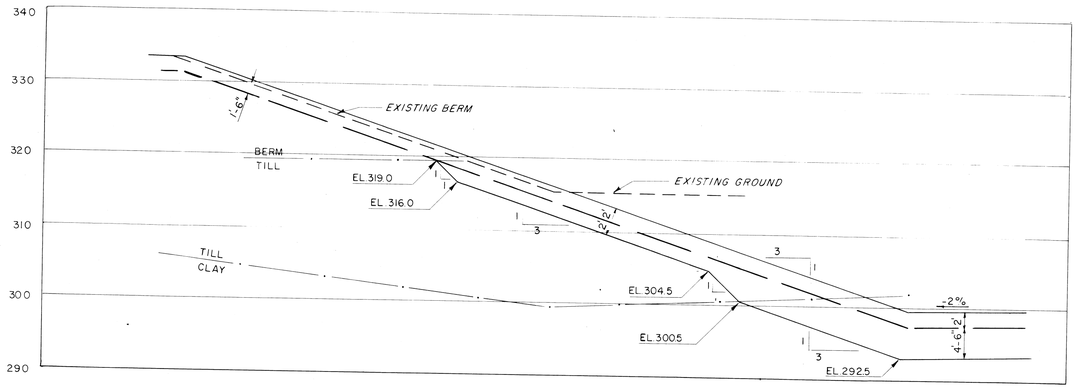
Tetra-Tech Inc. TT-A1001



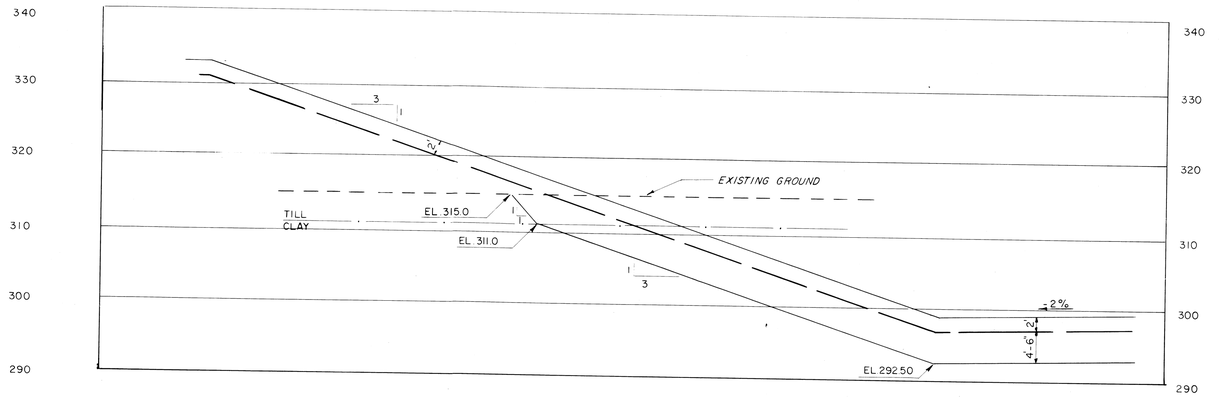

SECTION $f_4$-$f_4$



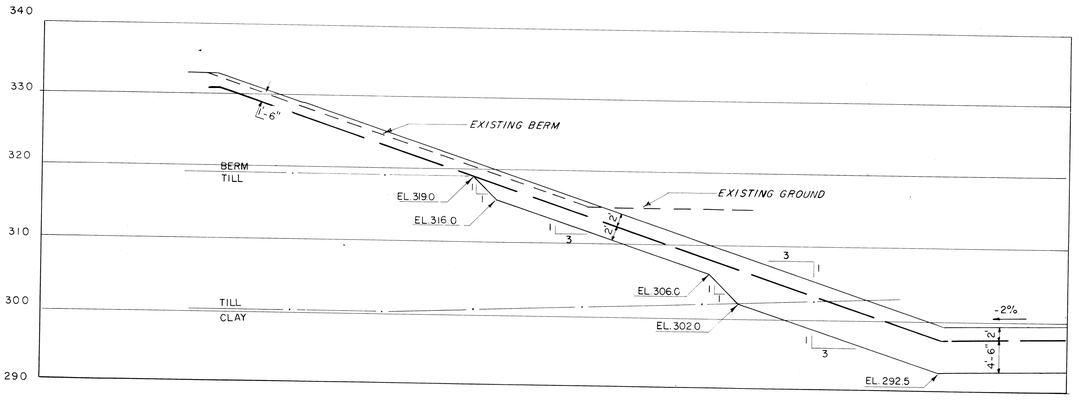

SECTION $i_4$-$i_4$




SECTION $g_4$-$g_4$

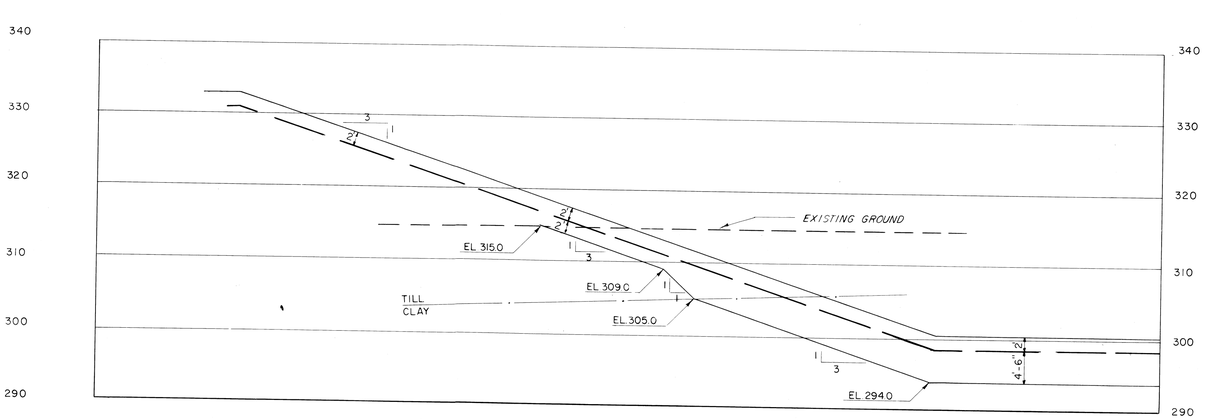



SECTION $j_4$-$j_4$




SECTION $h_4$-$h_4$

NOTE: SLOPE CHANGES ARE AT INTERPOLATED POSITIONS. FOR THE GIVEN LOCATIONS, DURING TIME OF EXCAVATION, SMALL TEST PITS SHOULD FIX THE ELEVATION OF THE CLAY LAYER AND DETERMINE SLOPE CHANGES ACCORDINGLY.




SECTION $k_4$-$k_4$

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: M.S.L.
Checked by:
Date: JAN. 30, 1980

Scales
HORIZONTAL 1" = 10'
VERTICAL 1" = 10'

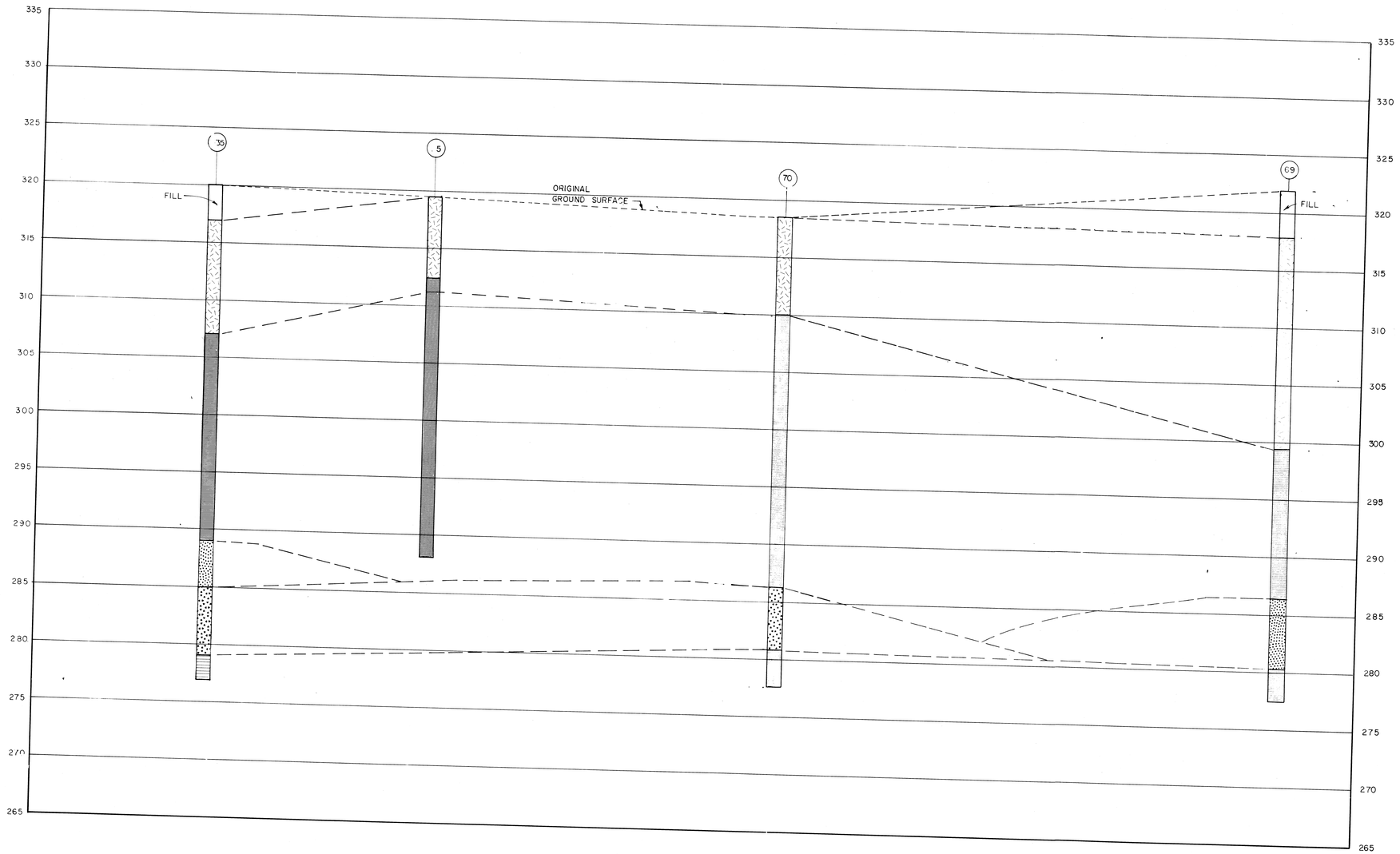
SALVATORE V. ARLOTTA, JR., PE.
N.Y. PE. No. 53679 Date

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

SCIENTIFIC LANDFILL NO. 10
SECTIONS

Sheet 10 of 13
Project No. 01368157

Tech-Repro, Inc. N44951




SEE SHEET 12 FOR LEGEND AND GEOLOGIC DESCRIPTION

## SECTION $A_3$-$A_3$

10X VERTICAL EXAGGERATION

0 5 10 VERTICAL

0 50 100 HORIZONTAL

SCALE IN FEET

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: SWD
Checked by: TPP, S.V.A., JS.
Date: 10/30/79

Scales: AS SHOWN

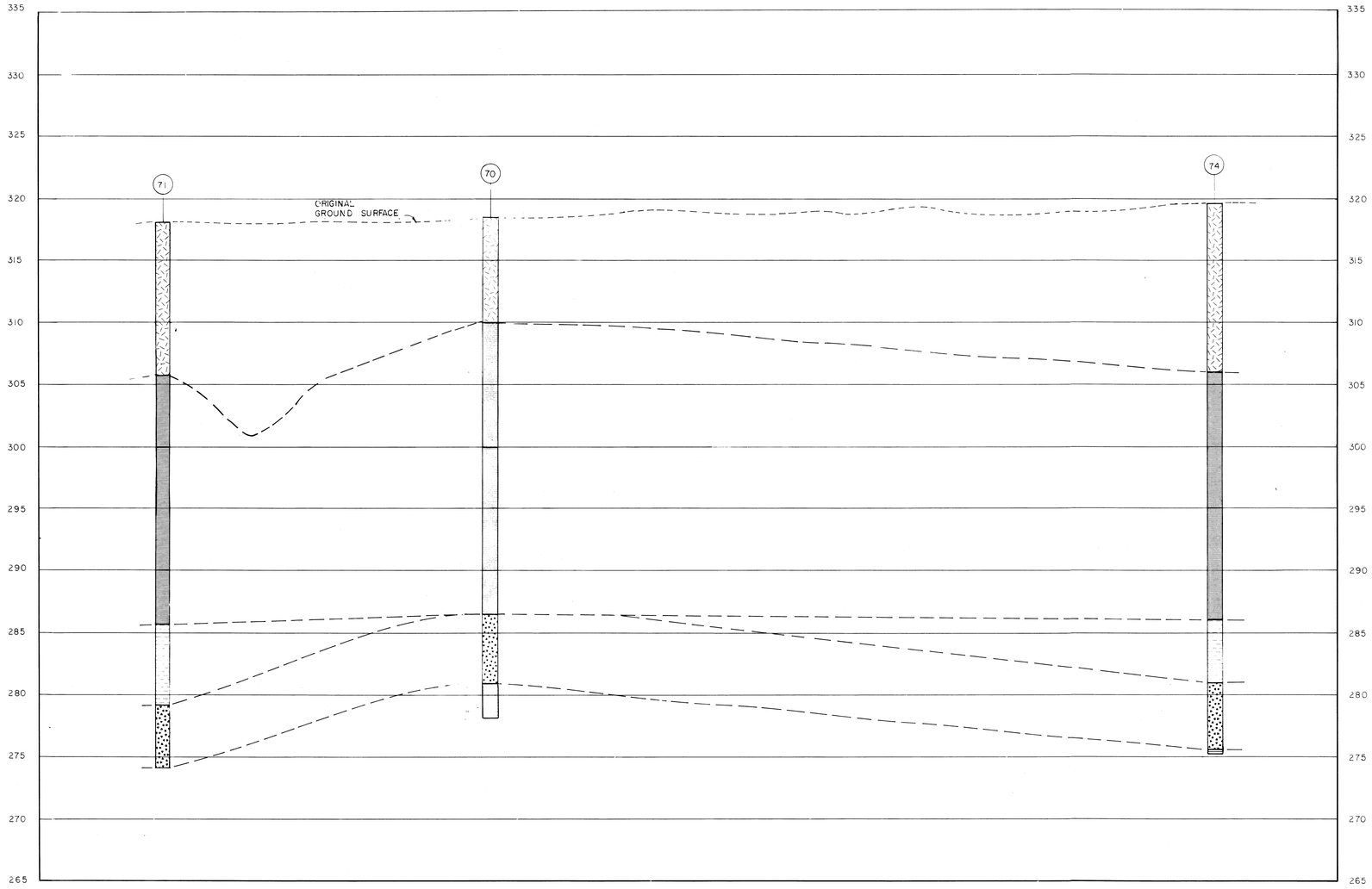
SALVATORE V. ARLOTTA, JR., PE.
N.Y. P.E. No. 53679 Date

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

SCIENTIFIC LANDFILL No. 10
GEOLOGIC SECTIONS

Sheet 11 of 13
Project No. 01368157

Thos-Rogers Inc. 144161




SECTION $B_2$-$B_3$

10X VERTICAL EXAGGERATION

0 5 10 VERTICAL

0 50 100 HORIZONTAL

SCALE IN FEET

| DESIGNATION | GEOLOGIC DESCRIPTION |
|---|---|
| | GLACIAL TILL |
| | GLACIOLACUSTRINE CLAYS AND SILTS |
| | GLACIOLACUSTRINE SILT, FINE SAND, LITTLE FINE GRAVEL |
| | GLACIOLACUSTRINE SAND |
| | PRE-WISCONSIN GLACIAL TILL |
| | QUEENSTON SHALE |

LEGEND

- 35 — BORING OR TEST PIT LOCATION
- GROUND SURFACE
- CONTACT
- GEOLOGIC DESIGNATION
- ORIGINAL GROUND SURFACE
- INFERRED CONTACTS
- LIMITS OF LAGOON

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by:
Checked by: B.S.
Date: 10/30/79

Scales
AS SHOWN

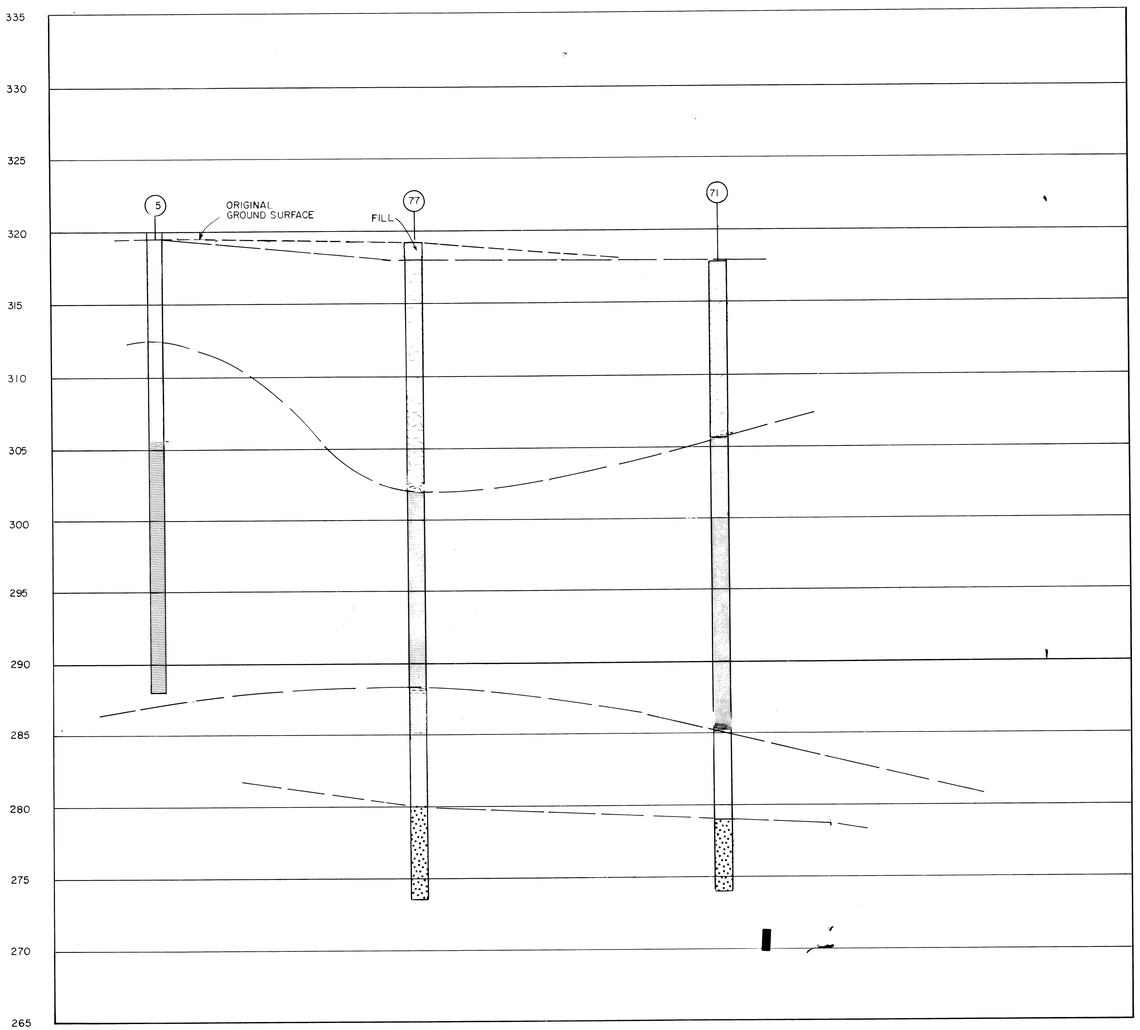
SALVATORE V. ARLOTTA, JR., P.E.
N.Y. P.E. No. 53679 Date

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

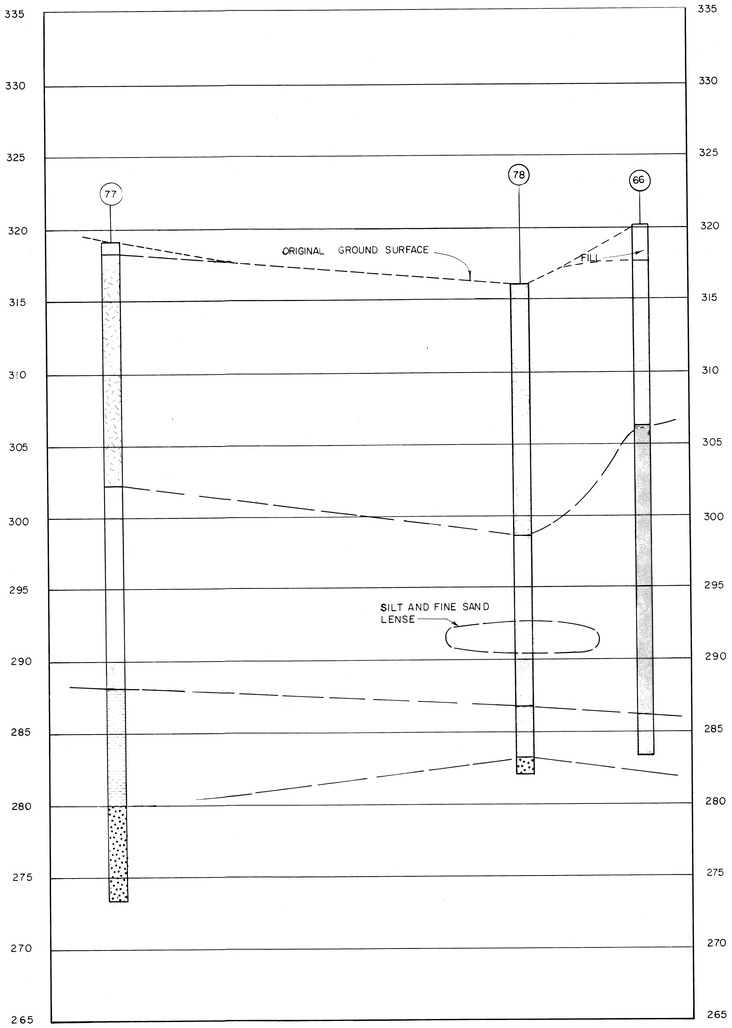
SCIENTIFIC LANDFILL NO. 10
GEOLOGIC SECTIONS

Sheet 12 of 13
Project No. 368157

Trak-Repro, Inc. N44901




SECTION $C_3$-$C_3$




SECTION $D_3$-$D_3$

10X VERTICAL EXAGGERATION

0 5 10 VERTICAL

0 50 100 HORIZONTAL

SCALE IN FEET

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Drawn by: FND
Checked by:
Date: 10/30/79

Scales: AS SHOWN

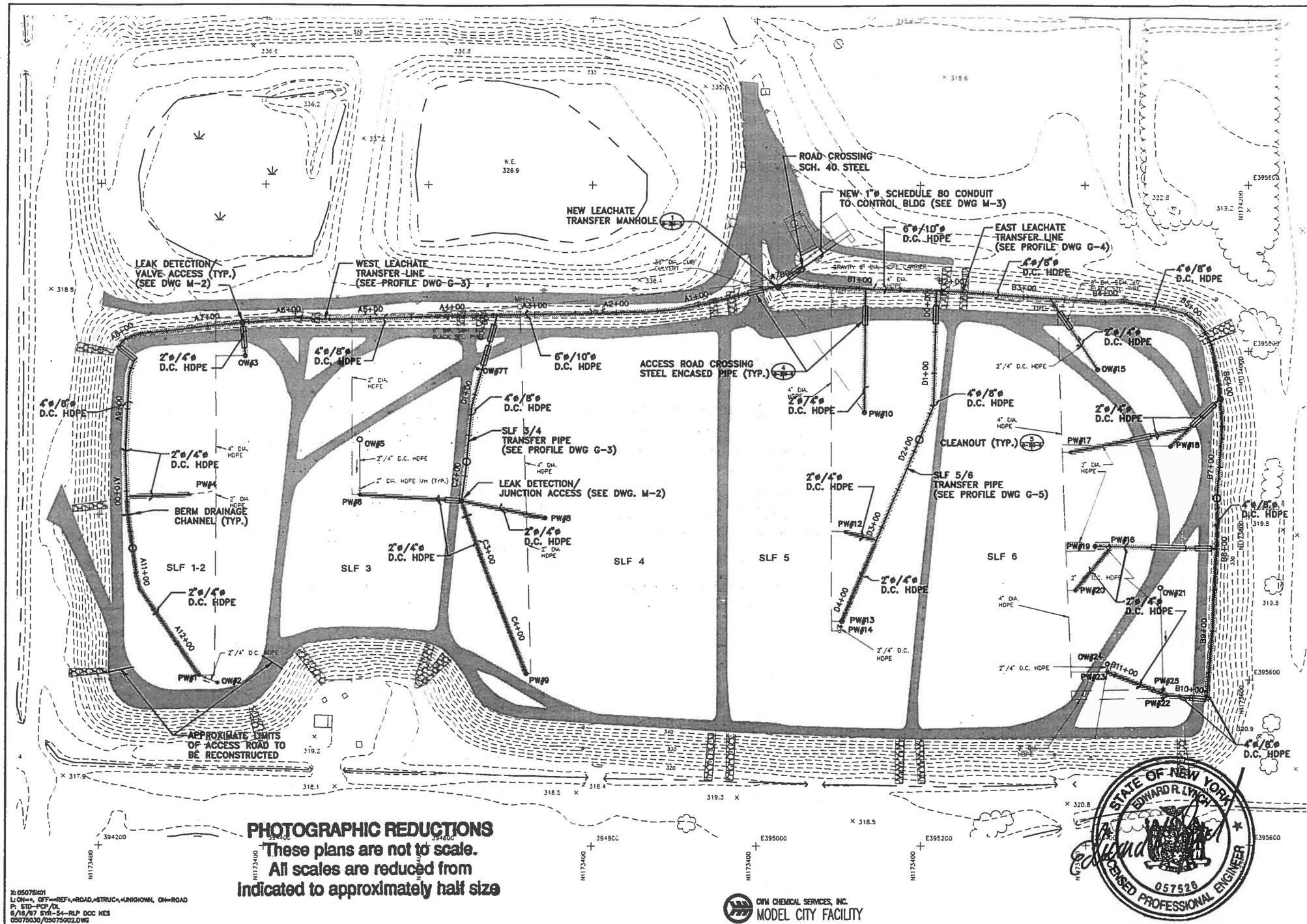
SALVATORE V. ARLOTTA, JR., P.E.
N.Y. P.E. No. 53679 Date

SCA CHEMICAL WASTE SERVICES, INC.
MODEL CITY, NIAGARA COUNTY, NEW YORK

SCIENTIFIC LANDFILL NO.10
GEOLOGIC SECTIONS

Sheet 13 of 13
Project No. 01368157

Tech-Repro Inc. N44901




**PHOTOGRAPHIC REDUCTIONS**
**These plans are not to scale.**
**All scales are reduced from indicated to approximately half size**

LEGEND

- EXISTING CONTOUR LINE
- × 337.0 SPOT ELEVATION
- EXISTING DRAINAGE DOWNCHUTE
- EXISTING LANDFILL ACCESS ROAD
- EXISTING CULVERT
- EXISTING UTILITY POLE
- EXISTING GAS VENT
- E395600 COORDINATE GRID LOCATION
- N1173400
- PROPOSED DOUBLE-WALLED LEACHATE TRANSFER PIPE
- PIPE TRENCH DETAIL A (1-SHT-2)
- PIPE TRENCH DETAIL B (2-SHT-2)
- PIPE TRENCH DETAIL C (3-SHT-2)
- 3 / 1-SHT-2 SECTION OR DETAIL NUMBER / SECTION OR DETAIL LOCATION / REFERENCE DRAWING LOCATION
- LEAK DETECTION/VALVE ACCESS (SEE DWG M-2)
- CLEAN-OUT (5-SHT-2)
- ACCESS ROAD CROSSING PIPE (4-SHT-2)
- BERM DRAINAGE CHANNEL (6-SHT-2)

ABBREVIATIONS

D.C. = DOUBLE CONTAINED
DIA. = DIAMETER
PW = PUMPING WELL
OW = OBSERVATION WELL
SCH. = SCHEDULE
ø = DIAMETER

NOTES

1. THIS MAP WAS COMPILED BY PHOTOGRAMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 12/14/96.
2. VERTICAL DATUM BASED ON NGS MEAN SEA LEVEL
3. COORDINATE GRID BASED ON NY STATE PLANE COORDINATE SYSTEM NAD 1927.

STATE OF NEW YORK
EDWARD R. LYNCH
057526
LICENSED PROFESSIONAL ENGINEER

CWM CHEMICAL SERVICES, INC.
MODEL CITY FACILITY

h:\05075\001
L:ON==, OFF==REF's,=ROAD,=STRUC's,=UNKNOWN, ON=ROAD
P: STD-PCP/DL
6/16/97 SYR-54-RLP DCC NES
05075030/05075002.DWG

Graphic Scale
60' 0 60' 120'
1"=60'

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

| No. | Date | Revisions | Init |
|---|---|---|---|
| | | | |

Project Mgr. CJC
Designed by CJC/PHB
Drawn by NES
Checked by GRC
Prof. Eng. EDWARD R. LYNCH
PE License 057526

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

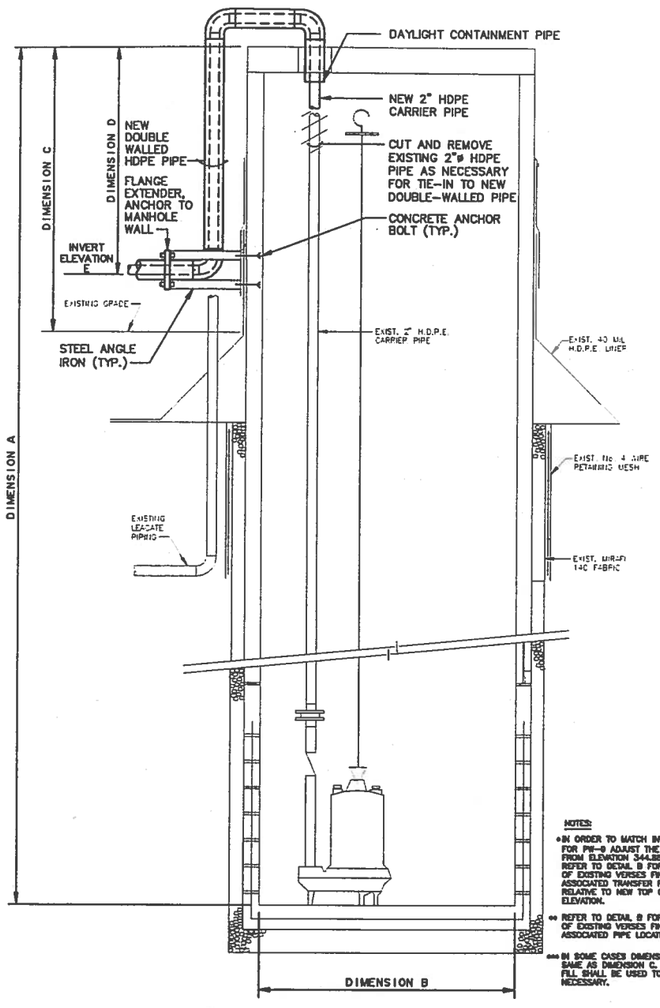
CWM CHEMICAL SERVICES, INC. • MODEL CITY, NEW YORK
SLF 1-6 LEACHATE TRANSFER LINE UPGRADE

# PROPOSED LEACHATE TRANSFER SITE PLAN

File Number 050.75.02F
Date JUNE 1997

Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

G-2



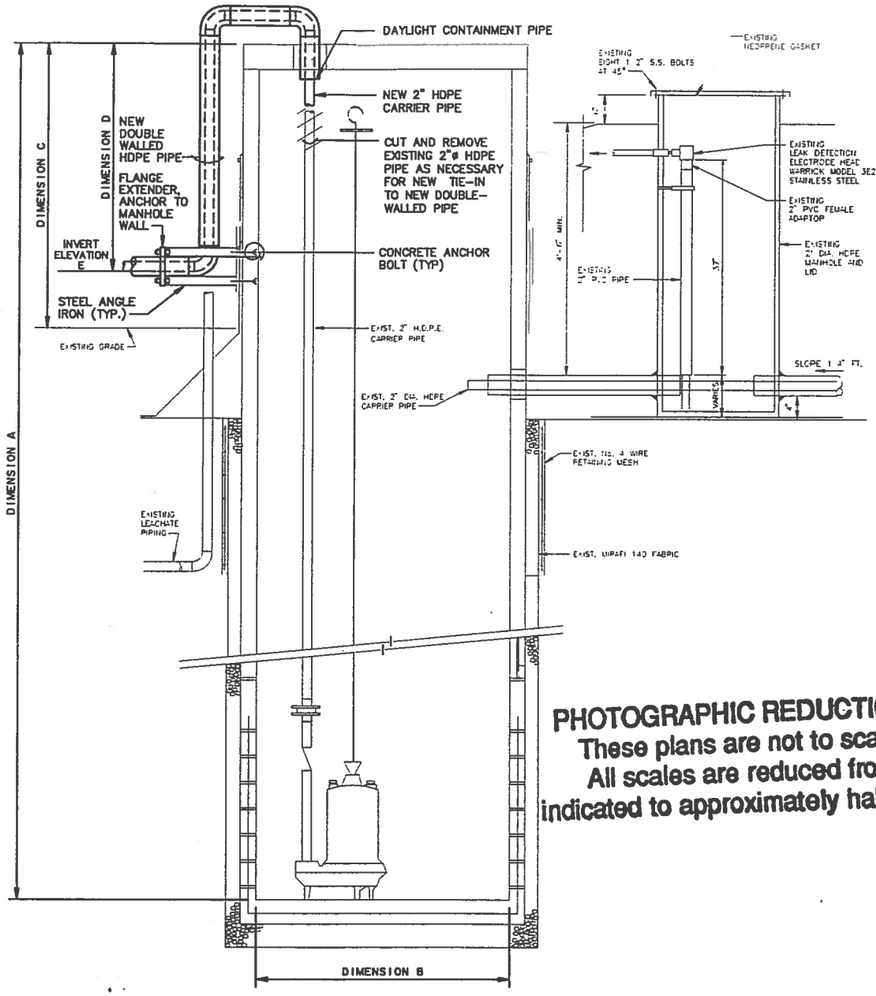

NOTES:

- IN ORDER TO MATCH INVERT ELEVATION E FOR PW-9 ADJUST THE TOP OF MANHOLE FROM ELEVATION 344.88 TO 348.0. REFER TO DETAIL B FOR REPRESENTATION OF EXISTING VERSES FINAL GRADE AND ASSOCIATED TRANSFER PIPE LOCATION RELATIVE TO NEW TOP OF MANHOLE ELEVATION.
- REFER TO DETAIL B FOR REPRESENTATION OF EXISTING VERSES FINAL GRADE AND ASSOCIATED PIPE LOCATION FOR PW-22.
- IN SOME CASES DIMENSION D WILL BE THE SAME AS DIMENSION C. IN OTHER CASES FILL SHALL BE USED TO ADJUST GRADE AS NECESSARY.

| EXTRACTION WELL NUMBER | EXISTING TOP OF MANHOLE ELEVATION (FEET) | DIMENSION A (FEET) | DIMENSION B (FEET) | DIMENSION C (FEET) | DIMENSION D (FEET) | INVERT ELEVATION E |
|---|---|---|---|---|---|---|
| PW-4 | 353.02 | 48.83 | 2.0 | 3.6 | 3.6 | 349.4 |
| PW-8 | 352.42 | 42.33 | 2.0 | 3.72 | 3.72 | 348.7 |
| • PW-9 | 344.88 | 34.00 | 2.0 | 3.60 | 1.00 | 347.0 |
| PW-10 | 349.25 | 29.25 | 4.0 | 1.55 | 1.55 | 347.7 |
| PW-12 | 351.63 | 40.75 | 2.0 | 4.23 | 4.23 | 347.4 |
| PW-17 | 351.33 | 31.00 | 4.0 | 4.33 | 4.33 | 347.0 |
| PW-18 | 349.05 | 28.25 | 4.0 | 4.95 | 4.95 | 344.8 |
| PW-20 | 352.42 | 35.67 | 4.0 | 4.42 | 4.42 | 348.2 |
| •• PW-22 | 347.85 | 34.58 | 2.0 | 6.05 | 5.65 | 342.2 |

## DETAIL A

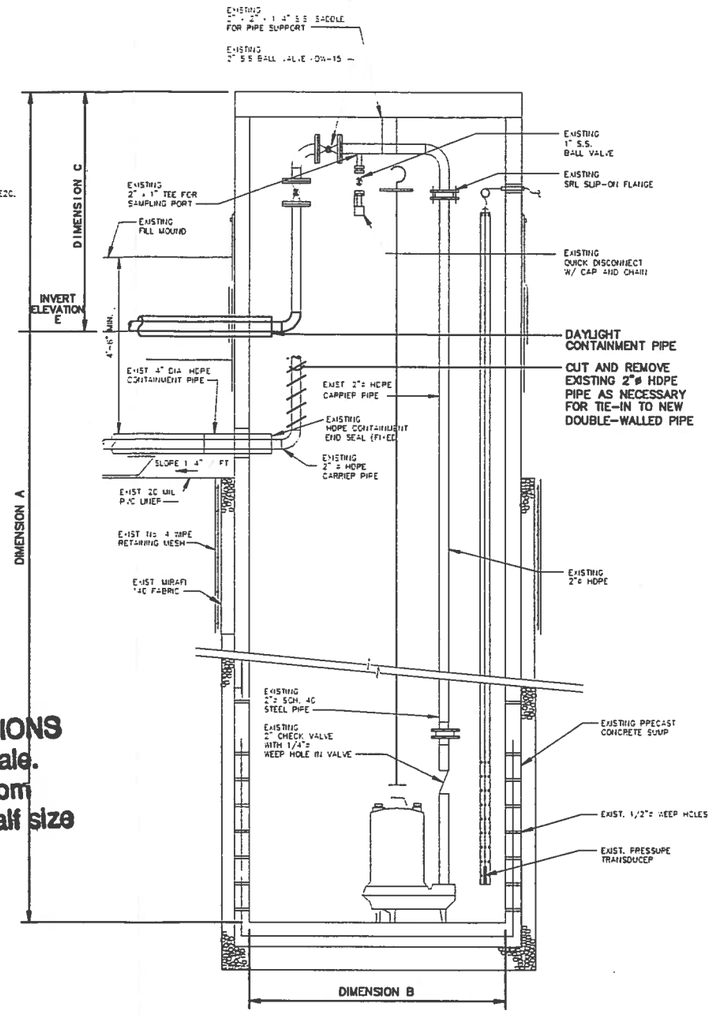
(TYPICAL FOR PW-4, PW-8, PW-9, PW-10 PW-12, PW-17, PW-18, PW-20, PW-22)
SCALE: 3/4"=1'-0"




| EXTRACTION WELL NUMBER | EXISTING TOP OF MANHOLE ELEVATION (FEET) | DIMENSION A (FEET) | DIMENSION B (FEET) | DIMENSION C (FEET) | NEW DIMENSION D (FEET) | INVERT ELEVATION E |
|---|---|---|---|---|---|---|
| PW-1 | 346.65 | 29.25 | 2.0 | 4.45 | 1.45 | 345.2 |
| PW-6 | 350.11 | 41.75 | 2.0 | 3.71 | 3.61 | 346.5 |
| PW-13 | 348.17 | 28.83 | 4.0 | 3.17 | 0.57 | 347.6 |
| PW-19 | 352.41 | 38.92 | 4.0 | 4.41 | 4.41 | 348.0 |
| PW-23 | 349.68 | 38.83 | 2.0 | 5.18 | 5.28 | 344.4 |
| PW-25 | 348.82 | 31.67 | 4.0 | 6.92 | 6.62 | 342.2 |

## DETAIL B

(TYPICAL FOR PW-1, PW-6, PW-13, PW-19, PW-23, AND PW-25)
SCALE: 3/4"=1'-0"




| EXTRACTION WELL NUMBER | EXISTING TOP OF MANHOLE ELEVATION (FEET) | DIMENSION A (FEET) | DIMENSION B (FEET) | DIMENSION C (FEET) | INVERT ELEVATION E |
|---|---|---|---|---|---|
| • OW-7T | 344.12 | 10.08 | 2.5 | 1.92 | 342.2 |
| •• OW-15 | 349.84 | 34.49 | 4.0 | 5.94 | 343.9 |

NOTES:

- REMOVE EXISTING PIPING AS NECESSARY TO CONNECT TO NEW TIE-IN. IF NECESSARY, RELOCATE EXISTING VALVE AND SAMPLE TAP.
- •• CONTRACTOR TO VERIFY WHETHER EXISTING MANHOLE PENETRATION MAY BE UTILIZED FOR REQUIRED TIE-IN. IF POSSIBLE, THEN CUT-IN AND WELD JUST OUTSIDE MANHOLE FOR TIE-IN.

## DETAIL C

(TYPICAL FOR OW-7T, OW-15)
SCALE: 3/4"=1'-0"

**PHOTOGRAPHIC REDUCTIONS**
**These plans are not to scale.**
**All scales are reduced from indicated to approximately half size**

GENERAL NOTE FOR DETAIL A, B, AND C
1.DISCHARGE PIPE LOCATION SHOWN FOR REPRESENTATIVE PURPOSES ONLY. REFER TO SITE PLAN FOR PROPER ORIENTATION.

STATE OF NEW YORK
EDWARD R. LYNCH
057526
LICENSED PROFESSIONAL ENGINEER

CWM CHEMICAL SERVICES, INC.
MODEL CITY FACILITY

X:NONE
L:ON=*, OFF=*REF*
P: STD-PCP/XL
6/97 SYR-54-NES AK DCC
05075030/05075006.DWG

Graphic Scale
3/4"=1'-0" 2' 1' 0 1' 2'

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

| No. | Date | Revisions | Init |
|---|---|---|---|
| | | | |

Project Mgr. CJC
Designed by CJC/AKR
Drawn by NES
Checked by GRC
Prof. Eng. EDWARD R. LYNCH
PE License 057526

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

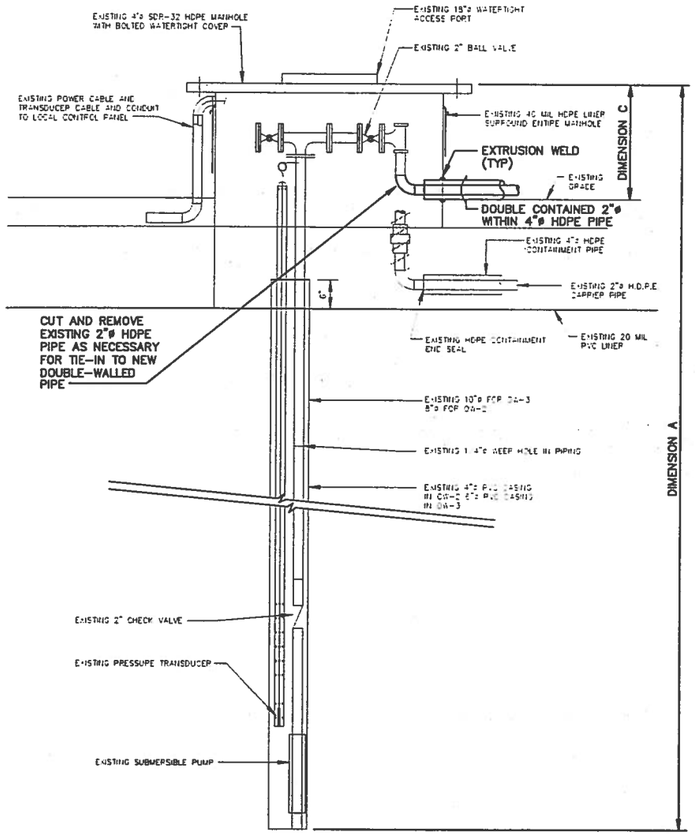
CWM CHEMICAL SERVICES, INC. • MODEL CITY, NEW YORK
SLF 1-6 LEACHATE TRANSFER LINE UPGRADE

# PUMPING WELL AND OBSERVATION WELL DETAILS

File Number 050.75.08F
Date JUNE 1997

Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-448-9120

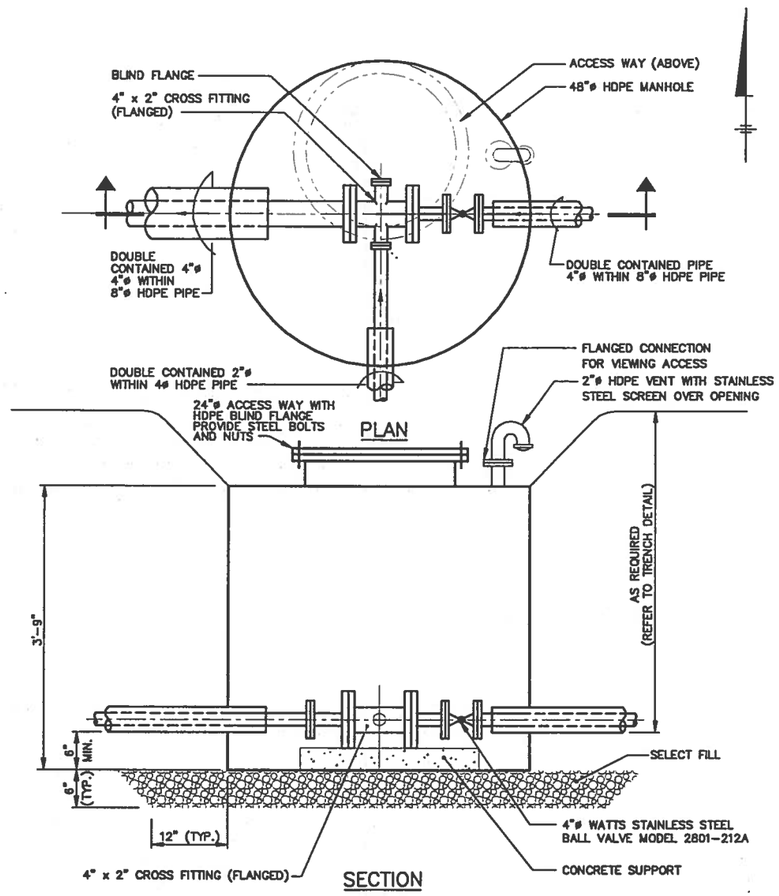
M-1




NOTE
1. DISCHARGE PIPE LOCATION SHOWN FOR REPRESENTATIVE PURPOSES ONLY. REFER TO SITE PLAN FOR PROPER ORIENTATION.

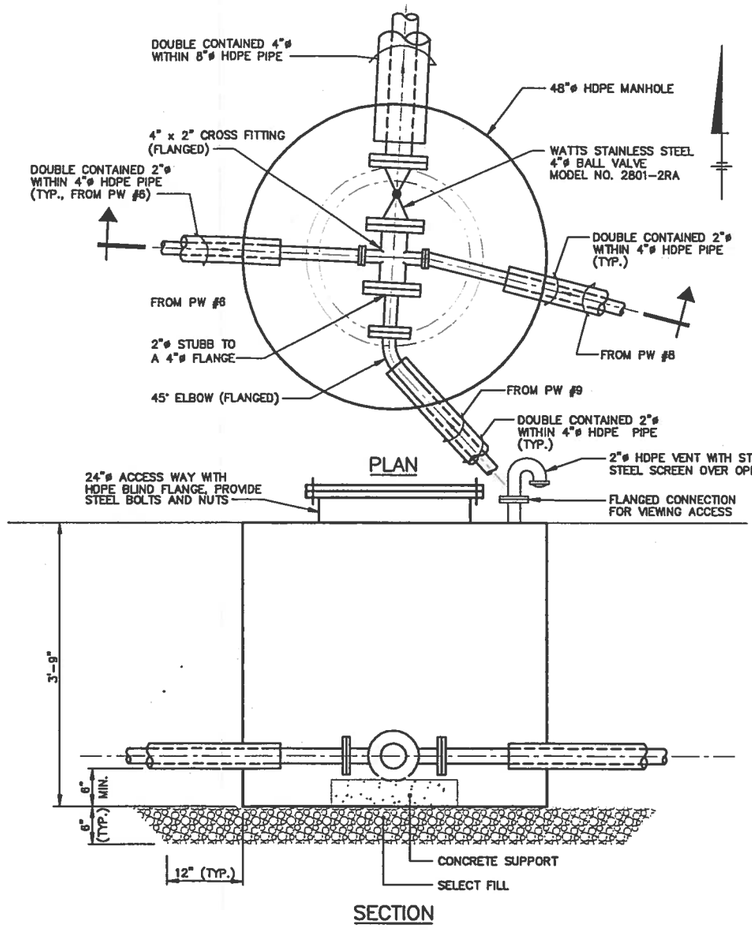
| EXTRACTION WELL NUMBER | EXIST. TOP OF MANHOLE ELEVATION | DIMENSION A (FEET) | DIMENSION C (FEET) | INVERT ELEVATION E |
|---|---|---|---|---|
| OW-3 | 345.86 | 26.50 | 2.26 | 343.6 |

## DETAIL D
(TYPICAL FOR OW-3)
SCALE: 3/4"=1'-0"




SECTION

## LEAK DETECTION/VALVE ACCESS
1 / 0-2M-3
SCALE: 1"=1'-0"




SECTION

## LEAK DETECTION/JUNCTION ACCESS
2 / 0-2M-3
SCALE: 1"=1'-0"

**PHOTOGRAPHIC REDUCTIONS**
These plans are not to scale.
All scales are reduced from indicated to approximately half size

STATE OF NEW YORK
EDWARD R. LYNCH
057528
LICENSED PROFESSIONAL ENGINEER

X: NONE
L: ON=*, OFF=REF*
P: STD-PCP/DL
6/97 SYR-54-NES MFS DCC
05075030/05075G08.DWG

CWM CHEMICAL SERVICES, INC.
MODEL CITY FACILITY

Graphic Scale
3/4"=1'-0" (2' 1' 0 1' 2')

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

| No. | Date | Revisions | Init |
|---|---|---|---|
| | | | |

Project Mgr. CJC
Designed by CJC/AKR
Drawn by NES
Checked by GRC
Prof. Eng. EDWARD R. LYNCH
PE License 057528

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

CWM CHEMICAL SERVICES, INC. • MODEL CITY, NEW YORK
SLF 1-6 LEACHATE TRANSFER LINE UPGRADE

# MECHANICAL DETAILS

File Number 050.75.09F
Date JUNE 1997

Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

M-2

# Attachment 17
# Standard Division Practice (SDP) Document Titled "Estimated Air Emissions from Stabilization"

STANDARD DIVISION PRACTICE

CWM Chemical Services, L.L.C., Model City Facility

Title: Estimated Air Emissions for Stabilization

SDP Number: 5000

Department: Stabilization

Effective Date: 3/1/17

Approval: _____

Page: 1 of 6

Approver's Title: District Manager

Replaces: NEW

1.0 Purpose: Establish procedures for estimating air emissions from the Stabilization facility.

2.0 Scope: This SDP describes the waste profile review process for considering air emissions and describes the procedure that will be used to track the estimated emissions.

3.0 Users: Approvals, Waste Receiving, Stabilization

4.0 Documentation/Forms:

4.1 Waste Profiles
4.2 Waste Tracking Forms
4.3 Tracking spreadsheet (e.g. Groups/Everyone/Projects/Air/Stab Release Estimate)

5.0 Protective Equipment: None

6.0 Specialized Equipment, Tools, Supplies: Computer with AS400 (waste profiles) and Groups/Everyone directory access.

7.0 Procedure:

WASTE PROFILE REVIEW AND APPROVAL

7.1 Review hazardous waste profile for response to question D.1.d – is waste exempt from Subpart CC air controls (40 CFR 264.1083, 6 NYCRR 373-2.29)? Hazardous wastes containing total VOCs >500 ppm may not be stabilized at CWM as air controls for VOCs are not in place at Stabilization.

DRAFT

7.2 Review constituents listed in the Chemical Composition of the Waste Profile and confirm that composition is consistent with the answer to question D.1.d. Organic compounds that are not considered VOCs under the Subpart CC program (non-CC compounds) include:

i. Compounds listed in Appendix VI of 40 CFR Part 265, Appendix 55 of 6 NYCRR 373-3 and
ii. Compounds with a Henry's Law Constant less than 1.8 x $10^{-6}$ atm/gram-mole/$m^3$ at 25$^oC$

7.3 Estimate VOC emission for the waste stream using the average concentration of the organic constituents and assuming 100% release for organic compounds subject to CC (CC compounds) and 50% release for non-CC compounds (7.1.2.i and ii). Review maximum values listed in Appendix 1, which includes values used in air modeling to demonstrate that SGC and AGCs were not exceeded for certain compounds and values from Table 2 (High Toxicity Air Contaminant List) in 6 NYCRR 212 for the compounds listed on the waste profile. Consider:

7.3.1 Will the estimated release for any compound in the waste stream exceed the maximum annual quantity listed in Appendix 1? If so, either the profile may not be approved for stabilization or the quantity must be limited to stay under the limit.

7.3.2 Consider the contribution to the annual (12 month rolling total) for the following limits:

- 150,00 tons waste per year through stabilization
- Not to exceed annual limits in Appendix 1
- Not to exceed 10 tons per year of each individual HAP (not otherwise restricted)

DRAFT

- Not to exceed 25 tons per year total HAPs
- Not to exceed 50 tons per year total VOCs



7.4 Include the estimated release rate (e.g. pounds of compound released per ton of waste stabilized) in section 3.B.1 of the Waste Management Decision(WMD) for use when waste is processed.

7.5 Include any processing restrictions (limits in quantity per year) in section 3.B.1 of the Waste Management Decision (WMD). Include a scheduling comment to notify Stabilization Supervisor when waste is scheduled.

WASTE TREATMENT THROUGH STABILIZATION

7.6 Review SECTION 3.B.1 of the WMD for restrictions on waste quantity. Record restrictions on the Waste Tracking Form to notify the Stabilization Department.

7.7 Using estimated shipment weight, the average concentration of the VOC, HAP and HTAC compounds listed in the Chemical Composition section and the stabilization emission factors (100% for CC and 50 % for non-CC) calculate the pounds that may be released during stabilization of the waste.

7.7.1 Check the 12-month running totals. If the additional quantity of any compound will put the 12-month running total over the limits in Appendix 1, do not send the shipment to Stabilization. Notify Approvals, the Technical Manager and the Stabilization Manager.

DRAFT

7.7.2 If any compound is approaching an annual limit in Appendix 1, notify Approvals and the Technical Manager.

7.7.3 If more current or load specific compound concentrations is desired, the load may be sampled in accordance with SDP 2001 (Sampling of Solids and Semi-Solids in Drums and Pails) or SDP 2004 (Sampling of Bulk Solids and Semi-solids) and tested for compounds of concern.

7.8 After stabilization, enter the actual weight received and the average compound concentrations from the waste profile into the tracking spreadsheet (e.g. Groups/Everyone/Projects/Air/Stab Release Estimate).

7.9 Update 12-month totals for individual compounds, HTACs, VOCs and HAPs.

WASTE TRANSFER THROUGH STABILIZATION PITS

7.10 The pits may be used to consolidate solid wastes and transfer them into a dump truck for outbound shipment (e.g. site generated filter cake from the AWT facility). No stabilization reagent is added, nor mixing performed if the waste is subject to Subpart CC; only a container to container transfer is performed. As specified in Subpart CC, the operator must minimize the time that the waste is uncovered during the transfer. It is moved as quickly as possible into an outbound bulk container and covered.

DRAFT

=

7.11 Due the short amount of time and the lack of mixing and reagent addition, a lower emission rate (less than half) is expected. For CC compounds an emission rate of 0.5 will be used. For non-CC compounds, a 0.25 factor will be employed.

7.12 Using the transfer specific emission factors and the weight of the waste that will be transferred through the pit, estimate the release and verify that no limits in Appendix 1 will be exceeded.

7.13 Enter the information into the tracking spreadsheet (e.g., Groups/Everyone/Projects/Air/Stab Release Estimate). Update 12-month totals for individual compounds, HTACs, VOCs and HAPs.

8.0 User Responsibilities:

8.1 Approvals – review profiles for management at Stabilization, identify restricted compounds, evaluate potential emissions, determine if waste is suitable for management at stabilization.

8.2 Waste Receiving – review inbound shipments for Stabilization, and verify that air emissions will not exceed the limits specified in Section 7.3.

8.3 Stabilization – follow any processing restrictions as indicated in the WMD or on the WTF.

8.4 Technical Manager – ensure that estimated emissions are being entered on the spreadsheet and that the 12-month running totals are being monitored and maintained under the limits in Section 7.3.

9.0 User Performance Criteria:

DRAFT

9.1 Technical Manager or designee – review spreadsheet at least monthly.



10.0 Cross References:

None

11.0 Regulatory/Permit Requirements:

11.1 State Facility Air Permit, Item 12.2 EMISSION UNIT 1-STABL

11.2 Waste Analysis Plan, Attachment C, Sitewide Part 373 Permit

11.3 6 NYCRR 373-2.29 Air Emission Standards for Tanks, Surface Impoundments and Containers (also USEPA 40 CFR Part 264 Subpart CC)

11.4 6 NYCRR Part 212

11.5 DAR-1 Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212

DRAFT

**Appendix 1**

**HTAC Organic compounds most common in hazardous waste at CWM**

| Compound | CC? | emission factor | HTAC* 12 month total max. (pounds) |
|---|---|---|---|
| Benzene | CC | 1 | 100 |
| Carbon tetrachloride | CC | 1 | 100 |
| Chloroform | CC | 1 | 100 |
| 1,2-Dichloroethane | CC | 1 | 100 |
| Tetrachloroethylene | CC | 1 | 1000 |
| 1,1,2,2-Tetrachloroethane | CC | 1 | 1000 |
| Trichloroethylene | CC | 1 | 500 |
| 1,1,2-Trichloroethane | CC | 1 | 100 |
| Vinyl chloride | CC | 1 | 100 |
| PCBs | CC | 0.00044 | 9.9 |
| POM (PACS, PAHS) | | | |
| Anthracene | CC | 1 | |
| Acenaphthene | CC | 1 | |
| Benzo(A)anthracene | non-CC | 0.5 | |
| Benzo(A)pyrene | non-CC | 0.5 | |
| Benzo(B)fluoranthene | CC | 1 | |
| Benzo(K)fluoranthene | non-CC | 0.5 | |
| Benzo(GHI)perylene | non-CC | 0.5 | |
| Chysene | non-CC | 0.5 | |
| Dibenzo(A,H)anthracene | non-CC | 0.5 | |
| Fluoranthene | CC | 1 | |
| Fluorene | CC | 1 | |
| Indeno(1,2,3-cd)pyrene | non-CC | 0.5 | |
| Phenanthrene | non-CC | 0.5 | |
| TOTAL POM | | | 153 |

*maximum for HTACs based on Table 2 of Part 212-2.2

maximum based on assumptions used in AERMOD

# Attachment 18
# Proposed Permit Condition-Monitoring of Stabilization Facility

Air Permit

Item 12.2.

EMISSION UNIT 1-STABL

OPERATION AND MONITORING REQUIREMENTS

(1) Stabilization treatment of waste using cement kiln dust, Portland cement or other similar reagents will take place in the stabilization unit with the bag houses operating. CWM is limited to stabilizing 150,000 tons of waste per year.
(2) The tanks used for stabilization are subject to 6 NYCRR 373-2.29 AIR EMISSION STANDARDS for tanks, containers and surface impoundments, as referenced in the facility's RCRA permit. No hazardous waste containing >500 ppm VOCs may be stabilized in the stabilization tanks. Additional regulatory considerations for minimizing VOC emissions includes:
    a. Profiles for stabilization are reviewed for the presence and concentration of High Toxicity Air Contaminants (HTACs) VOCs listed in 6 NYCRR 212-2.2 Table 2. VOC emissions are estimated and tracked in accordance with the facility's SDP for VOC emissions to maintain levels under the Mass Emission Limit (pounds per year).
(3) The facility shall perform a monthly visual inspection of the bags…….. [formerly (1)]
(4) The facility shall complete a daily visual inspection of the baghouses on operating days …. [formerly (2)].

**ENCLOSURE NO. 2**
**AIR STATE FACILITY PERMIT MODIFICATION**
**ADDITION OF RMU-2**

Revised/Updated Emissions Inventory – Addition of RMU-2
Revised March 24, 2017

# Emissions Inventory – RMU-2 Landfill

## CWM Chemical Services Model City Site
## Model City, New York

CWM Chemical Services, LLC

1550 Balmer Road

Model City, NY 14107

2055 Niagara Falls Boulevard Niagara Falls New York 14304 USA

080335 | Report No 8 | Revised March 17, 2016 and March 24, 2017

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| Table 5 | Facultative Pond 5 Emissions |
| Table 6 | Estimated VOC and HAP Emissions from Stormwater Detention Basin |


# Attachments


| | |
|---|---|
| Attachment 1 | Calculation of Fugitive PM-10 Emissions |
| Attachment 2 | Calculation of Fugitive PM2.5 Emissions |
| Attachment 3 | USEPA Paper *"Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools under Simulated Indoor Environmental Conditions"* |
| Attachment 4 | Historical Sampling Results for RMU-1 Leachate |
| Attachment 5 | VOC and HAP Emissions from Landfill Open Face |
| Attachment 6 | Select Drawings of RMU-2 Landfill |

# 1. Introduction

GHD has been retained by CWM Chemical Services, LLC (CWM) to prepare this revised emissions inventory of the proposed RMU-2 area at the Model City Facility (Facility or Site). The purpose of this revision is to update the February 2015 emission inventory for the facility taking into account current conditions at the facility and to incorporate comments provided by the New York State Department of Environmental Conservation (NYSDEC). The Inventory will also be used as a basis for the Air State Facility Permit Application as well as to develop appropriate air permitting strategies for the Facility.

The CWM facility is an existing commercial hazardous waste treatment, storage, and disposal facility (TSDF) in Model City, Niagara County, New York. This TSDF began operation in 1972 as ChemTrol Pollution Services, Inc. Due to corporate acquisitions and name changes, CWM, a subsidiary of Waste Management, Inc., is the present owner and operator of the facility.

Based on the previous quantification of air emissions from the facility, in accordance with the guidance and regulations presented in 6 NYCRR Part 201, of the New York Code of Rules and Regulations (NYCRR), the facility had not historically qualified as a potential Title V or Air State Facility source. Therefore, prior to 2013, emissions from sources not identified as Exempt or Trivial under 6 NYCRR Part 201-3, had been previously permitted with the New York State Department of Environmental Conservation (NYSDEC) Division of Air Resources in accordance with 6 NYCRR Part 201-4 (Minor Facility Registrations).

The recent promulgation of 6 NYCRR Part 201-9 presented the new 'Significant Mass Emission Rates for Persistent, Bioaccumulative and Toxic Compounds' that took effect on February 22, 2013. Any facility that has total emissions greater than the thresholds listed in the table for any compound must apply for an Air State Facility Permit or a Title V Permit within six months of receipt of the department's determination to submit a complete permit application. As a result, GHD representatives conducted a thorough review of CWM facility operations and existing permit documentation in order to ascertain the level of air permitting required for the CWM Facility going forward. Based on this review, GHD determined that an Air State Facility Permit Application was required for the Facility. The Air State Facility Permit Application for the existing facility was submitted to NYSDEC in January 2014. The Air State Facility Permit for the facility was issued on October 24, 2014. A request to modify the Air State Facility Permit, including a revised inventory, was submitted to the NYSDEC by CWM on February 5, 2015 for the facility expansion to construct RMU-2 and related units. By letter dated March 20, 2015, NYSDEC staff deemed the permit modification application complete and circulated, among other documents, a modified draft Air State Facility permit which incorporated conditions for the proposed RMU-2 landfill. Based on the documents provided by the petitioners following the RMU-2 Issues Conference, the NYSDEC reversed its decision on the completeness of CWM's permit modification application for the Air State Facility permit. In a December 1, 2015 letter from NYSDEC to the Honorable Daniel P. O'Connell regarding the proposed expansion at the CWM Facility, the NYSDEC indicated that a supplemental emissions inventory and clarification of certain calculations contained in the February 2015 permit modification application is required from CWM to render the modification application complete and for staff to determine if the draft Air State Facility permit for the proposed RMU-2 project needs to be modified.

Updates to the emissions inventory were submitted on February 12, 2016 and March 21, 2016 and included additional information requested in a December 1, 2015 letter from NYSDEC to the Honorable Daniel P. O'Connell regarding the proposed expansion at the CWM Facility. The NYSDEC issued a Notice of Complete Application and revised Draft Air State Facility Permit for RMU-2 for public comment on July 8, 2016. On December 7, 2016, the NYSDEC issued a letter to CWM indicating the application was incomplete and must be revised to include appropriate waste processing quantities to calculate the potential emissions from the facility with adequate justification to support the emissions calculations. This emissions inventory update includes additional information requested in the Notice of Incomplete Application from NYSDEC dated December 7, 2016.

# 2. Facility Description

The CWM Chemical Services, LLC (CWM), Model City Facility is located within the Erie-Niagara Region in the western section of New York State. The facility is situated on the boundary between the Towns of Lewiston and Porter in Niagara County. All hazardous waste management units are located within the Town of Porter. The facility's operations are authorized by a RCRA hazardous waste permit issued by NYSDEC and a TSCA (PCB) Approval issued by USEPA. The facility uses a number of processes for the proper storage, treatment and disposal of a variety of liquid and solid organic and inorganic hazardous waste and industrial non-hazardous waste. Storage, treatment and disposal capabilities include an aqueous waste treatment system, which includes phase separation, oxidation/reduction, neutralization, solids precipitation and filtration, biological treatment and carbon filtration. The treated effluent is stored in a facultative (fac) pond, qualified and discharged pursuant to the facility's State Pollutant Discharge Elimination System (SPDES) Permit. Other operations include waste stabilization; secure landfilling of approved solid waste, including PCBs; solvent and fuel blending processes; RCRA and TSCA container storage and transfer; landfill leachate collection, storage and treatment. As a RCRA permitted TSDF, CWM is subject to the hazardous waste regulations in 6 NYCRR Parts 370-376. This includes several regulations focused on minimizing the release of hazardous waste contaminants to the air: 373-2.28, Air Emission Standards for Equipment Leaks, and 373-2.29, Air Emission Standards for Tanks, Containers and Surface Impoundments.

The Model City Facility began operations in 1971 as ChemTrol Pollution Services, Inc. Activities included fuels blending of waste oils, distillation of spent solvents, aqueous waste treatment, and land disposal. In 1973, the stock of ChemTrol was purchased by SCA Services, Inc. The ChemTrol name was retained until late 1978 at which time the corporate name changed to SCA Chemical Waste Services, Inc., and in 1981, was renamed SCA Chemical Services, Inc.

In October 1984, WM Acquiring Corp., owned jointly by Waste Management, Inc. (WMI), and Genstar, Inc., acquired SCA Services, Inc., of which SCA Chemical Services, Inc. was a subsidiary. Through a corporate reorganization in October 1986, SCA Chemical Services, Inc. became a wholly owned subsidiary of Chemical Waste Management, Inc. (CWM), itself majority-owned by Waste Management, Inc. In July 1988, the corporate name SCA Chemical Services, Inc. was changed to CWM Chemical Services, Inc. CWM Chemical Services, Inc., became a limited liability company in January 1998 and became CWM Chemical Services, LLC. CWM Chemical Services, LLC, is the owner and operator of the Model City Facility.

The fuels blending tanks and solvent distillation operation were eliminated in the 1980s. The Aqueous Treatment facility continues to operate. The following summarizes the closed and active landfill units at the Facility:

| Landfill Area | Status |
|---|---|
| SLF 1-6 | Closed |
| SLF 7 | Closed |
| SLF 10 | Closed |
| SLF 11 | Closed |
| SLF 12 | Closed |
| RMU-1 | Closed |
| RMU-2 | Proposed |

The area encompassed by the proposed RMU-2 area is approximately 43.5 acres and will contain a total of six cells. The proposed waste area of RMU-2 is approximately 38.5 acres. The RMU-2 project also includes the replacement of existing facultative (Fac) ponds, namely Fac Ponds 3 and 8. Fac Pond 8 was closed in 2016 accordance with the Part 373 Permit. RMU-2 will include the areas currently occupied by Fac Pond 3 and closed Fac Pond 8. Proposed Fac Pond 5 will be constructed to replace the storage capacity for treated wastewater lost by the closure of Fac Ponds 3 and 8.

# 3. Facility Emission Unit Descriptions

The following sections present discussions of the emissions estimated for the sources identified at the Facility for the addition of RMU-2. Supporting calculations are provided as referenced.

## 3.1 Fugitive Dust Emissions: RMU-2

Off-road particulate matter (PM) emissions are primarily caused by the moving and handling of soil by heavy equipment such as loaders and bulldozers. The emissions were calculated based on the equipment and hours of operation for both operational and construction vehicles, and include such activities as soil handling and waste placement.

Operational vehicles and waste hauling vehicles also generate particulate emissions from traveling on both the paved and unpaved roads at the Facility. These emissions differ from those discussed above since they consider PM that is stirred up by vehicle tires on the road surface as opposed to the actual movement of soil. PM emissions to determine road dust were calculated based on information provided by the Facility, which include vehicle traffic, such as types of equipment and roads/paths traveled, as well as distances traveled and hours of operation. Figures 1 through 10 provide a description of the road segments and vehicle traffic routes for the different truck types that operate at the Facility. These routes have been modified from the current routes used for RMU-1 based on the expected routing for the RMU-2 expansion.

GHD utilized a series of United States Environmental Protection Agency (USEPA) published emission factors and emission factor equations in the performance of this work. Potential emissions for the facility were calculated based on the proposed draft Part 373 Permit maximum waste acceptance rate of 500,000 TPY. Attachment 1 presents the revised calculations of fugitive PM-10 dust potential emissions for the Facility with the RMU-2 Area included during construction and

operations. Attachment 2 presents the revised calculations of fugitive PM-2.5 dust potential emissions for the Facility with the RMU-2 Area included during construction and operations. For conservatism, the calculations included in Attachments 1 and 2 include the construction of a phase (first or second cell) of RMU-2 and the construction of Fac Pond 5 in the same year.

GHD estimated wind erosion calculations from soil stockpiles at the CWM Model City that will be utilized during construction/operation of the RMU-2 landfill. Calculations were performed according to the methodology given in USEPA AP-42 (Compilation of Air Pollutant Emission Factors), Section 13.2.5: Industrial Wind Erosion (November 2006). The following data was referenced for the calculation methodology:

- The maximum surface area of the stockpile (2.86 acres) was referenced from Appendix H of the RMU-2 Draft Environmental Impact Statement (November 2013)
- The maximum wind speed for each day was obtained from the on-site meteorological weather station (data validated by O'Brien & Gere)
- The wind data for 2011 was selected for the analysis as it represents worst-case emissions for the 5-year period of 2010 through 2014

The following assumptions were utilized in the work:

- Disturbances of the soil stockpile occur daily during construction season which occurs from April 1 to October 31 during the year; therefore, the number of disturbances per year equals 214 (i.e., N=214 in the calculations)

Tables 2A and 2B provide the calculation sheets for $PM_{10}$ and $PM_{2.5}$, respectively. The calculations are considered conservative since:

- It is assumed that the entire soil stockpile area is disturbed daily when only a small fraction is actually disturbed during any one day of operation
- Calculations were done assuming operation on Sunday, when the facility is actually closed on this day
- Fastest mile wind speed used is more conservative than required by AP-42

## 3.2 Landfill Emissions: RMU-2

This Section provides a summary of emissions from RMU-2, in addition to the emissions from the leachate collection standpipes presented in section 3.3.1.

### 3.2.1 Cover Diffusion

Emissions from diffusion of pollutants through the cover of the landfill unit were calculated using the methodology presented in Chapter 8.2 (Closed Landfills) of the USEPA document *Air Emissions Models for Waste and Wastewater*, dated November 1994. Cover diffusion calculations are based on the waste receiving data from RMU-1. Diffusion coefficients for the cover system were referenced from the papers *Transport of Volatile Organic Compounds Through PVC and LLDPE Geomembranes From Both Aqueous and Vapour Phases*, dated September 29, 2009 and *Migration of Dilute Aqueous Organic Pollutants Through HDPE Membranes*, dated May 10, 2001. The table below summarizes the calculation methodology for landfill cover diffusion for the capped portion of RMU-2:

| Landfill | Synthetic Liner | Cover Description | See Table |
|---|---|---|---|
| RMU-2<br>Final Cover | 40-mil HDPE<br>(19.5 acres) | 0.5 ft general fill & Geosynthetic Clay Liner (below liner) 1.5 ft general fill & 0.5 ft topsoil above liner | 3A |

Please note that diffusion coefficients for areas with a final cap were based on the geomembrane liner material only and did not take into account the soil cover above and below the liner material. Therefore, the effective diffusion coefficient is expected to be lower than what was presented in the calculations.

Worst-case emissions were calculated assuming maximum build out of the RMU-2 landfill (total acreage and final grade) with emissions occurring just prior to construction of the synthetic liner (40-mil HDPE). At that time, it is assumed that 19.5 acres of RMU-2 will have final cover installed while the remaining area (19 acres) will be either in the interim phase or in the active (waste receiving) phase. The table below summarizes the calculation methodology for landfill cover diffusion for the uncapped portions of RMU-2:

| Landfill | Synthetic Liner | Cover Description | See Table |
|---|---|---|---|
| RMU-2<br>(Interim Area) | None<br>(17.3 acres) | 1 inch of Posi Shell cover (24 hours per day) | 3B |
| RMU-2<br>(Active Area) | None<br>(1.7 acres) | 1 inch of Posi Shell cover (16 hours per day from 3:00 PM to 7:00 AM for Monday through Saturday; 24 hours per day on Sunday) | 3C |

The following tables provide to cover diffusion emission estimates for the RMU-2 Landfill:

- Table 3A presents cover diffusion calculations for the 19.5 acre region that has final cover installed
- Table 3B presents cover diffusion calculations for the 17.3 acre region that has interim cover installed (1 inch of Posi Shell cover for 24 hours per day, 365 days per year)
- Table 3C presents cover diffusion calculations for the 1.7-acre active region during non-operational hours (1 inch of Posi Shell cover for 16 hours per day from 3:00 PM to 7:00 AM on Monday through Saturday; 1 inch of Posi Shell cover for 24 hours per day on Sundays)

Emissions from the active region during operating hours (7:00 AM to 3:00 PM) are discussed in Section 3.2.3.

It should be noted that the assumption of 1 inch of Posi-Shell cover is conservative. Posi-Shell is applied at the end of every working day, therefore, it is applied over every few inches of placed soils such that there are numerous layers of Posi-Shell present in an area by the time it reaches grade and is ready for intermediate of final cover.

### 3.2.2 Barometric Pumping

According to RJ Pirkle, DE Wyatt, V Price, BB Looney (Barometric Pumping: The Connection Between The Vadose Zone and The Atmosphere, 1992) "the principal of barometric pumping is simple. During periods of falling barometric pressure, the pressure on the soil/atmosphere boundary is rapidly reduced. Soil gas from the sedimentary pore space flows vertically into the atmosphere in

order to restore pressure equilibrium." This concept is well understood and documented in landfills with a vent system. This condition is common at municipal solid waste landfills (with gas collection or venting systems) and in some cases solid waste landfill personnel will increase the vacuum on a gas collection system during periods of a rapid barometric pressure loss.

One of the base assumptions in the EPA document entitled Air Emissions for Waste and Wastewater (EPA-453/R-94-080A, November 1994) is that "the landfill is assumed to be vented to the atmosphere. The volume of gas available for barometric pumping is assumed to consist of the total void volume of the waste bed." In a landfill with a vent system this makes complete sense. As barometric pressure drops, vapors would rise vertically through vents and/or a gas venting layer and be emitted. As pressure increases, the void spaces would be refilled with air from the atmosphere where it would mix with vapors from the waste – and then rise again to be vented when the barometric pressure drops (thus "barometric pumping").

However, RMU-2 will not have a venting system (refer to Attachment 6 for drawings). Therefore as barometric pressure drops, any vapors within the unsaturated zone of the landfill may rise, but they will be contained by the clay and synthetic cap (other than potentially by diffusion as described in Section 3.2.1). They will not be emitted through a venting system, since one does not exist. Further, since the vapors will not be emitted, they will not be replenished during a high pressure event and the “barometric pumping” effect will not occur as described in the referenced document.

The only possible pathway for vapors to be emitted to the atmosphere from barometric pumping is through the standpipes. However, this is an incomplete pathway for the following reasons:

1. As described above, a reduction in barometric pressure will cause gases to rise vertically in an attempt to reach pressure equilibrium. The stand pipe risers are only perforated at the very bottom in order to allow leachate to flow from the landfill and into the bottom of the standpipes where it is then pumped from the landfill. During a reduction in barometric pressure gasses would be moving away from these perforations as they rise vertically.
2. The material at the bottom of the landfills is saturated with leachate, meaning that there is near zero pore space for gases to migrate through in the event that a preferential pressure gradient did exist.
3. The standpipes are covered, inhibiting gases present inside them from escaping.

The emissions inventory for other landfills at CWM currently includes emissions from the leachate within the standpipes. This analysis is entirely consistent with NYSDEC’s September 12, 1990 letter to CWM allowing the removal/capping of gas vents from SLF-11. While we believe that the above information provides evidence that barometric pumping does not occur, or occurs only to a very limited extent. In an effort to be conservative, the many background documents that the above EPA study was based on relative to barometric pumping were reviewed. Again, all of these documents were associated with landfills with a vent system. No references to barometric pumping without a gas venting system were found. One reference (Evaluation and Selection of Models for Estimating Air Emissions from Hazardous Waste Treatment, Storage and Disposal Facilities, EPA-450/3-84-020, December 1984) states that "for a landfill handling strictly hazardous waste, with no expected internal gas generation…an increase of 10-15 percent to emission release could be expected." Therefore, in order to be conservative, we propose to add 15 percent to our diffusion emission estimate to account for any limited effect barometric pumping may have.

### 3.2.3 Active Placement of Waste

Emissions from the open active area of waste disposal were estimated using a model developed for a similar hazardous waste landfill located in Louisiana. The model was developed based on equations presented in USEPA document *Air Emissions Models for Waste and Wastewater*, dated November 1994. The profile of waste used for the model is based on historical receipts for RMU-1 using the maximum amount of each compound received in a year for the period of 2005 through 2014 (in parts per million). The active area of the RMU-2 area was input into the model (1.7 acres) and the depth of waste in the active zone is assumed to be a very conservative 6 feet (approximate depth of one “lift “of waste). The output of the model is presented as Attachment 5. The emissions from active operations in RMU-2 are projected based on the types and maximum annual quantities of waste received in RMU-1. A factor of (2,496/8,760) was applied to the Attachment 5 results to account for the time period when the landfill is operational. At the end of each day, Posi Shell cover is applied to the active region, which substantially reduces emissions (see Table 3C for cover diffusion calculations for the 1.7 acre active region during non-operational hours).

## 3.3 Leachate Collection, Transfer and Storage

This Section provides a summary of emissions from the collection, transfer and storage of leachate at the Facility.

### 3.3.1 Standpipes and Sideslope Risers

Emissions occur within the landfill standpipes and sideslope risers due to the evaporation of leachate to the atmosphere. The calculation methodology for leachate emissions from the landfill standpipes and sideslope risers was taken from the USEPA paper, "*Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools under Simulated Indoor Environmental Conditions* (Guo, Z. and Roache, N.F., December 20, 2002)" [See Attachment 3 for paper]. The exposed leachate surface area for the RMU-2 standpipes was calculated by summing the following individual standpipe areas:

- Six (6) 24-inch HDPE vertical risers
- Six (6) 24-inch HDPE sideslope risers
- Twelve (12) 8-inch HDPE sideslope cleanouts

Table 4 presents a projected summary of VOC and HAP emissions from the RMU-2 standpipes. Individual VOC and HAP concentrations within the leachate in RMU-2 were based on the maximum detected value from the following historical sampling results from RMU-1 (see Attachment 4):

- Periodic sampling results for individual RMU-1 standpipes between May 2006 and February 2013
- Periodic sampling results for Tank T-102 between April 2012 and April 2013
- Periodic sampling results for Tank T-160 (lift station for RMU-1 Landfill) between January 31, 2012 and February 15, 2012

It is assumed, since the types and volume of wastes received is not proposed to change, that the leachate collected from the RMU-2 Landfill will have a similar composition and generation rate to that of the RMU-1 Landfill.

## 3.4 Facultative Ponds

As indicated in Section 2.0, Fac Pond 3 is in the footprint of RMU-2 and will be closed in accordance with the Part 373 Permit prior to constructing the second cell. To replace the wastewater storage capacity lost by the closure of Fac Pond a new impoundment will be constructed between SLF-7 and SLF-12, namely Fac Pond 5. Fac Pond 3 will be removed from the emissions inventory upon closure and Fac Pond 5 will need to be added to the inventory upon construction.

The laboratory analytical results for the treated wastewater discharged to the current facultative ponds (Fac Ponds 1 & 2 and 3) shows non-detects (NDs) for all Volatile Organic Compounds (VOCs) with the exception of acetone (which is not considered a VOC according to 6 NYCRR 200.1(cg)).

In order to obtain an estimate of potential emissions from the proposed Fac Pond 5, one half of the detection limit was assumed for each compound for a sample collected on December 2, 2015 from Fac Ponds 1 & 2. Emissions of PCBs from the facultative ponds were estimated based on the SPDES permit limit of 200 nanograms per liter. Emissions from the facultative pond were calculated using the mass balance approach presented as Equation 5-30 in the USEPA document *Air Emissions Models for Waste and Wastewater*, dated November 1994. Table 5 presents potential emissions from proposed Facultative Pond 5.

## 3.5 Stormwater Detention Basin

The active area of RMU-2 may at times contain a stormwater detention basin as shown on Permit Drawing No. XX included in the Draft Part 373 Permit Modifications for RMU-2. The stormwater detention basin will be constructed to manage precipitation that contacts the waste surface in the active area of the landfill.

Emissions from the RMU-2 stormwater detention basin were calculated in Table 6 assuming a 1-foot depth of water in the basin, resulting in an area of approximately 248 square meters. Based on historical sampling results, contact stormwater was non-detect during operation of RMU-1; therefore, half of the detection limit was used for these compounds.

## 3.6 VOC Emissions from Construction: RMU-2

As stated in the December 1, 2015 letter from NYSDEC to the Honorable Daniel P. O'Connell, "due to the natural low permeability of the soils and flat groundwater flow gradients, groundwater contamination remains close to the source areas. In addition, there is no inhabitable structures on-site overlying residual shallow soil or groundwater contamination. As a reminder, CWM has performed 83 investigations at the solid waste management units and site-wide areas at the facility. The remedial work undertaken at the facility, performed pursuant to the Corrective Actions Study and Interim Corrective Measures, have met the goals of the corrective action program and are protective of human health and the environment…. The decades of monitoring at the facility have indicated that hydraulic control is maintained by the groundwater extraction systems and migration of contamination beyond previously established extents is not occurring."

As discussed with NYSDEC, emissions from contamination identified during RMU-2 construction do not need to be quantified, and thus, are not presented in this Application. This is consistent with how investigations and remedial actions are conducted in New York State. It should be noted

however, that CWM has a plan in place for the radiological and chemical screening of soil that will be excavated as part of the RMU-2 project. The plan includes health and safety procedures as well as procedures for screening materials and how they will be properly managed. The daily data from the radiological and chemical contamination monitoring will be compiled, summarized and added to the project documentation. A copy of these daily summary reports will be included with the monthly Environmental Report for the month in which the data is collected. In addition, the reports will be available for review by the NYSDEC On-Site Monitors.

CWM also has an Ambient Air Monitoring Program. This program determines the impact, if any, of the hazardous waste activities and other site activities on the surrounding air quality at the Model City facility. CWM is expanding the Ambient Air Monitoring Program for the RMU-2 Project, based on recommendations from NYSDEC.

# 4. Emission Discussion

Table 1 presents a summary of total emissions for the CWM Facility. A summary of select compounds is presented below:

| ***Emission Source*** | ***Emissions (TPY)*** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ***VOCs*** | ***HAPs*** | ***CO*** | ***NOx*** | ***$SO_2$*** | ***$PM_{10}$*** | ***$PM_{2.5}$*** | ***Total GHG*** |
| Existing Facility | **4.11** | **2.29** | **2.64** | **4.62** | **0.01** | **2.96** | **2.32** | **4,472** |
| RMU-2 Landfill | **0.04** | **0.05** | **0.00** | **0.00** | **0.00** | **9.56** | **5.00** | **0.00** |
| **Totals (TPY)** | **4.15** | **2.34** | **2.64** | **4.62** | **0.01** | **12.53** | **7.32** | **4,472** |
| **Title V Threshold (TPY)** | **50** | **25** | **100** | **100** | **100** | **100** | **100** | **100,000** |

As shown in the table above, the facility is well below the thresholds for Title V applicability. The CWM Facility has applied for and obtained an Air State Facility Permit as described under 6 NYCRR 201-4.1. CWM is requesting a modification to the Air State Facility Permit to incorporate RMU-2.

# 5. Emission Caps

As shown in Table 1, potential emissions for all compounds are at least an order of magnitude (less than 10 percent) less than the facility emission thresholds for Title V Permit applicability. Even though CWM is not required to, they have voluntarily agreed to accept the following emission caps to demonstrate that the facility is non-major for VOCs and HAPs:

| Compound | Proposed Emission Cap |
|---|---|
| | |
| Total VOC | 50 tons per year |
| Total HAP | 25 tons per year |
| All Individual HAP | 10 tons per year (each) |

In addition, potential emissions for high toxicity air contaminants (HTAC) compounds are lower than the thresholds provided under 6 NYCRR Part 212 2.2, with the exception of PCBs and polycyclic organic matter (POM). Therefore, CWM will accept emission caps for the volatile organic HTAC compounds listed in 6 NYCRR Part 212-2.2 that are commonly found in hazardous waste (see Appendix 1 of SDP 5000 (provided as Attachment 17 of the Emission Inventory for the Existing Facility)), with the exception of PCBs and POM (emission caps for PCBs and POM will be based on the results provided in the final Air Quality Modeling Report, to be provided under separate cover). Tracking of emissions compared to the emissions caps will be performed:

1. Utilizing the emissions data presented in the Emissions Inventory that were calculated based on historical site-specific data for the landfills and other sources;
2. Utilizing the monitoring, recordkeeping and reporting requirements that the facility will implement to estimate the emissions from the stabilization facility (the major source of VOC and HAP that may be controlled by processing rate) are provided in the Standard Division Practice (SDP) document titled “Estimated Air Emissions from Stabilization” (provided as Attachment 17 of the Emission Inventory for the Existing Facility). The estimated emissions will be compared to the limits in the Appendix 1 of the SDP to demonstrate compliance with Part 212.

Stabilization is the largest source of VOCs and HAPs, has the greatest potential for variability, and can be monitored and controlled. Emissions from the remaining process sources are less likely to fluctuate and any fluctuation that does occur is expected to be addressed by the conservative nature of the methods and assumptions used in the Emissions Inventory.

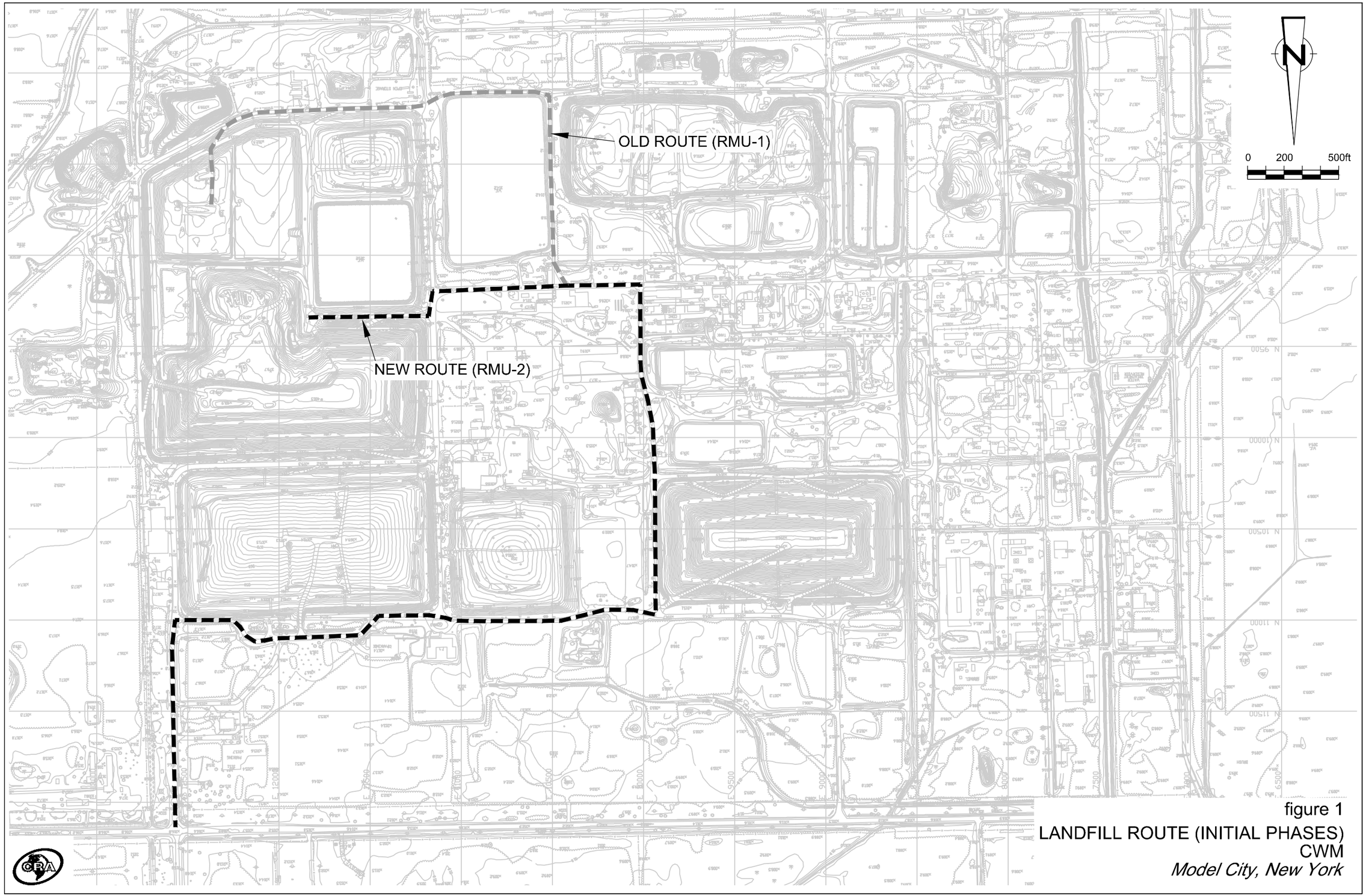



figure 1
LANDFILL ROUTE (INITIAL PHASES)
CWM
*Model City, New York*

80335-00(001)GN-NI001 JAN 12/2015

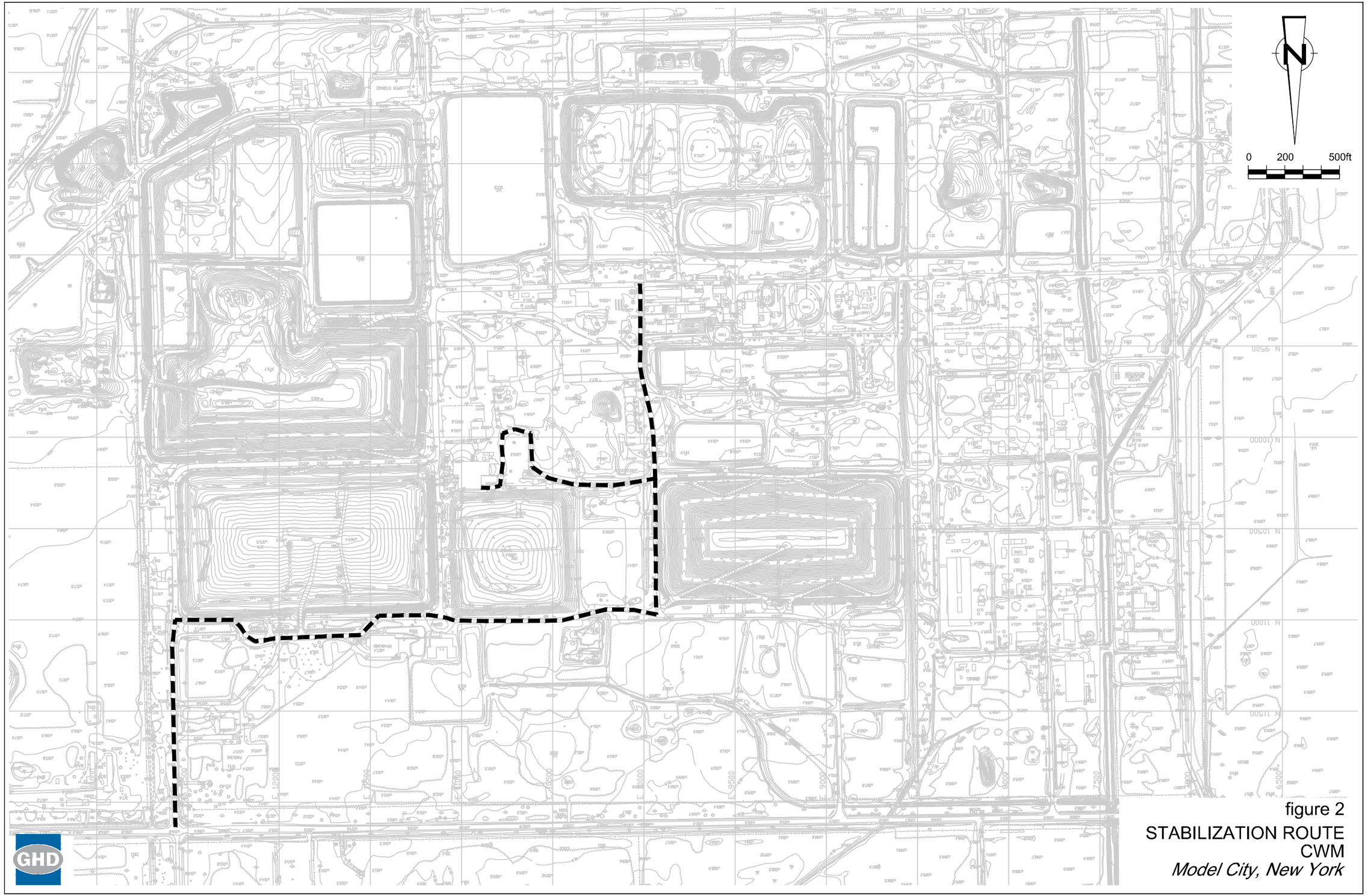



figure 2
STABILIZATION ROUTE
CWM
*Model City, New York*

80335-00(008)GN-NI002 MAR 17/2017

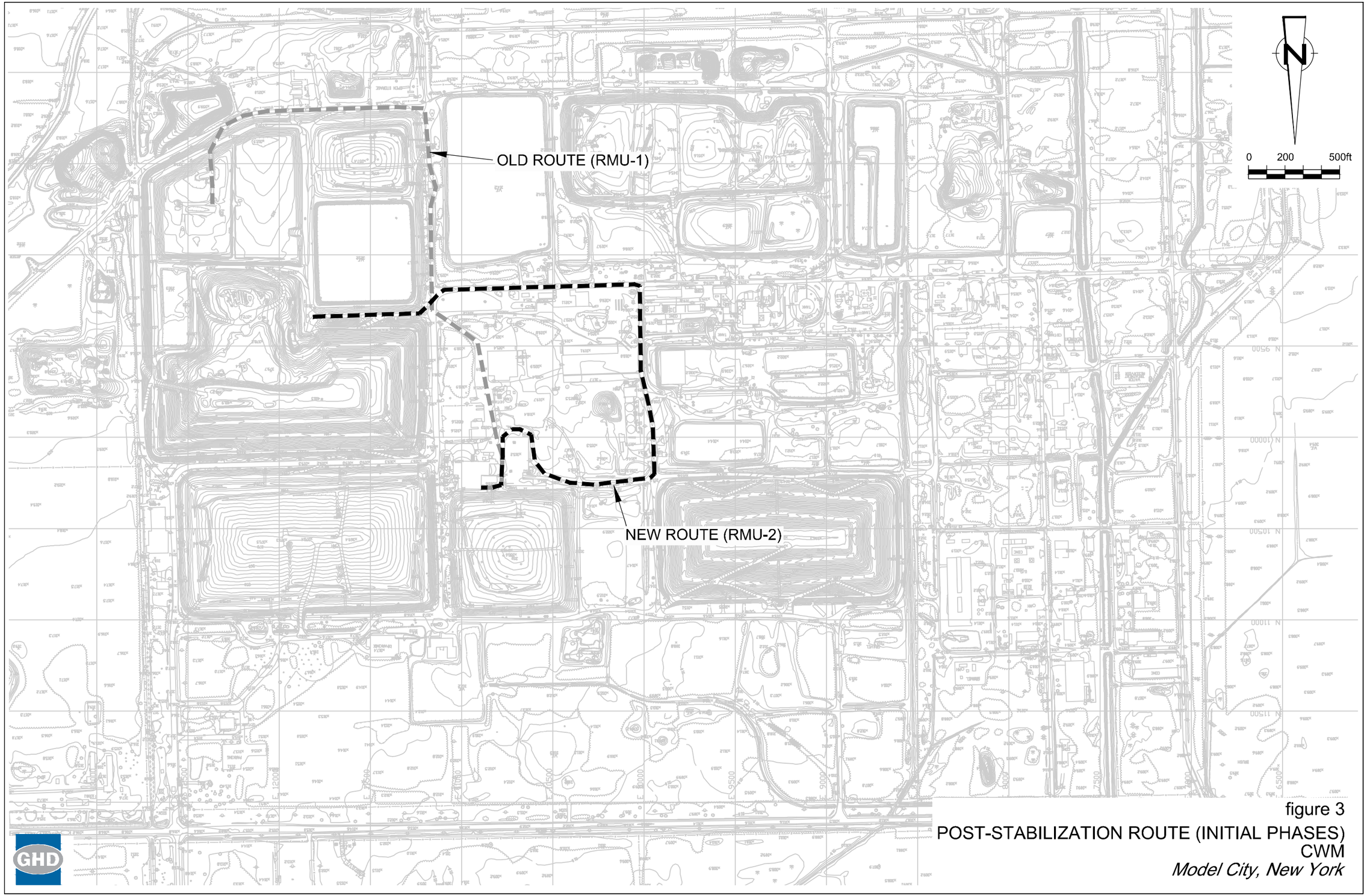


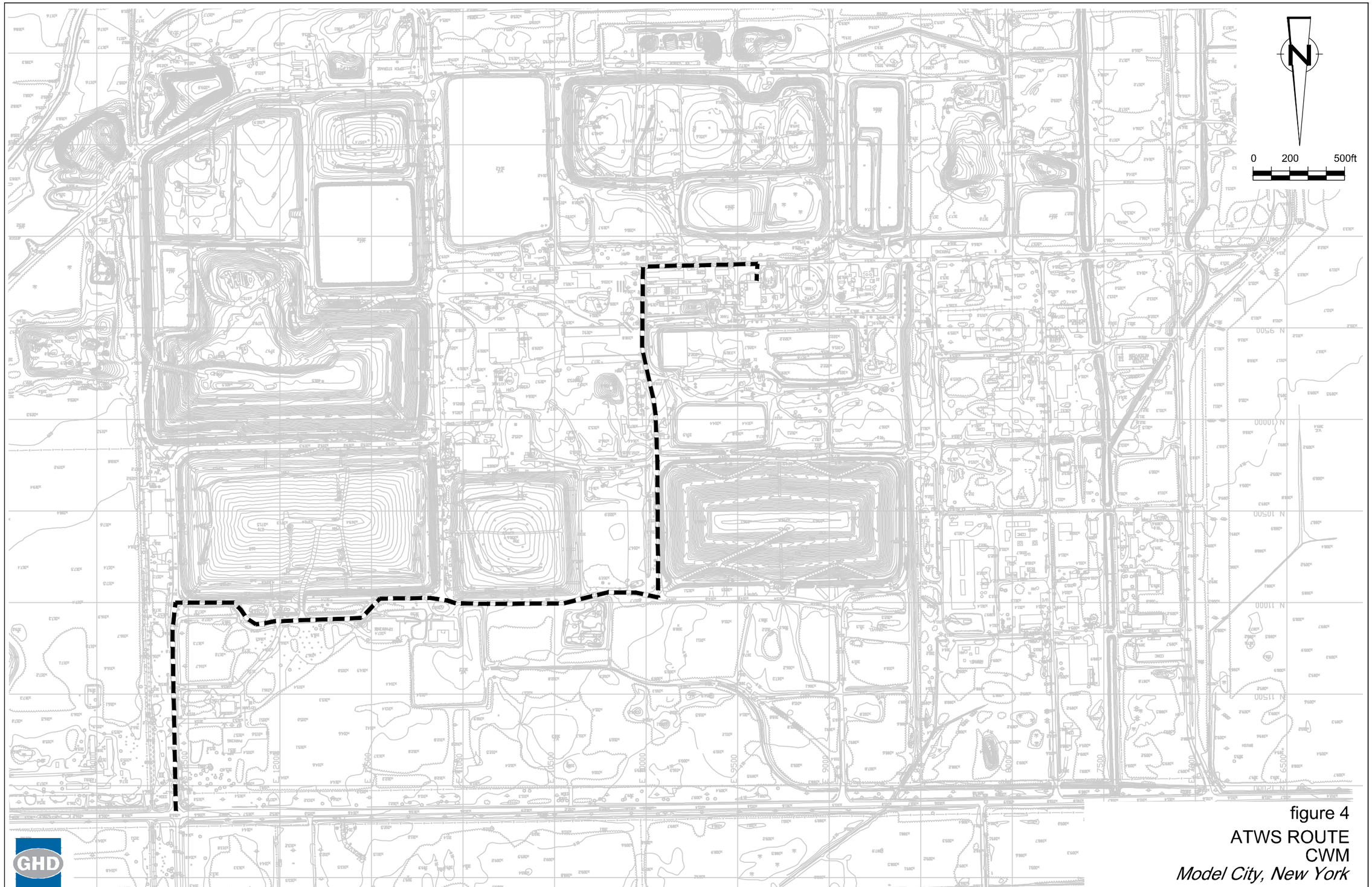

figure 3

POST-STABILIZATION ROUTE (INITIAL PHASES)

CWM

*Model City, New York*

80335-00(008)GN-NI003 MAR 17/2017




80335-00(008)GN-NI004 MAR 17/2017

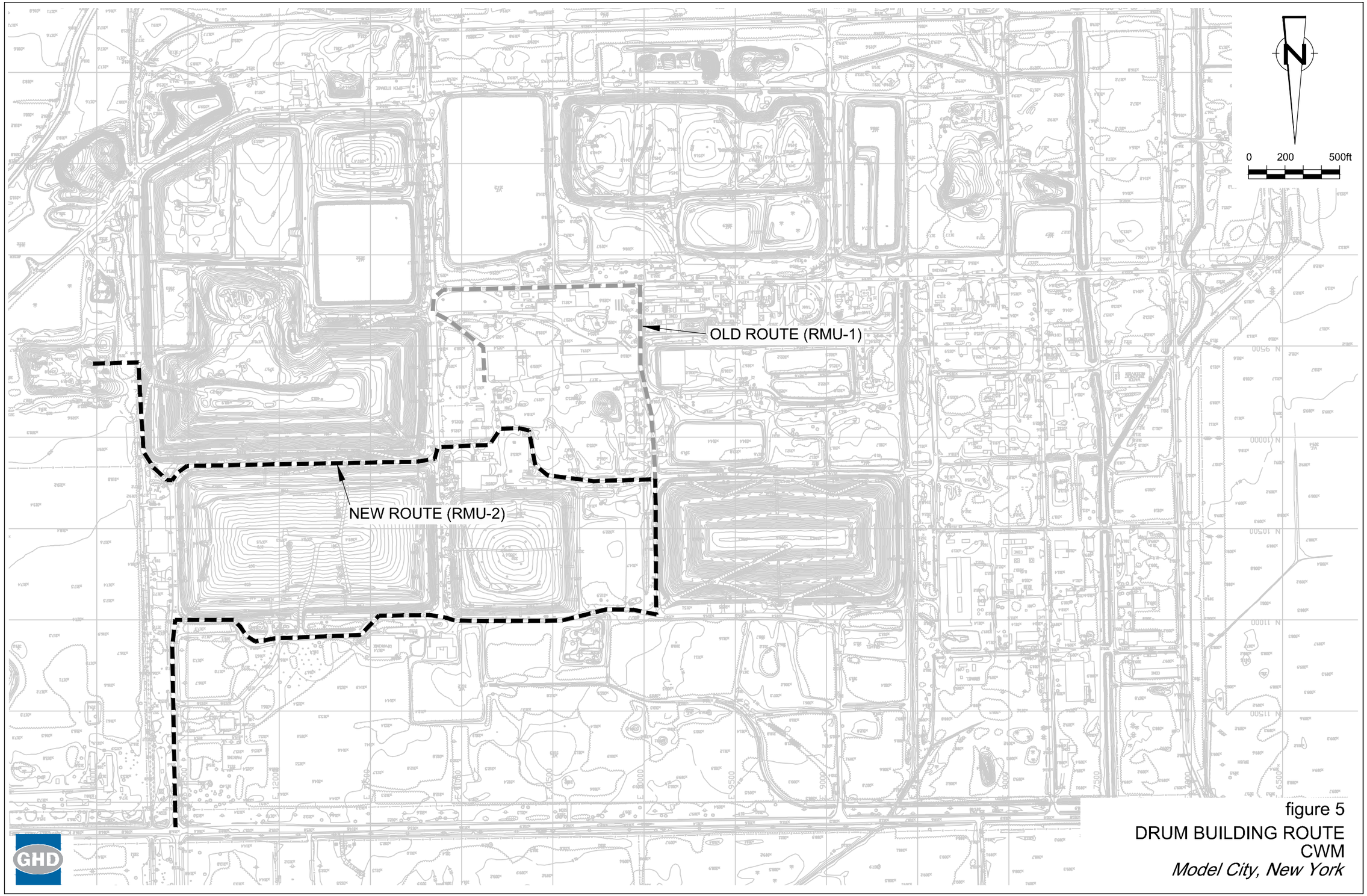



figure 5

DRUM BUILDING ROUTE

CWM

*Model City, New York*

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N

0 200 500ft

CLAY ONLY
30,193 TONS

STONE SOIL
156,535 TONS

figure 6

RMU-2 CONSTRUCTION 1 OF 6 PHASES
POTENTIAL CONSTRUCTION VEHICLE ROUTE
CWM
*Model City, New York*

GHD

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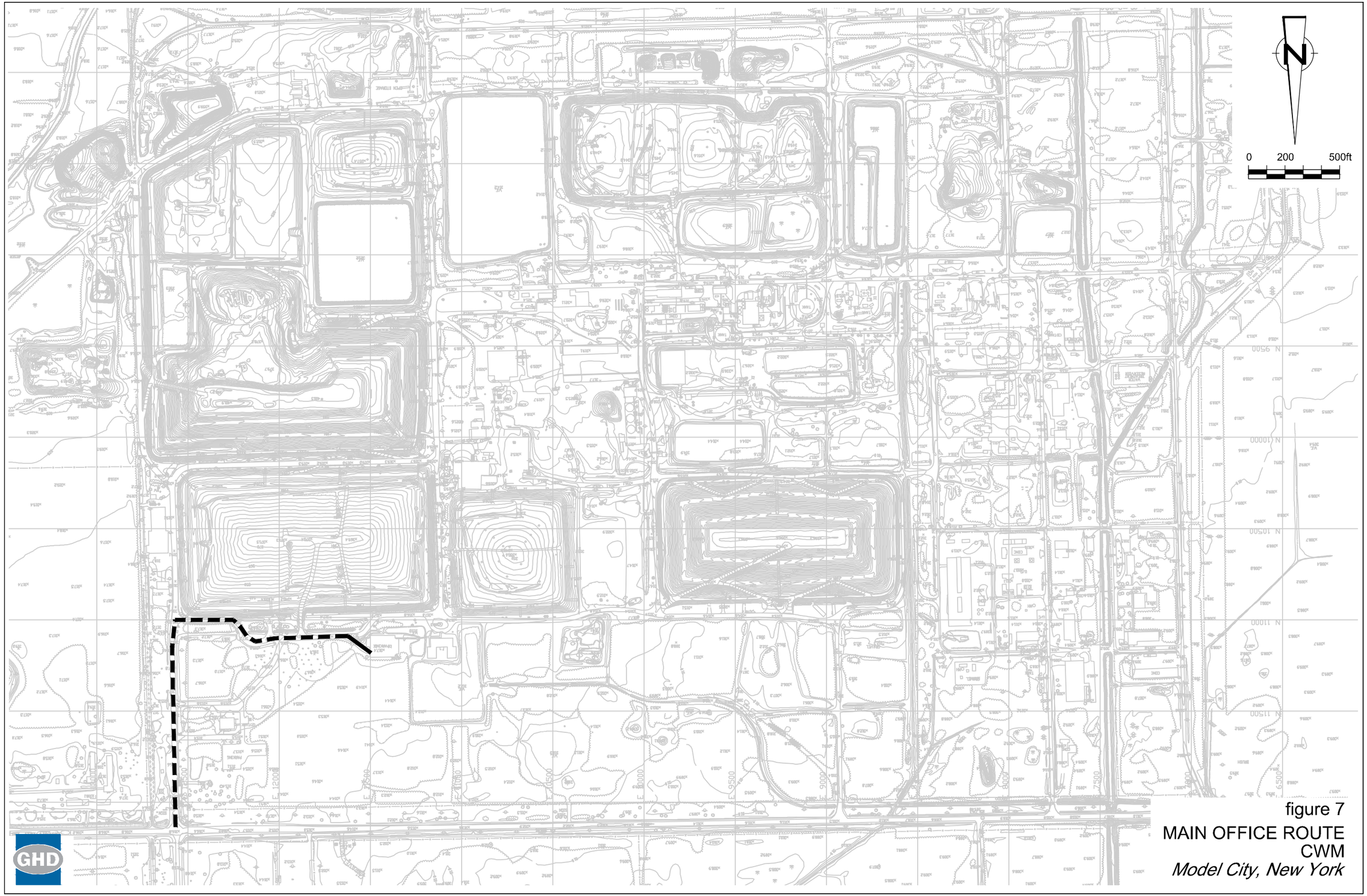



figure 7

MAIN OFFICE ROUTE

CWM

*Model City, New York*

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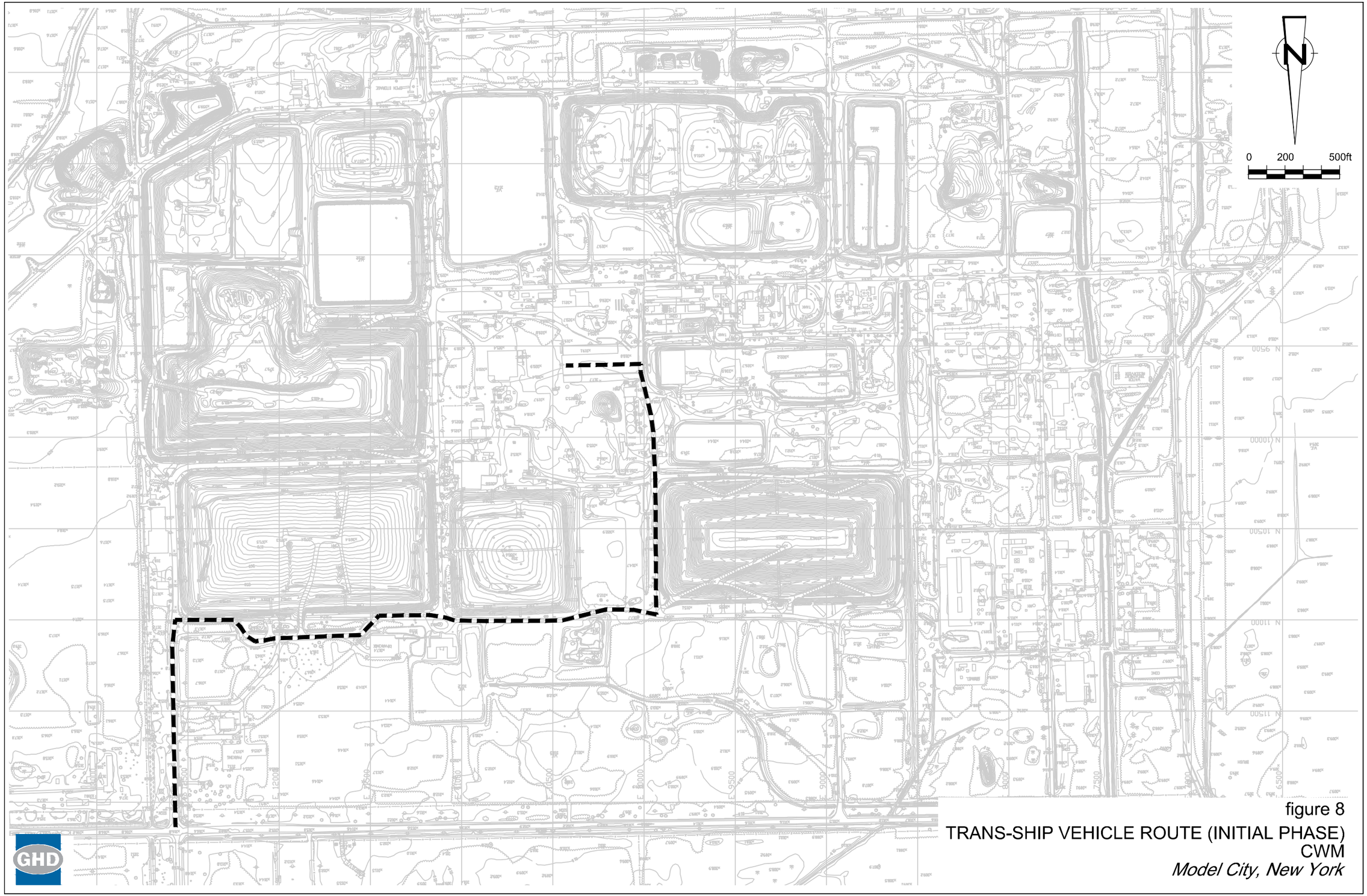



figure 8

TRANS-SHIP VEHICLE ROUTE (INITIAL PHASE)

CWM

*Model City, New York*

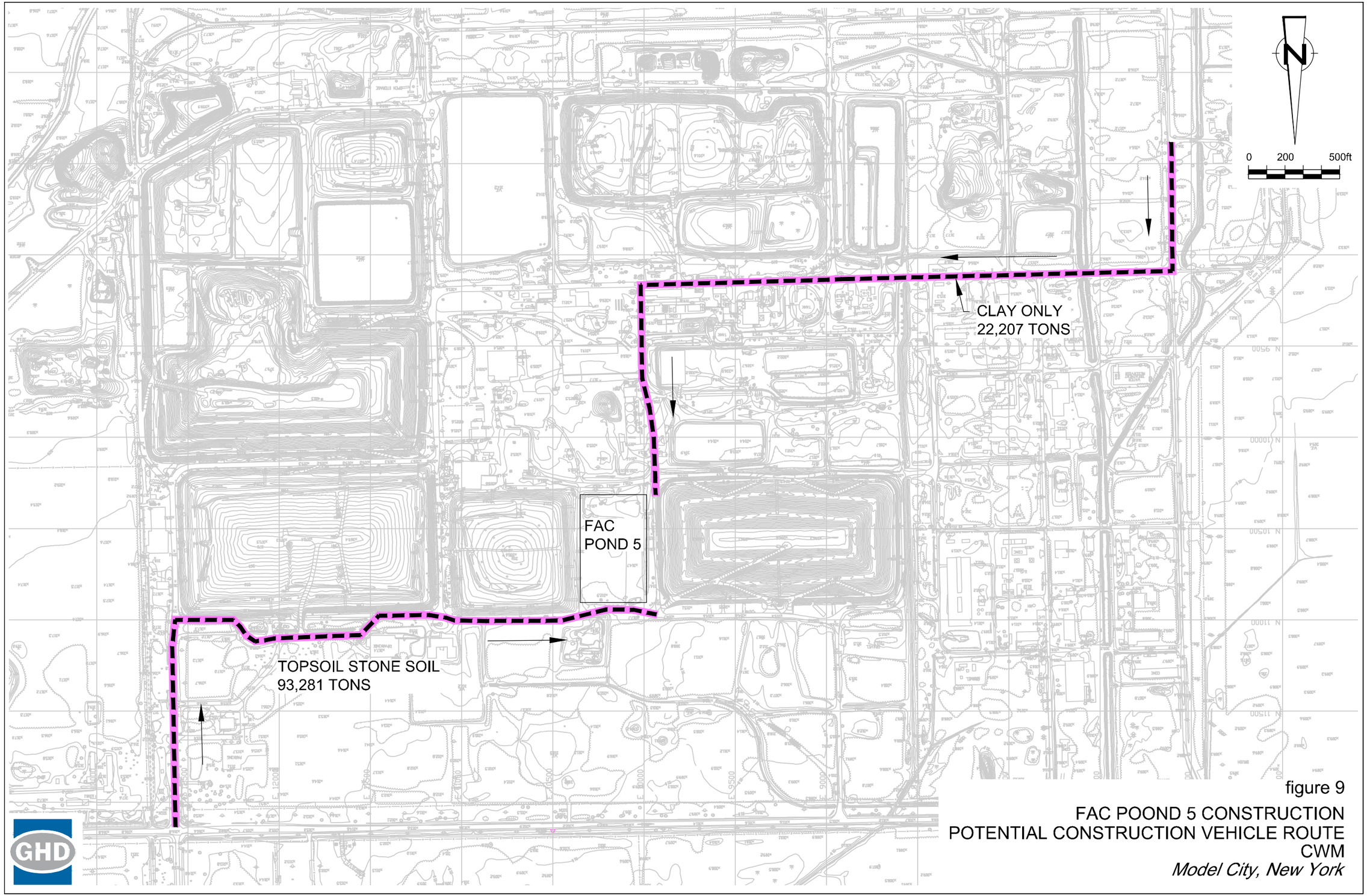
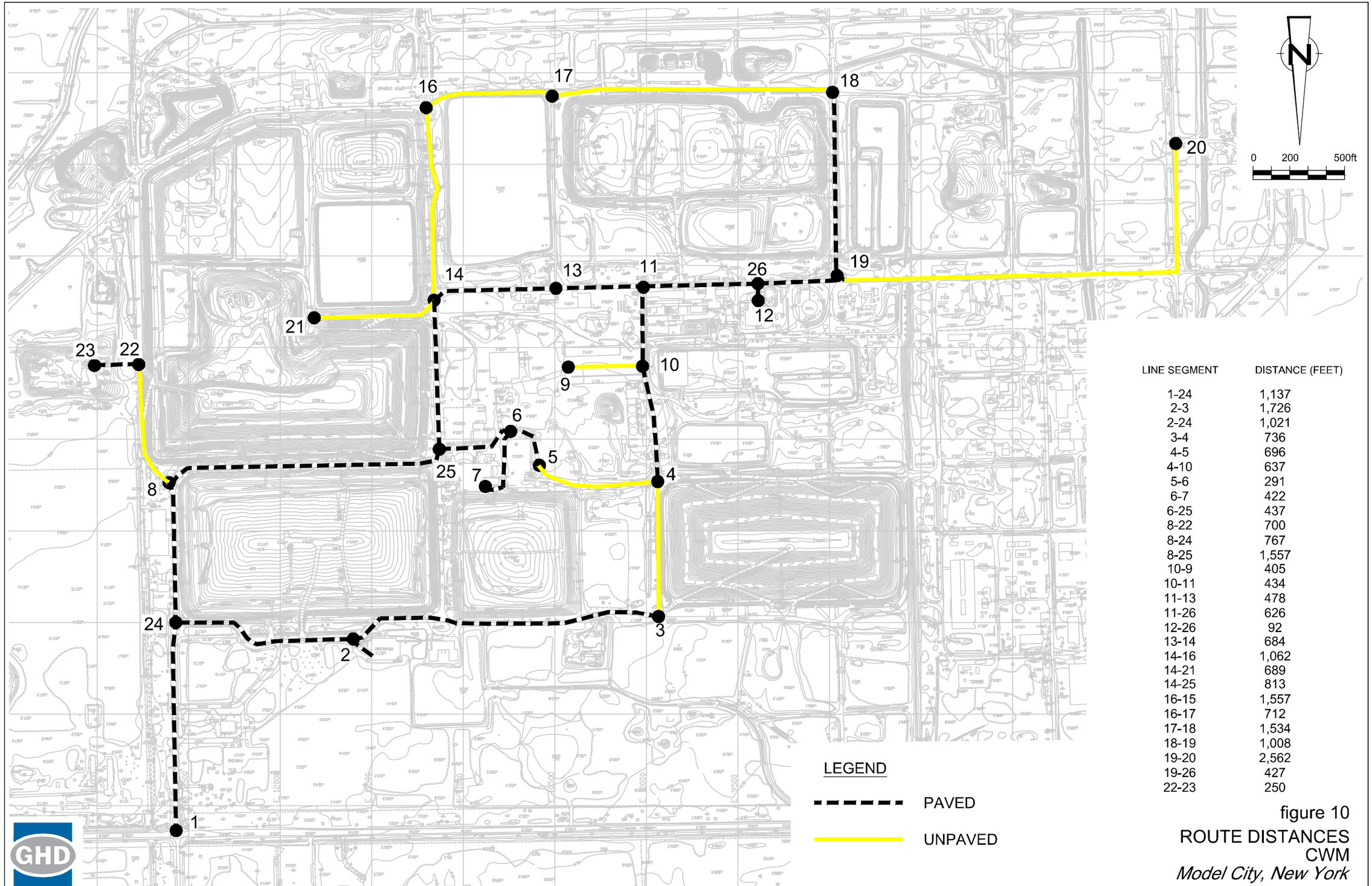



figure 9

FAC POOND 5 CONSTRUCTION
POTENTIAL CONSTRUCTION VEHICLE ROUTE
CWM
*Model City, New York*

80335-00(008)GN-NI009 MAR 17/2017

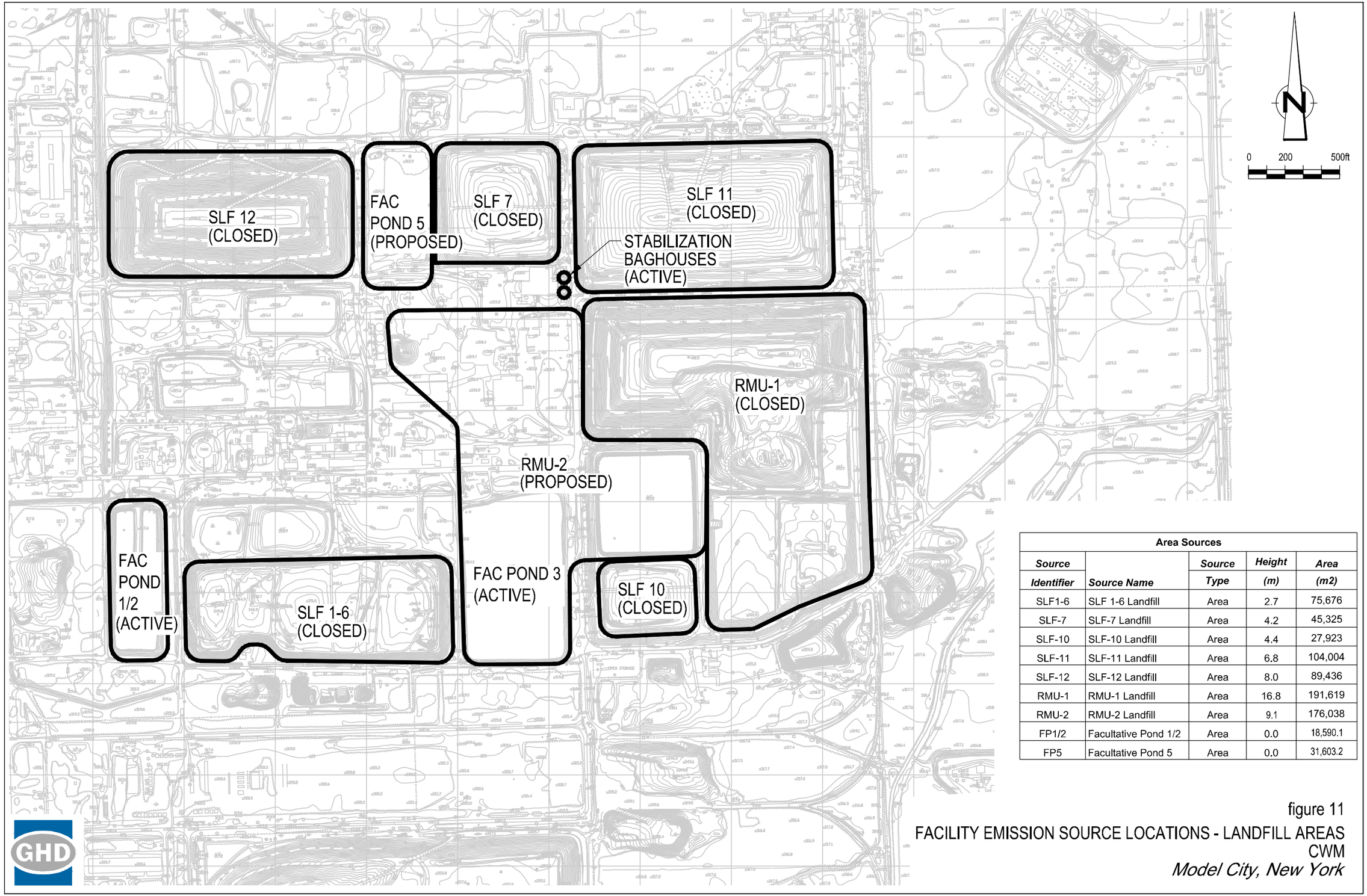



| LINE SEGMENT | DISTANCE (FEET) |
|---|---|
| 1-24 | 1,137 |
| 2-3 | 1,726 |
| 2-24 | 1,021 |
| 3-4 | 736 |
| 4-5 | 696 |
| 4-10 | 637 |
| 5-6 | 291 |
| 6-7 | 422 |
| 6-25 | 437 |
| 8-22 | 700 |
| 8-24 | 767 |
| 8-25 | 1,557 |
| 10-9 | 405 |
| 10-11 | 434 |
| 11-13 | 478 |
| 11-26 | 626 |
| 12-26 | 92 |
| 13-14 | 684 |
| 14-16 | 1,062 |
| 14-21 | 689 |
| 14-25 | 813 |
| 16-15 | 1,557 |
| 16-17 | 712 |
| 17-18 | 1,534 |
| 18-19 | 1,008 |
| 19-20 | 2,562 |
| 19-26 | 427 |
| 22-23 | 250 |

figure 10

ROUTE DISTANCES
CWM
*Model City, New York*

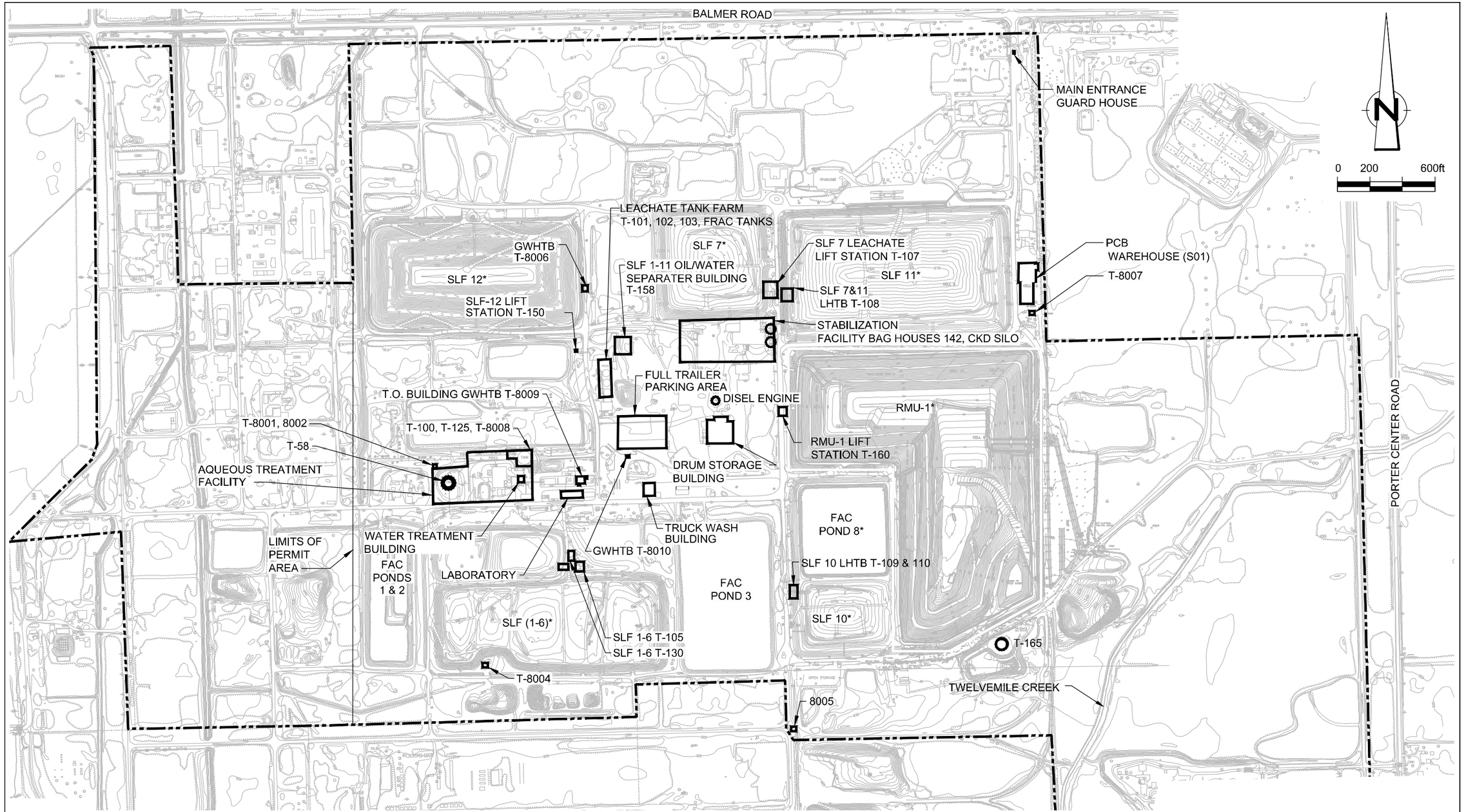
80335-00(008)GN-NI010 MAR 17/2017




| Area Sources | | | | |
|---|---|---|---|---|
| *Source Identifier* | *Source Name* | *Source Type* | *Height (m)* | *Area (m2)* |
| SLF1-6 | SLF 1-6 Landfill | Area | 2.7 | 75,676 |
| SLF-7 | SLF-7 Landfill | Area | 4.2 | 45,325 |
| SLF-10 | SLF-10 Landfill | Area | 4.4 | 27,923 |
| SLF-11 | SLF-11 Landfill | Area | 6.8 | 104,004 |
| SLF-12 | SLF-12 Landfill | Area | 8.0 | 89,436 |
| RMU-1 | RMU-1 Landfill | Area | 16.8 | 191,619 |
| RMU-2 | RMU-2 Landfill | Area | 9.1 | 176,038 |
| FP1/2 | Facultative Pond 1/2 | Area | 0.0 | 18,590.1 |
| FP5 | Facultative Pond 5 | Area | 0.0 | 31,603.2 |

figure 11

FACILITY EMISSION SOURCE LOCATIONS - LANDFILL AREAS
CWM
*Model City, New York*




LEGEND

| | | | |
|---|---|---|---|
| SLF = | SECURE LANDFILL | ——— | PROPERTY LINE |
| FAC = | FACULTATIVE | ——— | LIMITS OF ACTIVE LANDFILL |
| * = | INACTIVE | | |
| LHTB = | LEACHATE HOLDING TANK BUILDING | | |
| GWHTB = | GROUNDWATER COLLECTION HOLDING TANK BUILDING | | |

NOTES:

1. THIS MAP COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 5-31-01. (AIR SURVEY CORP. PROJECT NO.71010503)
2. VERTICAL DATUM BASED ON NGS MEAN SEA LEVEL.
3. GRID BASED ON LOCAL COORDINATE SYSTEM.
4. CONTOUR INTERVAL 2 FT.
5. DASHED CONTOURS INDICATE THAT GROUND IS PARTIALLY OBSCURED BY VEGETATION OR SHADOWS. THESE AREAS MAY NOT MEET STANDARD ACCURACY AND REQUIRE FIELD TESTING COMPLETION.
6. PROPERTY LINES ARE APPROXIMATE.
7. 630 PERMITTED ACRES.
8. 710 TOTAL ACRES.

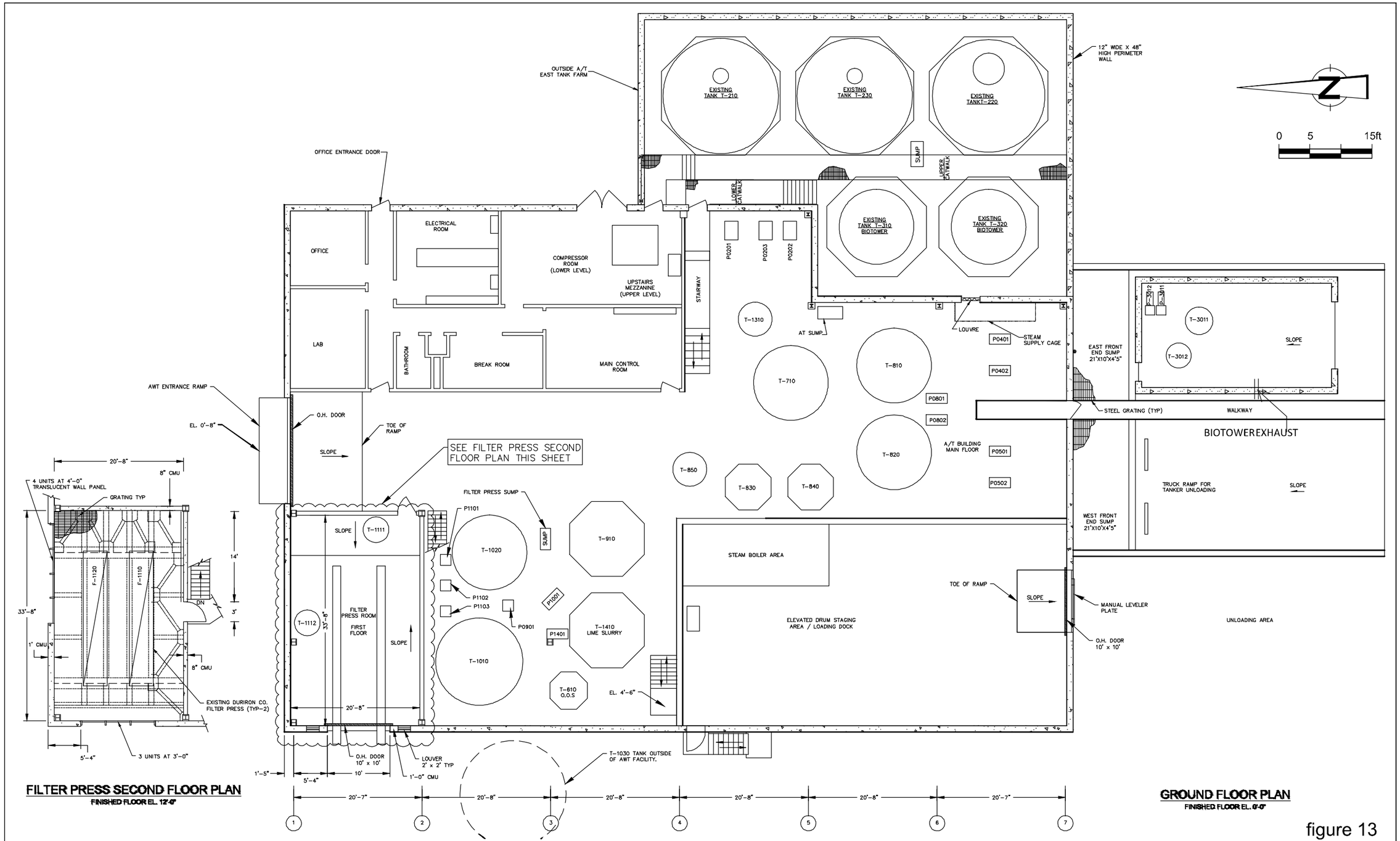
GHD

figure 12

# FACILITY EMISSION SOURCE LOCATIONS - BUILDINGS AND TANKS

CWM

*Model City, New York*

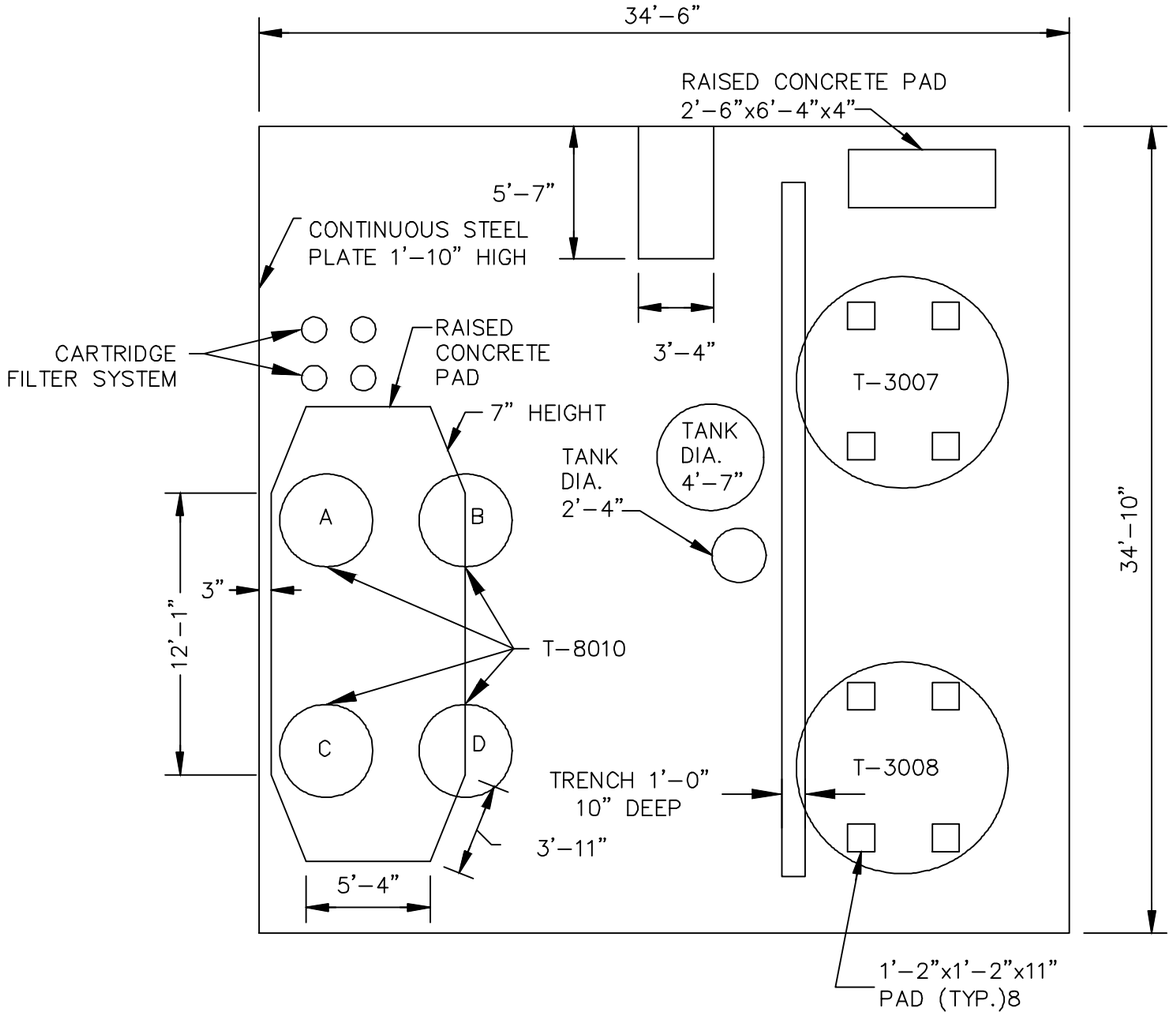



**FILTER PRESS SECOND FLOOR PLAN**
FINISHED FLOOR EL. 12'-0"

**GROUND FLOOR PLAN**
FINISHED FLOOR EL. 0'-0"

figure 13

FACILITY SOURCE LOCATIONS (AWT BUILDING)
CWM
*Model City, New York*




PLAN

N.T.S.

Modified: Nov. 2013

SOURCE REFERENCE:

| WATER TREATMENT BUILDING<br>6NYCRR PART 373 PERMIT | | |
|---|---|---|
| CWM CHEMICAL SERVICES LLC<br>TOWN OF PORTER, STATE OF NEW YORK | | |
| **EnSol, Inc.**<br>Environmental Solutions | 661 MAIN STREET<br>NIAGARA FALLS, NY 14301<br>PHONE (716) 285-3920<br>FAX (716) 285-3928 | FIGURE<br>D-20 |
| 8/13/13 | PN: 13-7028 | |

figure 14

FACILITY SOURCE LOCATIONS (WATER TREATMENT BUILDING)

CWM

*Model City, New York*

# TABLE 1

## FACILITY EMISSION SUMMARY
## EMISSIONS INVENTORY
## CWM CHEMICAL SERVICES, LLC

| | Exempt/ Trivial | Exempt / Trivial Basis | VOC | HAP | CO | NOx | $SO_2$ | PM-10 | PM-2.5 | Carbon Tetrachloride | Chloroform | Benzene | Methylene Chloride | TCE | Acrylonitrile | Pesticides, Herbicides, Insecticides | PCBs | POM | $CO_2$ | $CH_4$ | $N_2O$ | Arsenic | Cadmium | Chromium | Manganese | Nickel | Lead |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Emission Source** | | | ***Emissions (lb/year)*** | | | | | | | | | | | | | | | | | | | | | | | | |
| **EXISTING TOTALS (lb/year)** | | | **8,214.38** | **4,582.49** | **5,279.12** | **9,237.64** | **23.20** | **5,922.28** | **4,634.56** | **1.60** | **17.81** | **23.02** | **821.15** | **369.46** | **0.08** | **0.24** | **25.90** | **154.08** | **8,753,729.88** | **139.98** | **629.90** | **0.01** | **0.00** | **2.11** | **0.11** | **10.05** | **5.31** |
| **EXISTING TOTALS (TPY)** | | | **4.11** | **2.29** | **2.64** | **4.62** | **0.01** | **2.96** | **2.32** | **0.00** | **0.01** | **0.01** | **0.41** | **0.18** | **0.00** | **0.00** | **0.01** | **0.08** | **4,376.86** | **0.07** | **0.31** | **0.00** | **0.00** | **0.00** | **0.00** | **0.01** | **0.00** |
| RMU-2 Standpipes | N | --- | 2.74 | 2.41 | - | - | - | - | - | - | - | - | 0.83 | - | - | - | 0.04 | - | - | - | - | - | - | - | - | - | - |
| RMU-2 Cover Diffusion | N | --- | 40.06 | 50.57 | - | - | - | - | - | 0.04 | 0.34 | 1.37 | 13.05 | 1.88 | 0.00 | - | 0.10 | 0.01 | - | - | - | - | - | - | - | - | - |
| RMU-2 Barometric Pumping | N | --- | 6.01 | 7.59 | - | - | - | - | - | 0.01 | 0.05 | 0.21 | 1.96 | 0.28 | 0.00 | - | 0.02 | - | - | - | - | - | - | - | - | - | - |
| RMU-2 Landfill Operation | N | --- | 35.52 | 36.60 | - | - | - | 7,873.05 | 7,124.09 | 0.02 | 0.12 | 0.66 | 3.14 | 0.97 | 0.00 | - | 3.35 | 1.31 | - | - | - | 0.00 | 0.00 | 0.10 | 0.02 | 0.23 | 0.34 |
| RMU-2 Construction | N | --- | - | - | - | - | - | 11,190.60 | 2,863.49 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Facultative Pond 5 | N | --- | 0.66 | 0.52 | - | - | - | - | - | 0.02 | 0.02 | 0.02 | 0.04 | 0.02 | - | - | 0.03 | - | - | - | - | - | - | - | - | - | - |
| RMU-2 Stormwater Detention Basin | N | --- | 0.03 | 0.02 | - | - | - | - | - | - | - | - | - | - | - | - | 0.02 | - | - | - | - | - | - | - | - | - | - |
| Soil Stockpile Wind Erosion | N | --- | - | - | - | - | - | 64.09 | 9.61 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **RMU-2 TOTALS (lb/yr)** | | | **85.02** | **97.71** | **0.00** | **0.00** | **0.00** | **19,127.75** | **9,997.19** | **0.08** | **0.53** | **2.25** | **19.02** | **3.15** | **0.00** | **0.00** | **3.55** | **1.33** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.10** | **0.02** | **0.23** | **0.34** |
| **RMU-2 TOTALS (TPY)** | | | **0.04** | **0.05** | **0.00** | **0.00** | **0.00** | **9.56** | **5.00** | **0.00** | **0.00** | **0.00** | **0.01** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |
| **FACILITY TOTALS (lb/yr)** | | | **8,299.40** | **4,680.21** | **5,279.12** | **9,237.64** | **23.20** | **25,050.02** | **14,631.75** | **1.68** | **18.34** | **25.28** | **840.18** | **372.61** | **0.08** | **0.24** | **29.45** | **155.41** | **8,753,729.88** | **139.98** | **629.90** | **0.01** | **0.00** | **2.21** | **0.13** | **10.27** | **5.65** |
| **FACILITY TOTALS (TPY)** | | | **4.15** | **2.34** | **2.64** | **4.62** | **0.01** | **12.53** | **7.32** | **0.00** | **0.01** | **0.01** | **0.42** | **0.19** | **0.00** | **0.00** | **0.01** | **0.08** | **4,376.86** | **0.07** | **0.31** | **0.00** | **0.00** | **0.00** | **0.00** | **0.01** | **0.00** |
| **Title V Thresholds (TPY)** | | | **50** | **25** | **100** | **100** | **100** | **100** | **100** | **10** | **10** | **10** | **10** | **10** | **10** | **-** | **-** | **-** | **100,000** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **% of Title V Threshold** | | | **8.30%** | **9.36%** | **2.64%** | **4.62%** | **0.01%** | **12.53%** | **7.32%** | **0.01%** | **0.09%** | **0.13%** | **4.20%** | **1.86%** | **0.00%** | **-** | **-** | **-** | **4.38%** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |

**General Note: The numbers presented on this table have been rounded to 2 decimal places. Therefore, a value of '0.00' means less than 0.005 pounds per year, not necessarily that zero emissions are present. Emissions were reported to two significant digits past the decimal fro consistency, and since this level is orders of magnitude below applicable thresholds.**

**TABLE 2A**

**SOIL STOCKPILE WIND EROSION PM-10 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

***Wind Erosion***

Fugitive dust emissions from the soil stockpile will use emission factor equations in AP-42 Section 13.2.5 for Industrial Wind erosion

Equation 2:

$$\text{Emission factor} = k \sum_{i=1}^{N} P_i$$

where:

k = particle size multiplier PM10 k=0.5

N = number of disturbances of soil pile per year = 214 (daily during April 1 to October 31 construction season)

$P_i$ = erosion potential corresponding to observed (or probable) fastest mile of wind for ith period between disturbances, $g/m^2$

For $PM_{10}$, k = 0.5

The erosion potential function for a dry, exposed surface is: $P = 58 * (u^* - u_t^*)^2 + 25 * (u^* - u_t^*)$ [ P = 0 for $u^* < u_t^*$ ]

where:

$u^*$ = friction velocity (m/s)

$u_t^*$ = threshold friction velocity (m/s)

which = 1.02 m/s, as referenced from Table 13.2.5-2 of AP-42 Section 13.2.5 for overburden materials

$u^* = (0.053)*(u_{10}^+)$ where: $u_{10}^+$ = fastest mile of reference anemometer at 10m for period between disturbances

(This equation is used for relatively large flat piles with a height-to-base ratio less than 0.2).

| | | | | | |
|---|---|---|---|---|---|
| total area = | 2.86 | acres | = | 11,574 | $m^2$ |
| disturbed area = | 2.86 | acres | = | 11,574 | $m^2$ (maximum amount of disturbed area in any one day) |

Wind speed data from on-site meteorological station (anemometer height = 10 meters)

**TABLE 2A**

**SOIL STOCKPILE WIND EROSION PM-10 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.5 for* $PM_{10}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | APR | 1 | **16.47** | **16.5** | 7.36 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | APR | 2 | **23.43** | **23.4** | 10.47 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | APR | 3 | **16.43** | **16.4** | 7.34 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | APR | 4 | **28.23** | **28.2** | 12.62 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | APR | 5 | **23.95** | **24.0** | 10.71 | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | APR | 6 | **17.15** | **17.2** | 7.67 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | APR | 7 | **10.60** | **10.6** | 4.74 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8 | APR | 8 | **11.66** | **11.7** | 5.21 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 9 | APR | 9 | **13.94** | **13.9** | 6.23 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | APR | 10 | **26.03** | **26.0** | 11.64 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11 | APR | 11 | **38.95** | **39.0** | 17.41 | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12 | APR | 12 | **19.60** | **19.6** | 8.76 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13 | APR | 13 | **11.59** | **11.6** | 5.18 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 14 | APR | 14 | **13.99** | **14.0** | 6.25 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | APR | 15 | **20.9** | **20.9** | 9.34 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 16 | APR | 16 | **19.55** | **19.6** | 8.74 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 17 | APR | 17 | **32.39** | **32.4** | 14.48 | 0.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 18 | APR | 18 | **15.67** | **15.7** | 7.01 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 19 | APR | 19 | **17.68** | **17.7** | 7.90 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | APR | 20 | **29.71** | **29.7** | 13.28 | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 21 | APR | 21 | **23.67** | **23.7** | 10.58 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 22 | APR | 22 | **16.03** | **16.0** | 7.17 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 23 | APR | 23 | **24.92** | **24.9** | 11.14 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 24 | APR | 24 | **12.55** | **12.6** | 5.61 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 25 | APR | 25 | **11.96** | **12.0** | 5.35 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 26 | APR | 26 | **15.6** | **15.6** | 6.97 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 27 | APR | 27 | **30.07** | **30.1** | 13.44 | 0.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 28 | APR | 28 | **49.35** | **49.4** | 22.06 | 1.17 | 5.02 | 58141.67 | 29070.84 | 64.09 | 0.03 |
| 29 | APR | 29 | **20.11** | **20.1** | 8.99 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 | APR | 30 | **12.17** | **12.2** | 5.44 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2A**

**SOIL STOCKPILE WIND EROSION PM-10 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P ($g/m^2$ )* | *( g )* | *k=0.5 for $PM_{10}$ ( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 | MAY | 1 | **22.77** | **22.8** | 10.18 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 32 | MAY | 2 | **16.36** | **16.4** | 7.31 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 33 | MAY | 3 | **13.94** | **13.9** | 6.23 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 34 | MAY | 4 | **13.14** | **13.1** | 5.87 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | MAY | 5 | **17.35** | **17.4** | 7.76 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 36 | MAY | 6 | **24.92** | **24.9** | 11.14 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 37 | MAY | 7 | **11.58** | **11.6** | 5.18 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 38 | MAY | 8 | **12.81** | **12.8** | 5.73 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 39 | MAY | 9 | **14.45** | **14.5** | 6.46 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | MAY | 10 | **16.55** | **16.6** | 7.40 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 41 | MAY | 11 | **13.81** | **13.8** | 6.17 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 42 | MAY | 12 | **10.1** | **10.1** | 4.52 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 43 | MAY | 13 | **12.86** | **12.9** | 5.75 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 44 | MAY | 14 | **19.48** | **19.5** | 8.71 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 45 | MAY | 15 | **19.76** | **19.8** | 8.83 | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 46 | MAY | 16 | **14.05** | **14.1** | 6.28 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 47 | MAY | 17 | **19.44** | **19.4** | 8.69 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 48 | MAY | 18 | **13.34** | **13.3** | 5.96 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 49 | MAY | 19 | **12.34** | **12.3** | 5.52 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 50 | MAY | 20 | **8.06** | **8.1** | 3.60 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 51 | MAY | 21 | **10.05** | **10.1** | 4.49 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 52 | MAY | 22 | **15.74** | **15.7** | 7.04 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 53 | MAY | 23 | **25.88** | **25.9** | 11.57 | 0.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 54 | MAY | 24 | **18.09** | **18.1** | 8.09 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 55 | MAY | 25 | **16.94** | **16.9** | 7.57 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 56 | MAY | 26 | **20.33** | **20.3** | 9.09 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 57 | MAY | 27 | **11.57** | **11.6** | 5.17 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 58 | MAY | 28 | **19.59** | **19.6** | 8.76 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 59 | MAY | 29 | **15.26** | **15.3** | 6.82 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | MAY | 30 | **23.28** | **23.3** | 10.41 | 0.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 61 | MAY | 31 | **17.2** | **17.2** | 7.69 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2A**

**SOIL STOCKPILE WIND EROSION PM-10 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.5 for* $PM_{10}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 62 | JUN | 1 | **23.74** | **23.7** | 10.61 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 63 | JUN | 2 | **19.71** | **19.7** | 8.81 | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 64 | JUN | 3 | **10.35** | **10.4** | 4.63 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 65 | JUN | 4 | **25.19** | **25.2** | 11.26 | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 66 | JUN | 5 | **11.33** | **11.3** | 5.06 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 67 | JUN | 6 | **8.29** | **8.3** | 3.71 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 68 | JUN | 7 | **29.09** | **29.1** | 13.00 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 69 | JUN | 8 | **18.3** | **18.3** | 8.18 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 70 | JUN | 9 | **18.51** | **18.5** | 8.27 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 71 | JUN | 10 | **14.08** | **14.1** | 6.29 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 72 | JUN | 11 | **12.56** | **12.6** | 5.61 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 73 | JUN | 12 | **16.26** | **16.3** | 7.27 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 74 | JUN | 13 | **13.55** | **13.6** | 6.06 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 75 | JUN | 14 | **14.9** | **14.9** | 6.66 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 76 | JUN | 15 | **10.52** | **10.5** | 4.70 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 77 | JUN | 16 | **18.13** | **18.1** | 8.10 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 78 | JUN | 17 | **13.11** | **13.1** | 5.86 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 79 | JUN | 18 | **8.24** | **8.2** | 3.68 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 80 | JUN | 19 | **14.93** | **14.9** | 6.67 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 81 | JUN | 20 | **13.56** | **13.6** | 6.06 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 82 | JUN | 21 | **12.79** | **12.8** | 5.72 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 83 | JUN | 22 | **11.38** | **11.4** | 5.09 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 84 | JUN | 23 | **17.84** | **17.8** | 7.98 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 85 | JUN | 24 | **16.38** | **16.4** | 7.32 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 86 | JUN | 25 | **15.74** | **15.7** | 7.04 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 87 | JUN | 26 | **9.8** | **9.8** | 4.38 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 88 | JUN | 27 | **11.59** | **11.6** | 5.18 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 89 | JUN | 28 | **22.73** | **22.7** | 10.16 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 90 | JUN | 29 | **18.18** | **18.2** | 8.13 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 91 | JUN | 30 | **11.71** | **11.7** | 5.23 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2A**

**SOIL STOCKPILE WIND EROSION PM-10 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P ($g/m^2$)* | *( g )* | *k=0.5 for $PM_{10}$ ( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 92 | JUL | 1 | **10.34** | **10.3** | 4.62 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 93 | JUL | 2 | **16.11** | **16.1** | 7.20 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 94 | JUL | 3 | **15.44** | **15.4** | 6.90 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95 | JUL | 4 | **16.03** | **16.0** | 7.17 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 96 | JUL | 5 | **16.23** | **16.2** | 7.26 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 97 | JUL | 6 | **12.65** | **12.7** | 5.66 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 98 | JUL | 7 | **9.8** | **9.8** | 4.38 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 99 | JUL | 8 | **9.4** | **9.4** | 4.20 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | JUL | 9 | **10.54** | **10.5** | 4.71 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 101 | JUL | 10 | **13.1** | **13.1** | 5.86 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 102 | JUL | 11 | **21.8** | **21.8** | 9.75 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 103 | JUL | 12 | **16.67** | **16.7** | 7.45 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 104 | JUL | 13 | **15.84** | **15.8** | 7.08 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 105 | JUL | 14 | **12.95** | **13.0** | 5.79 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 106 | JUL | 15 | **16.28** | **16.3** | 7.28 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 107 | JUL | 16 | **8.95** | **9.0** | 4.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 108 | JUL | 17 | **17** | **17.0** | 7.60 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 109 | JUL | 18 | **14.5** | **14.5** | 6.48 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 110 | JUL | 19 | **13.66** | **13.7** | 6.11 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 111 | JUL | 20 | **14.44** | **14.4** | 6.46 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 112 | JUL | 21 | **20.27** | **20.3** | 9.06 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 113 | JUL | 22 | **10.23** | **10.2** | 4.57 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 114 | JUL | 23 | **13.79** | **13.8** | 6.16 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 115 | JUL | 24 | **12.07** | **12.1** | 5.40 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 116 | JUL | 25 | **13.2** | **13.2** | 5.90 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 117 | JUL | 26 | **19.32** | **19.3** | 8.64 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 118 | JUL | 27 | **9.47** | **9.5** | 4.23 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 119 | JUL | 28 | **10.99** | **11.0** | 4.91 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 120 | JUL | 29 | **16.26** | **16.3** | 7.27 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 121 | JUL | 30 | **8.74** | **8.7** | 3.91 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 122 | JUL | 31 | **15.26** | **15.3** | 6.82 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2A**

**SOIL STOCKPILE WIND EROSION PM-10 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.5 for* $PM_{10}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 123 | AUG | 1 | **13.42** | **13.4** | 6.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 124 | AUG | 2 | **16.2** | **16.2** | 7.24 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 125 | AUG | 3 | **13.55** | **13.6** | 6.06 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 126 | AUG | 4 | **12.6** | **12.6** | 5.63 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 127 | AUG | 5 | **14.18** | **14.2** | 6.34 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 128 | AUG | 6 | **10.33** | **10.3** | 4.62 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 129 | AUG | 7 | **15.14** | **15.1** | 6.77 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 130 | AUG | 8 | **11.68** | **11.7** | 5.22 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 131 | AUG | 9 | **11.4** | **11.4** | 5.10 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 132 | AUG | 10 | **21.76** | **21.8** | 9.73 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 133 | AUG | 11 | **18.46** | **18.5** | 8.25 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 134 | AUG | 12 | **13.84** | **13.8** | 6.19 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 135 | AUG | 13 | **13.07** | **13.1** | 5.84 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 136 | AUG | 14 | **9.15** | **9.2** | 4.09 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 137 | AUG | 15 | **13.26** | **13.3** | 5.93 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 138 | AUG | 16 | **11** | **11.0** | 4.92 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 139 | AUG | 17 | **16.78** | **16.8** | 7.50 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 140 | AUG | 18 | **16.07** | **16.1** | 7.18 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 141 | AUG | 19 | **11.93** | **11.9** | 5.33 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 142 | AUG | 20 | **13.86** | **13.9** | 6.20 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 143 | AUG | 21 | **18.25** | **18.3** | 8.16 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 144 | AUG | 22 | **17.38** | **17.4** | 7.77 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 145 | AUG | 23 | **15.08** | **15.1** | 6.74 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 146 | AUG | 24 | **26.77** | **26.8** | 11.97 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 147 | AUG | 25 | **20.75** | **20.8** | 9.28 | 0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 148 | AUG | 26 | **9.14** | **9.1** | 4.09 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 149 | AUG | 27 | **9.04** | **9.0** | 4.04 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 150 | AUG | 28 | **21.74** | **21.7** | 9.72 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 151 | AUG | 29 | **16.14** | **16.1** | 7.22 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 152 | AUG | 30 | **13.33** | **13.3** | 5.96 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 153 | AUG | 31 | **8.64** | **8.6** | 3.86 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2A**

**SOIL STOCKPILE WIND EROSION PM-10 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.5 for* $PM_{10}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 154 | SEP | 1 | **12.85** | **12.9** | 5.74 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 155 | SEP | 2 | **11.87** | **11.9** | 5.31 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 156 | SEP | 3 | **8.66** | **8.7** | 3.87 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 157 | SEP | 4 | **39.62** | **39.6** | 17.71 | 0.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 158 | SEP | 5 | **14.14** | **14.1** | 6.32 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 159 | SEP | 6 | **14.12** | **14.1** | 6.31 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 160 | SEP | 7 | **18.44** | **18.4** | 8.24 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 161 | SEP | 8 | **13.03** | **13.0** | 5.82 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 162 | SEP | 9 | **12.52** | **12.5** | 5.60 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 163 | SEP | 10 | **11.9** | **11.9** | 5.32 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 164 | SEP | 11 | **8.43** | **8.4** | 3.77 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 165 | SEP | 12 | **16.45** | **16.5** | 7.35 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 166 | SEP | 13 | **27.69** | **27.7** | 12.38 | 0.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 167 | SEP | 14 | **16.31** | **16.3** | 7.29 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 168 | SEP | 15 | **20.67** | **20.7** | 9.24 | 0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 169 | SEP | 16 | **11.81** | **11.8** | 5.28 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 170 | SEP | 17 | **13.67** | **13.7** | 6.11 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 171 | SEP | 18 | **10.97** | **11.0** | 4.90 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 172 | SEP | 19 | **15.81** | **15.8** | 7.07 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 173 | SEP | 20 | **11.94** | **11.9** | 5.34 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 174 | SEP | 21 | **16.23** | **16.2** | 7.26 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 175 | SEP | 22 | **14.07** | **14.1** | 6.29 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 176 | SEP | 23 | **12.11** | **12.1** | 5.41 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 177 | SEP | 24 | **10.86** | **10.9** | 4.85 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 178 | SEP | 25 | **12.15** | **12.2** | 5.43 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 179 | SEP | 26 | **8.81** | **8.8** | 3.94 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 180 | SEP | 27 | **13.39** | **13.4** | 5.99 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 181 | SEP | 28 | **8.01** | **8.0** | 3.58 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 182 | SEP | 29 | **14.73** | **14.7** | 6.58 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 183 | SEP | 30 | **23.9** | **23.9** | 10.68 | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2A**

**SOIL STOCKPILE WIND EROSION PM-10 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.5 for* $PM_{10}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 184 | OCT | 1 | **20.99** | **21.0** | 9.38 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 185 | OCT | 2 | **20.32** | **20.3** | 9.08 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 186 | OCT | 3 | **13.27** | **13.3** | 5.93 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 187 | OCT | 4 | **11.73** | **11.7** | 5.24 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 188 | OCT | 5 | **13.4** | **13.4** | 5.99 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 189 | OCT | 6 | **8.23** | **8.2** | 3.68 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 190 | OCT | 7 | **6.942** | **6.9** | 3.10 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 191 | OCT | 8 | **11.65** | **11.7** | 5.21 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 192 | OCT | 9 | **10.01** | **10.0** | 4.47 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 193 | OCT | 10 | **7.628** | **7.6** | 3.41 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194 | OCT | 11 | **8.97** | **9.0** | 4.01 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 195 | OCT | 12 | **11.49** | **11.5** | 5.14 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 196 | OCT | 13 | **11.54** | **11.5** | 5.16 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 197 | OCT | 14 | **19.13** | **19.1** | 8.55 | 0.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 198 | OCT | 15 | **28.92** | **28.9** | 12.93 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 199 | OCT | 16 | **25.05** | **25.1** | 11.20 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 200 | OCT | 17 | **29.02** | **29.0** | 12.97 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 201 | OCT | 18 | **15.49** | **15.5** | 6.92 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 202 | OCT | 19 | **24.66** | **24.7** | 11.02 | 0.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 203 | OCT | 20 | **21.97** | **22.0** | 9.82 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 204 | OCT | 21 | **19.27** | **19.3** | 8.61 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 205 | OCT | 22 | **12.57** | **12.6** | 5.62 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 206 | OCT | 23 | **13.32** | **13.3** | 5.95 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 207 | OCT | 24 | **19.28** | **19.3** | 8.62 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 208 | OCT | 25 | **14.9** | **14.9** | 6.66 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 209 | OCT | 26 | **15.36** | **15.4** | 6.87 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 210 | OCT | 27 | **13.27** | **13.3** | 5.93 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 211 | OCT | 28 | **10.35** | **10.4** | 4.63 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 212 | OCT | 29 | **8.06** | **8.1** | 3.60 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 213 | OCT | 30 | **11.75** | **11.8** | 5.25 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 214 | OCT | 31 | **11.59** | **11.6** | 5.18 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | **TOTAL** | **0.03** |

**TPY**

**TABLE 2B**

**SOIL STOCKPILE WIND EROSION PM-2.5 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

**Wind Erosion**

Fugitive dust emissions from the soil stockpile will use emission factor equations in AP-42 Section 13.2.5 for Industrial Wind erosion

Equation 2:

$$\text{Emission factor} = k \sum_{i=1}^{N} P_i$$

where:

k = particle size multiplier PM2.5 k=0.075

N = number of disturbances of soil pile per year = 214 (daily during April 1 to October 31 construction season)

$P_i$ = erosion potential corresponding to observed (or probable) fastest mile of wind for ith period between disturbances, $g/m^2$

For $PM_{2.5}$, k = 0.075

The erosion potential function for a dry, exposed surface is: $P = 58 * (u^* - u_t^*)^2 + 25 * (u^* - u_t^*)$ [ P = 0 for $u^* < u_t^*$ ]

where:

$u^*$ = friction velocity (m/s)

$u_t^*$ = threshold friction velocity (m/s)

which = 1.02 m/s, as referenced from Table 13.2.5-2 of AP-42 Section 13.2.5 for overburden materials

$u^* = (0.053)*(u_{10}^+)$ where: $u_{10}^+$ = fastest mile of reference anemometer at 10m for period between disturbances
(This equation is used for relatively large flat piles with a height-to-base ratio less than 0.2).

| | | | | | |
|---|---|---|---|---|---|
| total area = | 2.86 | acres | = | 11,574 | $m^2$ |
| disturbed area = | 2.86 | acres | = | 11,574 | $m^2$ (maximum amount of disturbed area in any one day) |

Wind speed data from on-site meteorological station (anemometer height = 10 meters)

**TABLE 2B**

**SOIL STOCKPILE WIND EROSION PM-2.5 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.075 for* $PM_{2.5}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | APR | 1 | **16.47** | **16.5** | 7.36 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | APR | 2 | **23.43** | **23.4** | 10.47 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | APR | 3 | **16.43** | **16.4** | 7.34 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | APR | 4 | **28.23** | **28.2** | 12.62 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | APR | 5 | **23.95** | **24.0** | 10.71 | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | APR | 6 | **17.15** | **17.2** | 7.67 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | APR | 7 | **10.60** | **10.6** | 4.74 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8 | APR | 8 | **11.66** | **11.7** | 5.21 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 9 | APR | 9 | **13.94** | **13.9** | 6.23 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | APR | 10 | **26.03** | **26.0** | 11.64 | 0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11 | APR | 11 | **38.95** | **39.0** | 17.41 | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 12 | APR | 12 | **19.60** | **19.6** | 8.76 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13 | APR | 13 | **11.59** | **11.6** | 5.18 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 14 | APR | 14 | **13.99** | **14.0** | 6.25 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15 | APR | 15 | **20.9** | **20.9** | 9.34 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 16 | APR | 16 | **19.55** | **19.6** | 8.74 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 17 | APR | 17 | **32.39** | **32.4** | 14.48 | 0.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 18 | APR | 18 | **15.67** | **15.7** | 7.01 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 19 | APR | 19 | **17.68** | **17.7** | 7.90 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | APR | 20 | **29.71** | **29.7** | 13.28 | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 21 | APR | 21 | **23.67** | **23.7** | 10.58 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 22 | APR | 22 | **16.03** | **16.0** | 7.17 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 23 | APR | 23 | **24.92** | **24.9** | 11.14 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 24 | APR | 24 | **12.55** | **12.6** | 5.61 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 25 | APR | 25 | **11.96** | **12.0** | 5.35 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 26 | APR | 26 | **15.6** | **15.6** | 6.97 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 27 | APR | 27 | **30.07** | **30.1** | 13.44 | 0.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 28 | APR | 28 | **49.35** | **49.4** | 22.06 | 1.17 | 5.02 | 58141.67 | 4360.63 | 9.61 | 0.00 |
| 29 | APR | 29 | **20.11** | **20.1** | 8.99 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 | APR | 30 | **12.17** | **12.2** | 5.44 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2B**

**SOIL STOCKPILE WIND EROSION PM-2.5 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.075 for* $PM_{2.5}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 | MAY | 1 | **22.77** | **22.8** | 10.18 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 32 | MAY | 2 | **16.36** | **16.4** | 7.31 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 33 | MAY | 3 | **13.94** | **13.9** | 6.23 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 34 | MAY | 4 | **13.14** | **13.1** | 5.87 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | MAY | 5 | **17.35** | **17.4** | 7.76 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 36 | MAY | 6 | **24.92** | **24.9** | 11.14 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 37 | MAY | 7 | **11.58** | **11.6** | 5.18 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 38 | MAY | 8 | **12.81** | **12.8** | 5.73 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 39 | MAY | 9 | **14.45** | **14.5** | 6.46 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | MAY | 10 | **16.55** | **16.6** | 7.40 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 41 | MAY | 11 | **13.81** | **13.8** | 6.17 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 42 | MAY | 12 | **10.1** | **10.1** | 4.52 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 43 | MAY | 13 | **12.86** | **12.9** | 5.75 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 44 | MAY | 14 | **19.48** | **19.5** | 8.71 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 45 | MAY | 15 | **19.76** | **19.8** | 8.83 | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 46 | MAY | 16 | **14.05** | **14.1** | 6.28 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 47 | MAY | 17 | **19.44** | **19.4** | 8.69 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 48 | MAY | 18 | **13.34** | **13.3** | 5.96 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 49 | MAY | 19 | **12.34** | **12.3** | 5.52 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 50 | MAY | 20 | **8.06** | **8.1** | 3.60 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 51 | MAY | 21 | **10.05** | **10.1** | 4.49 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 52 | MAY | 22 | **15.74** | **15.7** | 7.04 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 53 | MAY | 23 | **25.88** | **25.9** | 11.57 | 0.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 54 | MAY | 24 | **18.09** | **18.1** | 8.09 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 55 | MAY | 25 | **16.94** | **16.9** | 7.57 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 56 | MAY | 26 | **20.33** | **20.3** | 9.09 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 57 | MAY | 27 | **11.57** | **11.6** | 5.17 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 58 | MAY | 28 | **19.59** | **19.6** | 8.76 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 59 | MAY | 29 | **15.26** | **15.3** | 6.82 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | MAY | 30 | **23.28** | **23.3** | 10.41 | 0.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 61 | MAY | 31 | **17.2** | **17.2** | 7.69 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2B**

**SOIL STOCKPILE WIND EROSION PM-2.5 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.075 for* $PM_{2.5}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 62 | JUN | 1 | **23.74** | **23.7** | 10.61 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 63 | JUN | 2 | **19.71** | **19.7** | 8.81 | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 64 | JUN | 3 | **10.35** | **10.4** | 4.63 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 65 | JUN | 4 | **25.19** | **25.2** | 11.26 | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 66 | JUN | 5 | **11.33** | **11.3** | 5.06 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 67 | JUN | 6 | **8.29** | **8.3** | 3.71 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 68 | JUN | 7 | **29.09** | **29.1** | 13.00 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 69 | JUN | 8 | **18.3** | **18.3** | 8.18 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 70 | JUN | 9 | **18.51** | **18.5** | 8.27 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 71 | JUN | 10 | **14.08** | **14.1** | 6.29 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 72 | JUN | 11 | **12.56** | **12.6** | 5.61 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 73 | JUN | 12 | **16.26** | **16.3** | 7.27 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 74 | JUN | 13 | **13.55** | **13.6** | 6.06 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 75 | JUN | 14 | **14.9** | **14.9** | 6.66 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 76 | JUN | 15 | **10.52** | **10.5** | 4.70 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 77 | JUN | 16 | **18.13** | **18.1** | 8.10 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 78 | JUN | 17 | **13.11** | **13.1** | 5.86 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 79 | JUN | 18 | **8.24** | **8.2** | 3.68 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 80 | JUN | 19 | **14.93** | **14.9** | 6.67 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 81 | JUN | 20 | **13.56** | **13.6** | 6.06 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 82 | JUN | 21 | **12.79** | **12.8** | 5.72 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 83 | JUN | 22 | **11.38** | **11.4** | 5.09 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 84 | JUN | 23 | **17.84** | **17.8** | 7.98 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 85 | JUN | 24 | **16.38** | **16.4** | 7.32 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 86 | JUN | 25 | **15.74** | **15.7** | 7.04 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 87 | JUN | 26 | **9.8** | **9.8** | 4.38 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 88 | JUN | 27 | **11.59** | **11.6** | 5.18 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 89 | JUN | 28 | **22.73** | **22.7** | 10.16 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 90 | JUN | 29 | **18.18** | **18.2** | 8.13 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 91 | JUN | 30 | **11.71** | **11.7** | 5.23 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2B**

**SOIL STOCKPILE WIND EROSION PM-2.5 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.075 for* $PM_{2.5}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 92 | JUL | 1 | **10.34** | **10.3** | 4.62 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 93 | JUL | 2 | **16.11** | **16.1** | 7.20 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 94 | JUL | 3 | **15.44** | **15.4** | 6.90 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 95 | JUL | 4 | **16.03** | **16.0** | 7.17 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 96 | JUL | 5 | **16.23** | **16.2** | 7.26 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 97 | JUL | 6 | **12.65** | **12.7** | 5.66 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 98 | JUL | 7 | **9.8** | **9.8** | 4.38 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 99 | JUL | 8 | **9.4** | **9.4** | 4.20 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | JUL | 9 | **10.54** | **10.5** | 4.71 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 101 | JUL | 10 | **13.1** | **13.1** | 5.86 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 102 | JUL | 11 | **21.8** | **21.8** | 9.75 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 103 | JUL | 12 | **16.67** | **16.7** | 7.45 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 104 | JUL | 13 | **15.84** | **15.8** | 7.08 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 105 | JUL | 14 | **12.95** | **13.0** | 5.79 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 106 | JUL | 15 | **16.28** | **16.3** | 7.28 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 107 | JUL | 16 | **8.95** | **9.0** | 4.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 108 | JUL | 17 | **17** | **17.0** | 7.60 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 109 | JUL | 18 | **14.5** | **14.5** | 6.48 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 110 | JUL | 19 | **13.66** | **13.7** | 6.11 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 111 | JUL | 20 | **14.44** | **14.4** | 6.46 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 112 | JUL | 21 | **20.27** | **20.3** | 9.06 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 113 | JUL | 22 | **10.23** | **10.2** | 4.57 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 114 | JUL | 23 | **13.79** | **13.8** | 6.16 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 115 | JUL | 24 | **12.07** | **12.1** | 5.40 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 116 | JUL | 25 | **13.2** | **13.2** | 5.90 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 117 | JUL | 26 | **19.32** | **19.3** | 8.64 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 118 | JUL | 27 | **9.47** | **9.5** | 4.23 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 119 | JUL | 28 | **10.99** | **11.0** | 4.91 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 120 | JUL | 29 | **16.26** | **16.3** | 7.27 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 121 | JUL | 30 | **8.74** | **8.7** | 3.91 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 122 | JUL | 31 | **15.26** | **15.3** | 6.82 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2B**

**SOIL STOCKPILE WIND EROSION PM-2.5 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.075 for* $PM_{2.5}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 123 | AUG | 1 | **13.42** | **13.4** | 6.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 124 | AUG | 2 | **16.2** | **16.2** | 7.24 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 125 | AUG | 3 | **13.55** | **13.6** | 6.06 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 126 | AUG | 4 | **12.6** | **12.6** | 5.63 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 127 | AUG | 5 | **14.18** | **14.2** | 6.34 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 128 | AUG | 6 | **10.33** | **10.3** | 4.62 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 129 | AUG | 7 | **15.14** | **15.1** | 6.77 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 130 | AUG | 8 | **11.68** | **11.7** | 5.22 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 131 | AUG | 9 | **11.4** | **11.4** | 5.10 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 132 | AUG | 10 | **21.76** | **21.8** | 9.73 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 133 | AUG | 11 | **18.46** | **18.5** | 8.25 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 134 | AUG | 12 | **13.84** | **13.8** | 6.19 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 135 | AUG | 13 | **13.07** | **13.1** | 5.84 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 136 | AUG | 14 | **9.15** | **9.2** | 4.09 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 137 | AUG | 15 | **13.26** | **13.3** | 5.93 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 138 | AUG | 16 | **11** | **11.0** | 4.92 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 139 | AUG | 17 | **16.78** | **16.8** | 7.50 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 140 | AUG | 18 | **16.07** | **16.1** | 7.18 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 141 | AUG | 19 | **11.93** | **11.9** | 5.33 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 142 | AUG | 20 | **13.86** | **13.9** | 6.20 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 143 | AUG | 21 | **18.25** | **18.3** | 8.16 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 144 | AUG | 22 | **17.38** | **17.4** | 7.77 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 145 | AUG | 23 | **15.08** | **15.1** | 6.74 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 146 | AUG | 24 | **26.77** | **26.8** | 11.97 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 147 | AUG | 25 | **20.75** | **20.8** | 9.28 | 0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 148 | AUG | 26 | **9.14** | **9.1** | 4.09 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 149 | AUG | 27 | **9.04** | **9.0** | 4.04 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 150 | AUG | 28 | **21.74** | **21.7** | 9.72 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 151 | AUG | 29 | **16.14** | **16.1** | 7.22 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 152 | AUG | 30 | **13.33** | **13.3** | 5.96 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 153 | AUG | 31 | **8.64** | **8.6** | 3.86 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2B**

**SOIL STOCKPILE WIND EROSION PM-2.5 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.075 for* $PM_{2.5}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 154 | SEP | 1 | **12.85** | **12.9** | 5.74 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 155 | SEP | 2 | **11.87** | **11.9** | 5.31 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 156 | SEP | 3 | **8.66** | **8.7** | 3.87 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 157 | SEP | 4 | **39.62** | **39.6** | 17.71 | 0.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 158 | SEP | 5 | **14.14** | **14.1** | 6.32 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 159 | SEP | 6 | **14.12** | **14.1** | 6.31 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 160 | SEP | 7 | **18.44** | **18.4** | 8.24 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 161 | SEP | 8 | **13.03** | **13.0** | 5.82 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 162 | SEP | 9 | **12.52** | **12.5** | 5.60 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 163 | SEP | 10 | **11.9** | **11.9** | 5.32 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 164 | SEP | 11 | **8.43** | **8.4** | 3.77 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 165 | SEP | 12 | **16.45** | **16.5** | 7.35 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 166 | SEP | 13 | **27.69** | **27.7** | 12.38 | 0.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 167 | SEP | 14 | **16.31** | **16.3** | 7.29 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 168 | SEP | 15 | **20.67** | **20.7** | 9.24 | 0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 169 | SEP | 16 | **11.81** | **11.8** | 5.28 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 170 | SEP | 17 | **13.67** | **13.7** | 6.11 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 171 | SEP | 18 | **10.97** | **11.0** | 4.90 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 172 | SEP | 19 | **15.81** | **15.8** | 7.07 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 173 | SEP | 20 | **11.94** | **11.9** | 5.34 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 174 | SEP | 21 | **16.23** | **16.2** | 7.26 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 175 | SEP | 22 | **14.07** | **14.1** | 6.29 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 176 | SEP | 23 | **12.11** | **12.1** | 5.41 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 177 | SEP | 24 | **10.86** | **10.9** | 4.85 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 178 | SEP | 25 | **12.15** | **12.2** | 5.43 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 179 | SEP | 26 | **8.81** | **8.8** | 3.94 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 180 | SEP | 27 | **13.39** | **13.4** | 5.99 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 181 | SEP | 28 | **8.01** | **8.0** | 3.58 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 182 | SEP | 29 | **14.73** | **14.7** | 6.58 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 183 | SEP | 30 | **23.9** | **23.9** | 10.68 | 0.57 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**TABLE 2B**

**SOIL STOCKPILE WIND EROSION PM-2.5 CALCULATIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| *i* | *MONTH* | *DAY* | *DAILY FASTEST MILE* | $u_{10}^{+}$ *(in mph at 10m)* | *( m/s )* | *u* ( m/s )* | *P* $(g/m^2)$ | *( g )* | *k=0.075 for* $PM_{2.5}$ *( g )* | *( lbs )* | *( tons )* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 184 | OCT | 1 | **20.99** | **21.0** | 9.38 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 185 | OCT | 2 | **20.32** | **20.3** | 9.08 | 0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 186 | OCT | 3 | **13.27** | **13.3** | 5.93 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 187 | OCT | 4 | **11.73** | **11.7** | 5.24 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 188 | OCT | 5 | **13.4** | **13.4** | 5.99 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 189 | OCT | 6 | **8.23** | **8.2** | 3.68 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 190 | OCT | 7 | **6.942** | **6.9** | 3.10 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 191 | OCT | 8 | **11.65** | **11.7** | 5.21 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 192 | OCT | 9 | **10.01** | **10.0** | 4.47 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 193 | OCT | 10 | **7.628** | **7.6** | 3.41 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194 | OCT | 11 | **8.97** | **9.0** | 4.01 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 195 | OCT | 12 | **11.49** | **11.5** | 5.14 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 196 | OCT | 13 | **11.54** | **11.5** | 5.16 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 197 | OCT | 14 | **19.13** | **19.1** | 8.55 | 0.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 198 | OCT | 15 | **28.92** | **28.9** | 12.93 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 199 | OCT | 16 | **25.05** | **25.1** | 11.20 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 200 | OCT | 17 | **29.02** | **29.0** | 12.97 | 0.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 201 | OCT | 18 | **15.49** | **15.5** | 6.92 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 202 | OCT | 19 | **24.66** | **24.7** | 11.02 | 0.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 203 | OCT | 20 | **21.97** | **22.0** | 9.82 | 0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 204 | OCT | 21 | **19.27** | **19.3** | 8.61 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 205 | OCT | 22 | **12.57** | **12.6** | 5.62 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 206 | OCT | 23 | **13.32** | **13.3** | 5.95 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 207 | OCT | 24 | **19.28** | **19.3** | 8.62 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 208 | OCT | 25 | **14.9** | **14.9** | 6.66 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 209 | OCT | 26 | **15.36** | **15.4** | 6.87 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 210 | OCT | 27 | **13.27** | **13.3** | 5.93 | 0.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 211 | OCT | 28 | **10.35** | **10.4** | 4.63 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 212 | OCT | 29 | **8.06** | **8.1** | 3.60 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 213 | OCT | 30 | **11.75** | **11.8** | 5.25 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 214 | OCT | 31 | **11.59** | **11.6** | 5.18 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | **TOTAL** | **0.00** |

**TPY**

**TABLE 3A**

**ESTIMATED VOC AND HAP EMISSIONS FROM RMU-2 LANDFILL (FINAL COVER AREAS ONLY)**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Waste Concentration [1] (ppm) | $C_i$ | $C_i / MW_i$ | $X_i$ | $P_i$* (atm) | $P_i$ (atm) | $C_{si}$ ($g/cm^3$) | $J_i$ ($g/cm^2$-s) | Diffusion $E_{1i}$ (g/s) | Diffusion $E_{1i}$ (lb/yr) | Diffusion VOC Emissions (lb/yr) | Diffusion HAP Emissions (lb/yr) | Total VOC Emissions (lb/yr) | Total HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane (Methyl chloroform) | 71-55-6 | | X | 133.4 | 1.15 | 1.15E-06 | 8.60E-09 | 2.45E-06 | 1.62E-01 | 3.97E-07 | 2.17E-09 | 1.41E-16 | 1.11E-07 | 7.73E-03 | | 0.01 | | 0.01 |
| 1,1,2-Trichloroethane (Cloroethene) | 79-00-5 | X | X | 133.4 | 0.01 | 1.10E-08 | 8.27E-11 | 2.36E-08 | 3.29E-02 | 7.76E-10 | 4.23E-12 | 2.75E-19 | 2.17E-10 | 1.51E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2,4-Trichlorobenzene (unsym-Trichlorobenzene) | 120-82-1 | X | X | 181.5 | 9.99 | 9.99E-06 | 5.50E-08 | 1.57E-05 | 2.37E-04 | 3.72E-09 | 2.76E-11 | 1.79E-18 | 1.42E-09 | 9.85E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2-Dichloroethane (Ethylene dichloride, EDC) | 107-06-2 | X | X | 98.96 | 0.03 | 2.90E-08 | 2.93E-10 | 8.35E-08 | 1.05E-01 | 8.80E-09 | 3.56E-11 | 2.31E-18 | 1.83E-09 | 1.27E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,4-Dichlorobenzene (p-Dichlorobenzene) | 106-46-7 | X | X | 147 | 0.35 | 3.52E-07 | 2.39E-09 | 6.83E-07 | 1.58E-03 | 1.08E-09 | 6.49E-12 | 4.22E-19 | 3.33E-10 | 2.31E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 107-13-1 | X | X | 53.1 | 0.00 | 3.10E-10 | 5.84E-12 | 1.67E-09 | 1.50E-01 | 2.50E-10 | 5.43E-13 | 3.53E-20 | 2.79E-11 | 1.94E-06 | 0.00 | 0.00 | 0.00 | 0.00 |
| Benzene (Benzol, Coal naphhtha) | 71-43-2 | X | X | 78.1 | 0.35 | 3.46E-07 | 4.42E-09 | 1.26E-06 | 1.25E-01 | 1.58E-07 | 5.05E-10 | 3.28E-17 | 2.59E-08 | 1.80E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| bis (2-Ethylhexyl) phthalate (DEHP, Di-(2-ethylhexyl)phthalate | 117-81-7 | X | X | 390.56 | 7.33 | 7.33E-06 | 1.88E-08 | 5.36E-06 | 2.63E-10 | 1.41E-15 | 2.25E-17 | 1.46E-24 | 1.16E-15 | 8.03E-11 | 0.00 | 0.00 | 0.00 | 0.00 |
| Carbon disulfide (Carbon bisulfide) | 75-15-0 | X | X | 76.1 | 0.12 | 1.20E-07 | 1.57E-09 | 4.49E-07 | 4.82E-01 | 2.16E-07 | 6.73E-10 | 4.38E-17 | 3.45E-08 | 2.40E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Carbon tetrachloride (Tetrachloromethane) | 56-23-5 | X | X | 153.8 | 0.01 | 8.09E-09 | 5.26E-11 | 1.50E-08 | 1.49E-01 | 2.23E-09 | 1.40E-11 | 9.13E-19 | 7.20E-10 | 5.01E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chlordane | 57-74-9 | X | X | 409.8 | 0.05 | 5.43E-08 | 1.32E-10 | 3.78E-08 | 1.30E-08 | 4.91E-16 | 8.23E-18 | 5.35E-25 | 4.22E-16 | 2.94E-11 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chlorobenzene (Benzene chloride) | 108-90-7 | X | X | 112.6 | 6.77 | 6.77E-06 | 6.01E-08 | 1.71E-05 | 1.55E-02 | 2.66E-07 | 1.23E-09 | 7.97E-17 | 6.29E-08 | 4.37E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chloroform (Trichloromethane) | 67-66-3 | X | X | 119.38 | 0.04 | 3.93E-08 | 3.29E-10 | 9.39E-08 | 2.74E-01 | 2.57E-08 | 1.25E-10 | 8.15E-18 | 6.43E-09 | 4.47E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cresol - mixed isomers | 1319-77-3 | X | X | 108.1 | 0.00 | 9.42E-10 | 8.72E-12 | 2.49E-09 | 3.95E-04 | 9.82E-13 | 4.34E-15 | 2.82E-22 | 2.23E-13 | 1.55E-08 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dibutyl phthalate (DBP) | 84-74-2 | X | X | 278.3 | 6.01 | 6.01E-06 | 2.16E-08 | 6.17E-06 | 1.30E-07 | 8.01E-13 | 9.12E-15 | 5.93E-22 | 4.68E-13 | 3.25E-08 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dichloromethane (Methylene chloride, DCM) | 75-09-2 | | X | 85 | 0.72 | 7.16E-07 | 8.42E-09 | 2.40E-06 | 5.76E-01 | 1.39E-06 | 4.82E-09 | 3.13E-16 | 2.47E-07 | 1.72E-02 | | 0.02 | | 0.02 |
| Ethyl benzene (Phenylethane) | 100-41-4 | X | X | 106.2 | 3.48 | 3.48E-06 | 3.27E-08 | 9.34E-06 | 1.15E-03 | 1.07E-08 | 4.65E-11 | 3.02E-18 | 2.38E-09 | 1.66E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ethylene glycol | 107-21-1 | X | X | 62.08 | 0.27 | 2.68E-07 | 4.32E-09 | 1.23E-06 | 1.66E-04 | 2.04E-10 | 5.19E-13 | 3.37E-20 | 2.66E-11 | 1.85E-06 | 0.00 | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone (MEK) | 78-93-3 | X | | 72.1 | 1.99 | 1.99E-06 | 2.76E-08 | 7.88E-06 | 1.32E-01 | 1.04E-06 | 3.06E-09 | 1.99E-16 | 1.57E-07 | 1.09E-02 | 0.01 | | 0.01 | |
| Naphthalene (and Methylnaphthalenes) | 91-20-3 | X | X | 128.2 | 5.26 | 5.26E-06 | 4.11E-08 | 1.17E-05 | 3.03E-04 | 3.55E-09 | 1.86E-11 | 1.21E-18 | 9.54E-10 | 6.63E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Phenol (Benzenol, Carbolic acid) | 108-95-2 | X | X | 94.1 | 0.00 | 8.81E-10 | 9.36E-12 | 2.67E-09 | 4.49E-04 | 1.20E-12 | 4.61E-15 | 3.00E-22 | 2.37E-13 | 1.64E-08 | 0.00 | 0.00 | 0.00 | 0.00 |
| Polynuclear Aromatic Hydrocarbons (Generic PAHs) | 206-44-0 | X | X | 147 | 15.04 | 1.50E-05 | 1.02E-07 | 2.92E-05 | 3.02E-05 | 8.82E-10 | 5.30E-12 | 3.45E-19 | 2.72E-10 | 1.89E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pyridine | 110-86-1 | X | | 79.1 | 0.00 | 7.17E-10 | 9.06E-12 | 2.59E-09 | 2.63E-02 | 6.81E-11 | 2.20E-13 | 1.43E-20 | 1.13E-11 | 7.85E-07 | 0.00 | | 0.00 | |
| Tetrachloroethylene (Antisol 1, Carbon dichloride, Perchloroethylene) | 127-18-4 | X | X | 165.83 | 0.90 | 9.00E-07 | 5.43E-09 | 1.55E-06 | 2.50E-02 | 3.87E-08 | 2.63E-10 | 1.71E-17 | 1.35E-08 | 9.36E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Toluene (Methylbenzene) | 108-88-3 | X | X | 92.4 | 13.55 | 1.36E-05 | 1.47E-07 | 4.19E-05 | 3.95E-02 | 1.65E-06 | 6.24E-09 | 4.06E-16 | 3.20E-07 | 2.23E-02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Trichloroethylene (Acetylene trichloride) | 79-01-6 | X | X | 131.4 | 0.60 | 6.02E-07 | 4.58E-09 | 1.31E-06 | 9.87E-02 | 1.29E-07 | 6.93E-10 | 4.51E-17 | 3.56E-08 | 2.47E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vinyl chloride (Chloroethene, Monochloride ethylene) | 75-01-4 | X | X | 62.6 | 0.01 | 1.00E-08 | 1.60E-10 | 4.57E-08 | 3.50E+00 | 1.60E-07 | 4.10E-10 | 2.66E-17 | 2.10E-08 | 1.46E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Xylene (mixed isomers) | 1330-20-7 | X | X | 106.16 | 10.26 | 1.03E-05 | 9.66E-08 | 2.76E-05 | 1.12E-02 | 3.08E-07 | 1.34E-09 | 8.70E-17 | 6.87E-08 | 4.77E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Polychlorinated Biphenyls (PCB's) | 1336-36-3 | X | X | 292 | 940.00 | 9.40E-04 | 3.22E-06 | 9.19E-04 | 5.40E-06 | 4.96E-09 | 5.92E-11 | 3.85E-18 | 3.04E-09 | 2.11E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Anthracene | 120-12-7 | X | | 178.23 | 1.60 | 1.60E-06 | 9.00E-09 | 2.57E-06 | 1.71E-09 | 4.39E-15 | 3.20E-17 | 2.08E-24 | 1.64E-15 | 1.14E-10 | 0.00 | | 0.00 | |
| Phenathrene | 85-01-8 | X | | 178.23 | 5.54 | 5.54E-06 | 3.11E-08 | 8.86E-06 | 6.80E-04 | 6.03E-09 | 4.39E-11 | 2.86E-18 | 2.25E-09 | 1.57E-04 | 0.00 | | 0.00 | |
| benzo(ghi)perylene | 191-24-2 | X | | 276.33 | 0.14 | 1.43E-07 | 5.18E-10 | 1.48E-07 | 1.32E-13 | 1.95E-20 | 2.20E-22 | 1.43E-29 | 1.13E-20 | 7.86E-16 | 0.00 | | 0.00 | |
| 2,4-Dimethylphenol | 105-67-9 | X | | 122.16 | 0.00 | 4.81E-09 | 3.94E-11 | 1.12E-08 | 1.33E-02 | 1.50E-10 | 7.47E-13 | 4.86E-20 | 3.83E-11 | 2.66E-06 | 0.00 | | 0.00 | |
| p-phenylenediamine | 106-50-3 | X | X | 108.14 | 0.01 | 1.14E-08 | 1.05E-10 | 3.00E-08 | 6.10E-06 | 1.83E-13 | 8.09E-16 | 5.26E-23 | 4.15E-14 | 2.89E-09 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mercury | 7439-97-6 | X | X | 200.59 | 0.03 | 2.58E-08 | 1.29E-10 | 3.68E-08 | 1.70E-06 | 6.25E-14 | 5.13E-16 | 3.33E-23 | 2.63E-14 | 1.83E-09 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2,4-Trimethylbenzene | 95-63-6 | X | | 120.19 | 0.00 | 1.27E-09 | 1.06E-11 | 3.02E-09 | 6.00E-03 | 1.81E-11 | 8.89E-14 | 5.78E-21 | 4.56E-12 | 3.17E-07 | 0.00 | | 0.00 | |
| | | | | | | | | | | | | | | TOTALS | 0.05 | 0.07 | 0.05 | 0.07 |

Variables of Interest

$D_{el}$ = 6.5E-09 $cm^2/s$ (HDPE liner)
l = 0.1 cm (GCL + 40-mil HDPE liner)
A = 19.5 acres = 7.89E+08 $cm^2$ (final cover area only, see Attachment 5 for open face area calculations)

$V_{truck}$ = 21 $m^3$
$P_t$ = 303 mmHg
$N_v$ = 342.4 mol
# Trucks / year = 52 (once per week)

Notes:
1 Analytical results provided by CWM

**TABLE 3B**

**ESTIMATED VOC AND HAP EMISSIONS FROM RMU-2 LANDFILL - INTERIM AREAS ONLY**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Waste Concentration [1] (ppm) | $C_i$ | $C_i / MW_i$ | $X_i$ | $P_i$* (atm) | $P_i$ (atm) | $C_{si}$ ($g/cm^3$) | $J_i$ ($g/cm^2$-s) | Diffusion $E_{1i}$ (g/s) | Diffusion $E_{1i}$ (lb/yr) | Diffusion VOC Emissions (lb/yr) | Diffusion HAP Emissions (lb/yr) | Total VOC Emissions (lb/yr) | Total HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane (Methyl chloroform) | 71-55-6 | | X | 133.4 | 1.15 | 1.15E-06 | 8.60E-09 | 2.45E-06 | 1.62E-01 | 3.97E-07 | 2.17E-09 | 1.13E-13 | 7.88E-05 | 5.48E+00 | | 5.48 | | 5.48 |
| 1,1,2-Trichloroethane (Cloroethene) | 79-00-5 | X | X | 133.4 | 0.01 | 1.10E-08 | 8.27E-11 | 2.36E-08 | 3.29E-02 | 7.76E-10 | 4.23E-12 | 2.20E-16 | 1.54E-07 | 1.07E-02 | 0.01 | 0.01 | 0.01 | 0.01 |
| 1,2,4-Trichlorobenzene (unsym-Trichlorobenzene) | 120-82-1 | X | X | 181.5 | 9.99 | 9.99E-06 | 5.50E-08 | 1.57E-05 | 2.37E-04 | 3.72E-09 | 2.76E-11 | 1.43E-15 | 1.00E-06 | 6.98E-02 | 0.07 | 0.07 | 0.07 | 0.07 |
| 1,2-Dichloroethane (Ethylene dichloride, EDC) | 107-06-2 | X | X | 98.96 | 0.03 | 2.90E-08 | 2.93E-10 | 8.35E-08 | 1.05E-01 | 8.80E-09 | 3.56E-11 | 1.85E-15 | 1.30E-06 | 9.00E-02 | 0.09 | 0.09 | 0.09 | 0.09 |
| 1,4-Dichlorobenzene (p-Dichlorobenzene) | 106-46-7 | X | X | 147 | 0.35 | 3.52E-07 | 2.39E-09 | 6.83E-07 | 1.58E-03 | 1.08E-09 | 6.49E-12 | 3.37E-16 | 2.36E-07 | 1.64E-02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Acrylonitrile | 107-13-1 | X | X | 53.1 | 0.00 | 3.10E-10 | 5.84E-12 | 1.67E-09 | 1.50E-01 | 2.50E-10 | 5.43E-13 | 2.82E-17 | 1.98E-08 | 1.37E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Benzene (Benzol, Coal naphhtha) | 71-43-2 | X | X | 78.1 | 0.35 | 3.46E-07 | 4.42E-09 | 1.26E-06 | 1.25E-01 | 1.58E-07 | 5.05E-10 | 2.63E-14 | 1.84E-05 | 1.28E+00 | 1.28 | 1.28 | 1.28 | 1.28 |
| bis (2-Ethylhexyl) phthalate (DEHP, Di-(2-ethylhexyl)phthalate | 117-81-7 | X | X | 390.56 | 7.33 | 7.33E-06 | 1.88E-08 | 5.36E-06 | 2.63E-10 | 1.41E-15 | 2.25E-17 | 1.17E-21 | 8.19E-13 | 5.70E-08 | 0.00 | 0.00 | 0.00 | 0.00 |
| Carbon disulfide (Carbon bisulfide) | 75-15-0 | X | X | 76.1 | 0.12 | 1.20E-07 | 1.57E-09 | 4.49E-07 | 4.82E-01 | 2.16E-07 | 6.73E-10 | 3.50E-14 | 2.45E-05 | 1.70E+00 | 1.70 | 1.70 | 1.70 | 1.70 |
| Carbon tetrachloride (Tetrachloromethane) | 56-23-5 | X | X | 153.8 | 0.01 | 8.09E-09 | 5.26E-11 | 1.50E-08 | 1.49E-01 | 2.23E-09 | 1.40E-11 | 7.30E-16 | 5.11E-07 | 3.55E-02 | 0.04 | 0.04 | 0.04 | 0.04 |
| Chlordane | 57-74-9 | X | X | 409.8 | 0.05 | 5.43E-08 | 1.32E-10 | 3.78E-08 | 1.30E-08 | 4.91E-16 | 8.23E-18 | 4.28E-22 | 3.00E-13 | 2.08E-08 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chlorobenzene (Benzene chloride) | 108-90-7 | X | X | 112.6 | 6.77 | 6.77E-06 | 6.01E-08 | 1.71E-05 | 1.55E-02 | 2.66E-07 | 1.23E-09 | 6.37E-14 | 4.46E-05 | 3.10E+00 | 3.10 | 3.10 | 3.10 | 3.10 |
| Chloroform (Trichloromethane) | 67-66-3 | X | X | 119.38 | 0.04 | 3.93E-08 | 3.29E-10 | 9.39E-08 | 2.74E-01 | 2.57E-08 | 1.25E-10 | 6.52E-15 | 4.56E-06 | 3.17E-01 | 0.32 | 0.32 | 0.32 | 0.32 |
| Cresol - mixed isomers | 1319-77-3 | X | X | 108.1 | 0.00 | 9.42E-10 | 8.72E-12 | 2.49E-09 | 3.95E-04 | 9.82E-13 | 4.34E-15 | 2.26E-19 | 1.58E-10 | 1.10E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dibutyl phthalate (DBP) | 84-74-2 | X | X | 278.3 | 6.01 | 6.01E-06 | 2.16E-08 | 6.17E-06 | 1.30E-07 | 8.01E-13 | 9.12E-15 | 4.74E-19 | 3.32E-10 | 2.31E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dichloromethane (Methylene chloride, DCM) | 75-09-2 | | X | 85 | 0.72 | 7.16E-07 | 8.42E-09 | 2.40E-06 | 5.76E-01 | 1.39E-06 | 4.82E-09 | 2.50E-13 | 1.75E-04 | 1.22E+01 | | 12.18 | | 12.18 |
| Ethyl benzene (Phenylethane) | 100-41-4 | X | X | 106.2 | 3.48 | 3.48E-06 | 3.27E-08 | 9.34E-06 | 1.15E-03 | 1.07E-08 | 4.65E-11 | 2.41E-15 | 1.69E-06 | 1.17E-01 | 0.12 | 0.12 | 0.12 | 0.12 |
| Ethylene glycol | 107-21-1 | X | X | 62.08 | 0.27 | 2.68E-07 | 4.32E-09 | 1.23E-06 | 1.66E-04 | 2.04E-10 | 5.19E-13 | 2.70E-17 | 1.89E-08 | 1.31E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone (MEK) | 78-93-3 | X | | 72.1 | 1.99 | 1.99E-06 | 2.76E-08 | 7.88E-06 | 1.32E-01 | 1.04E-06 | 3.06E-09 | 1.59E-13 | 1.11E-04 | 7.74E+00 | 7.74 | | 7.74 | |
| Naphthalene (and Methylnaphthalenes) | 91-20-3 | X | X | 128.2 | 5.26 | 5.26E-06 | 4.11E-08 | 1.17E-05 | 3.03E-04 | 3.55E-09 | 1.86E-11 | 9.66E-16 | 6.76E-07 | 4.70E-02 | 0.05 | 0.05 | 0.05 | 0.05 |
| Phenol (Benzenol, Carbolic acid) | 108-95-2 | X | X | 94.1 | 0.00 | 8.81E-10 | 9.36E-12 | 2.67E-09 | 4.49E-04 | 1.20E-12 | 4.61E-15 | 2.40E-19 | 1.68E-10 | 1.17E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Polynuclear Aromatic Hydrocarbons (Generic PAHs) | 206-44-0 | X | X | 147 | 15.04 | 1.50E-05 | 1.02E-07 | 2.92E-05 | 3.02E-05 | 8.82E-10 | 5.30E-12 | 2.75E-16 | 1.93E-07 | 1.34E-02 | 0.01 | 0.01 | 0.01 | 0.01 |
| Pyridine | 110-86-1 | X | | 79.1 | 0.00 | 7.17E-10 | 9.06E-12 | 2.59E-09 | 2.63E-02 | 6.81E-11 | 2.20E-13 | 1.14E-17 | 8.01E-09 | 5.57E-04 | 0.00 | | 0.00 | |
| Tetrachloroethylene (Antisol 1, Carbon dichloride, Perchloroethylene) | 127-18-4 | X | X | 165.83 | 0.90 | 9.00E-07 | 5.43E-09 | 1.55E-06 | 2.50E-02 | 3.87E-08 | 2.63E-10 | 1.36E-14 | 9.55E-06 | 6.64E-01 | 0.66 | 0.66 | 0.66 | 0.66 |
| Toluene (Methylbenzene) | 108-88-3 | X | X | 92.4 | 13.55 | 1.36E-05 | 1.47E-07 | 4.19E-05 | 3.95E-02 | 1.65E-06 | 6.24E-09 | 3.24E-13 | 2.27E-04 | 1.58E+01 | 15.79 | 15.79 | 15.79 | 15.79 |
| Trichloroethylene (Acetylene trichloride) | 79-01-6 | X | X | 131.4 | 0.60 | 6.02E-07 | 4.58E-09 | 1.31E-06 | 9.87E-02 | 1.29E-07 | 6.93E-10 | 3.60E-14 | 2.52E-05 | 1.75E+00 | 1.75 | 1.75 | 1.75 | 1.75 |
| Vinyl chloride (Chloroethene, Monochloride ethylene) | 75-01-4 | X | X | 62.6 | 0.01 | 1.00E-08 | 1.60E-10 | 4.57E-08 | 3.50E+00 | 1.60E-07 | 4.10E-10 | 2.13E-14 | 1.49E-05 | 1.04E+00 | 1.04 | 1.04 | 1.04 | 1.04 |
| Xylene (mixed isomers) | 1330-20-7 | X | X | 106.16 | 10.26 | 1.03E-05 | 9.66E-08 | 2.76E-05 | 1.12E-02 | 3.08E-07 | 1.34E-09 | 6.96E-14 | 4.87E-05 | 3.39E+00 | 3.39 | 3.39 | 3.39 | 3.39 |
| Polychlorinated Biphenyls (PCB's) | 1336-36-3 | X | X | 292 | 600.00 | 6.00E-04 | 2.05E-06 | 5.86E-04 | 5.40E-06 | 3.16E-09 | 3.78E-11 | 1.96E-15 | 1.37E-06 | 9.56E-02 | 0.10 | 0.10 | 0.10 | 0.10 |
| Anthracene | 120-12-7 | X | | 178.23 | 1.60 | 1.60E-06 | 9.00E-09 | 2.57E-06 | 1.71E-09 | 4.39E-15 | 3.20E-17 | 1.66E-21 | 1.16E-12 | 8.09E-08 | 0.00 | | 0.00 | |
| Phenathrene | 85-01-8 | X | | 178.23 | 5.54 | 5.54E-06 | 3.11E-08 | 8.86E-06 | 6.80E-04 | 6.03E-09 | 4.39E-11 | 2.28E-15 | 1.60E-06 | 1.11E-01 | 0.11 | | 0.11 | |
| benzo(ghi)perylene | 191-24-2 | X | | 276.33 | 0.14 | 1.43E-07 | 5.18E-10 | 1.48E-07 | 1.32E-13 | 1.95E-20 | 2.20E-22 | 1.15E-26 | 8.02E-18 | 5.58E-13 | 0.00 | | 0.00 | |
| 2,4-Dimethylphenol | 105-67-9 | X | | 122.16 | 0.00 | 4.81E-09 | 3.94E-11 | 1.12E-08 | 1.33E-02 | 1.50E-10 | 7.47E-13 | 3.88E-17 | 2.72E-08 | 1.89E-03 | 0.00 | | 0.00 | |
| p-phenylenediamine | 106-50-3 | X | X | 108.14 | 0.01 | 1.14E-08 | 1.05E-10 | 3.00E-08 | 6.10E-06 | 1.83E-13 | 8.09E-16 | 4.21E-20 | 2.94E-11 | 2.05E-06 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mercury | 7439-97-6 | X | X | 200.59 | 0.03 | 2.58E-08 | 1.29E-10 | 3.68E-08 | 1.70E-06 | 6.25E-14 | 5.13E-16 | 2.66E-20 | 1.87E-11 | 1.30E-06 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2,4-Trimethylbenzene | 95-63-6 | X | | 120.19 | 0.00 | 1.27E-09 | 1.06E-11 | 3.02E-09 | 6.00E-03 | 1.81E-11 | 8.89E-14 | 4.62E-18 | 3.24E-09 | 2.25E-04 | 0.00 | | 0.00 | |
| | | | | | | | | | | | | | | TOTALS | 37.38 | 47.19 | 37.38 | 47.19 |

Variables of Interest

| | | | | |
|---|---|---|---|---|
| $D_{ei}$ = | 1.32E-04 | $cm^2/s$ | (interim cover) | |
| l = | 2.5 | cm | | |
| A = | 17.3 | acres = | 7E+08 | $cm^2$ |
| $V_{truck}$ = | 21 | $m^3$ | | |
| $P_t$ = | 303 | mmHg | | |
| $N_v$ = | 342.4 | mol | | |
| # Trucks / year = | 52 | (once per week) | | |

Notes:
1 Analytical results provided by CWM

**TABLE 3C**

**ESTIMATED VOC AND HAP EMISSIONS FROM RMU-2 LANDFILL WITH POSI-SHELL COVER**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | $MW_i$ (g/mol) | Waste Concentration [1] (ppm) | $C_i$ | $C_i / MW_i$ | $X_i$ | $P_i$* (atm) | $P_i$ (atm) | $C_{si}$ ($g/cm^3$) | $J_i$ ($g/cm^2$-s) | Diffusion $E_{1i}$ (g/s) | Diffusion $E_{1i}$ (lb/yr) | Diffusion VOC Emissions (lb/yr) | Diffusion HAP Emissions (lb/yr) | Total VOC Emissions (lb/yr) | Total HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane (Methyl chloroform) | 71-55-6 | | X | 133.4 | 1.15 | 1.15E-06 | 8.60E-09 | 2.45E-06 | 1.62E-01 | 3.97E-07 | 2.17E-09 | 1.13E-13 | 7.75E-06 | 3.85E-01 | | 0.39 | | 0.39 |
| 1,1,2-Trichloroethane (Cloroethene) | 79-00-5 | X | X | 133.4 | 0.01 | 1.10E-08 | 8.27E-11 | 2.36E-08 | 3.29E-02 | 7.76E-10 | 4.23E-12 | 2.20E-16 | 1.51E-08 | 7.53E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2,4-Trichlorobenzene (unsym-Trichlorobenzene) | 120-82-1 | X | X | 181.5 | 9.99 | 9.99E-06 | 5.50E-08 | 1.57E-05 | 2.37E-04 | 3.72E-09 | 2.76E-11 | 1.43E-15 | 9.87E-08 | 4.91E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2-Dichloroethane (Ethylene dichloride, EDC) | 107-06-2 | X | X | 98.96 | 0.03 | 2.90E-08 | 2.93E-10 | 8.35E-08 | 1.05E-01 | 8.80E-09 | 3.56E-11 | 1.85E-15 | 1.27E-07 | 6.33E-03 | 0.01 | 0.01 | 0.01 | 0.01 |
| 1,4-Dichlorobenzene (p-Dichlorobenzene) | 106-46-7 | X | X | 147 | 0.35 | 3.52E-07 | 2.39E-09 | 6.83E-07 | 1.58E-03 | 1.08E-09 | 6.49E-12 | 3.37E-16 | 2.32E-08 | 1.15E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Acrylonitrile | 107-13-1 | X | X | 53.1 | 0.00 | 3.10E-10 | 5.84E-12 | 1.67E-09 | 1.50E-01 | 2.50E-10 | 5.43E-13 | 2.82E-17 | 1.94E-09 | 9.66E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Benzene (Benzol, Coal naphhtha) | 71-43-2 | X | X | 78.1 | 0.35 | 3.46E-07 | 4.42E-09 | 1.26E-06 | 1.25E-01 | 1.58E-07 | 5.05E-10 | 2.63E-14 | 1.81E-06 | 8.98E-02 | 0.09 | 0.09 | 0.09 | 0.09 |
| bis (2-Ethylhexyl) phthalate (DEHP, Di-(2-ethylhexyl)phthalate | 117-81-7 | X | X | 390.56 | 7.33 | 7.33E-06 | 1.88E-08 | 5.36E-06 | 2.63E-10 | 1.41E-15 | 2.25E-17 | 1.17E-21 | 8.05E-14 | 4.00E-09 | 0.00 | 0.00 | 0.00 | 0.00 |
| Carbon disulfide (Carbon bisulfide) | 75-15-0 | X | X | 76.1 | 0.12 | 1.20E-07 | 1.57E-09 | 4.49E-07 | 4.82E-01 | 2.16E-07 | 6.73E-10 | 3.50E-14 | 2.41E-06 | 1.20E-01 | 0.12 | 0.12 | 0.12 | 0.12 |
| Carbon tetrachloride (Tetrachloromethane) | 56-23-5 | X | X | 153.8 | 0.01 | 8.09E-09 | 5.26E-11 | 1.50E-08 | 1.49E-01 | 2.23E-09 | 1.40E-11 | 7.30E-16 | 5.02E-08 | 2.50E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chlordane | 57-74-9 | X | X | 409.8 | 0.05 | 5.43E-08 | 1.32E-10 | 3.78E-08 | 1.30E-08 | 4.91E-16 | 8.23E-18 | 4.28E-22 | 2.94E-14 | 1.46E-09 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chlorobenzene (Benzene chloride) | 108-90-7 | X | X | 112.6 | 6.77 | 6.77E-06 | 6.01E-08 | 1.71E-05 | 1.55E-02 | 2.66E-07 | 1.23E-09 | 6.37E-14 | 4.38E-06 | 2.18E-01 | 0.22 | 0.22 | 0.22 | 0.22 |
| Chloroform (Trichloromethane) | 67-66-3 | X | X | 119.38 | 0.04 | 3.93E-08 | 3.29E-10 | 9.39E-08 | 2.74E-01 | 2.57E-08 | 1.25E-10 | 6.52E-15 | 4.48E-07 | 2.23E-02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Cresol - mixed isomers | 1319-77-3 | X | X | 108.1 | 0.00 | 9.42E-10 | 8.72E-12 | 2.49E-09 | 3.95E-04 | 9.82E-13 | 4.34E-15 | 2.26E-19 | 1.55E-11 | 7.72E-07 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dibutyl phthalate (DBP) | 84-74-2 | X | X | 278.3 | 6.01 | 6.01E-06 | 2.16E-08 | 6.17E-06 | 1.30E-07 | 8.01E-13 | 9.12E-15 | 4.74E-19 | 3.26E-11 | 1.62E-06 | 0.00 | 0.00 | 0.00 | 0.00 |
| Dichloromethane (Methylene chloride, DCM) | 75-09-2 | | X | 85 | 0.72 | 7.16E-07 | 8.42E-09 | 2.40E-06 | 5.76E-01 | 1.39E-06 | 4.82E-09 | 2.50E-13 | 1.72E-05 | 8.56E-01 | | 0.86 | | 0.86 |
| Ethyl benzene (Phenylethane) | 100-41-4 | X | X | 106.2 | 3.48 | 3.48E-06 | 3.27E-08 | 9.34E-06 | 1.15E-03 | 1.07E-08 | 4.65E-11 | 2.41E-15 | 1.66E-07 | 8.26E-03 | 0.01 | 0.01 | 0.01 | 0.01 |
| Ethylene glycol | 107-21-1 | X | X | 62.08 | 0.27 | 2.68E-07 | 4.32E-09 | 1.23E-06 | 1.66E-04 | 2.04E-10 | 5.19E-13 | 2.70E-17 | 1.86E-09 | 9.23E-05 | 0.00 | 0.00 | 0.00 | 0.00 |
| Methyl ethyl ketone (MEK) | 78-93-3 | X | | 72.1 | 1.99 | 1.99E-06 | 2.76E-08 | 7.88E-06 | 1.32E-01 | 1.04E-06 | 3.06E-09 | 1.59E-13 | 1.09E-05 | 5.44E-01 | 0.54 | | 0.54 | |
| Naphthalene (and Methylnaphthalenes) | 91-20-3 | X | X | 128.2 | 5.26 | 5.26E-06 | 4.11E-08 | 1.17E-05 | 3.03E-04 | 3.55E-09 | 1.86E-11 | 9.66E-16 | 6.65E-08 | 3.30E-03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Phenol (Benzenol, Carbolic acid) | 108-95-2 | X | X | 94.1 | 0.00 | 8.81E-10 | 9.36E-12 | 2.67E-09 | 4.49E-04 | 1.20E-12 | 4.61E-15 | 2.40E-19 | 1.65E-11 | 8.20E-07 | 0.00 | 0.00 | 0.00 | 0.00 |
| Polynuclear Aromatic Hydrocarbons (Generic PAHs) | 206-44-0 | X | X | 147 | 15.04 | 1.50E-05 | 1.02E-07 | 2.92E-05 | 3.02E-05 | 8.82E-10 | 5.30E-12 | 2.75E-16 | 1.89E-08 | 9.42E-04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pyridine | 110-86-1 | X | | 79.1 | 0.00 | 7.17E-10 | 9.06E-12 | 2.59E-09 | 2.63E-02 | 6.81E-11 | 2.20E-13 | 1.14E-17 | 7.87E-10 | 3.91E-05 | 0.00 | | 0.00 | |
| Tetrachloroethylene (Antisol 1, Carbon dichloride, Perchloroethylene) | 127-18-4 | X | X | 165.83 | 0.90 | 9.00E-07 | 5.43E-09 | 1.55E-06 | 2.50E-02 | 3.87E-08 | 2.63E-10 | 1.36E-14 | 9.39E-07 | 4.67E-02 | 0.05 | 0.05 | 0.05 | 0.05 |
| Toluene (Methylbenzene) | 108-88-3 | X | X | 92.4 | 13.55 | 1.36E-05 | 1.47E-07 | 4.19E-05 | 3.95E-02 | 1.65E-06 | 6.24E-09 | 3.24E-13 | 2.23E-05 | 1.11E+00 | 1.11 | 1.11 | 1.11 | 1.11 |
| Trichloroethylene (Acetylene trichloride) | 79-01-6 | X | X | 131.4 | 0.60 | 6.02E-07 | 4.58E-09 | 1.31E-06 | 9.87E-02 | 1.29E-07 | 6.93E-10 | 3.60E-14 | 2.48E-06 | 1.23E-01 | 0.12 | 0.12 | 0.12 | 0.12 |
| Vinyl chloride (Chloroethene, Monochloride ethylene) | 75-01-4 | X | X | 62.6 | 0.01 | 1.00E-08 | 1.60E-10 | 4.57E-08 | 3.50E+00 | 1.60E-07 | 4.10E-10 | 2.13E-14 | 1.47E-06 | 7.29E-02 | 0.07 | 0.07 | 0.07 | 0.07 |
| Xylene (mixed isomers) | 1330-20-7 | X | X | 106.16 | 10.26 | 1.03E-05 | 9.66E-08 | 2.76E-05 | 1.12E-02 | 3.08E-07 | 1.34E-09 | 6.96E-14 | 4.79E-06 | 2.38E-01 | 0.24 | 0.24 | 0.24 | 0.24 |
| Polychlorinated Biphenyls (PCB's) | 1336-36-3 | X | X | 292 | 600.00 | 6.00E-04 | 2.05E-06 | 5.86E-04 | 5.40E-06 | 3.16E-09 | 3.78E-11 | 1.96E-15 | 1.35E-07 | 6.72E-03 | 0.01 | 0.01 | 0.01 | 0.01 |
| Anthracene | 120-12-7 | X | | 178.23 | 1.60 | 1.60E-06 | 9.00E-09 | 2.57E-06 | 1.71E-09 | 4.39E-15 | 3.20E-17 | 1.66E-21 | 1.14E-13 | 5.69E-09 | 0.00 | | 0.00 | |
| Phenathrene | 85-01-8 | X | | 178.23 | 5.54 | 5.54E-06 | 3.11E-08 | 8.86E-06 | 6.80E-04 | 6.03E-09 | 4.39E-11 | 2.28E-15 | 1.57E-07 | 7.81E-03 | 0.01 | | 0.01 | |
| benzo(ghi)perylene | 191-24-2 | X | | 276.33 | 0.14 | 1.43E-07 | 5.18E-10 | 1.48E-07 | 1.32E-13 | 1.95E-20 | 2.20E-22 | 1.15E-26 | 7.88E-19 | 3.92E-14 | 0.00 | | 0.00 | |
| 2,4-Dimethylphenol | 105-67-9 | X | | 122.16 | 0.00 | 4.81E-09 | 3.94E-11 | 1.12E-08 | 1.33E-02 | 1.50E-10 | 7.47E-13 | 3.88E-17 | 2.67E-09 | 1.33E-04 | 0.00 | | 0.00 | |
| p-phenylenediamine | 106-50-3 | X | X | 108.14 | 0.01 | 1.14E-08 | 1.05E-10 | 3.00E-08 | 6.10E-06 | 1.83E-13 | 8.09E-16 | 4.21E-20 | 2.89E-12 | 1.44E-07 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mercury | 7439-97-6 | X | X | 200.59 | 0.03 | 2.58E-08 | 1.29E-10 | 3.68E-08 | 1.70E-06 | 6.25E-14 | 5.13E-16 | 2.66E-20 | 1.83E-12 | 9.11E-08 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,2,4-Trimethylbenzene | 95-63-6 | X | | 120.19 | 0.00 | 1.27E-09 | 1.06E-11 | 3.02E-09 | 6.00E-03 | 1.81E-11 | 8.89E-14 | 4.62E-18 | 3.18E-10 | 1.58E-05 | 0.00 | | 0.00 | |

Variables of Interest

| | | | | |
|---|---|---|---|---|
| $D_{ei}$ = | 1.32E-04 | $cm^2/s$ | Posishell over active region, 16 hours per day (Monday - Saturday); 24 hours per day on Sunday | |
| l = | 2.5 | cm | | |
| A = | 1.7 | acres = | 68796530 | $cm^2$ |
| $V_{truck}$ = | 21 | $m^3$ | | |
| $P_t$ = | 303 | mmHg | | |
| $N_v$ = | 342.4 | mol | | |
| # Trucks / year = | 52 | (once per week) | | |

| | | | | | | | | | | | | | | TOTALS | 2.63 | 3.32 | 2.63 | 3.32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Notes:
1 Analytical results provided by CWM

**TABLE 4**

**ESTIMATED VOC AND HAP EMISSIONS FROM RMU-2 STANDPIPES**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | Mol. Weight (g/mol) | Leachate Concentration [2] (µg/L) | Leachate Concentration (µg/m$^3$) | # Carbon Atoms | # Hydrogen Atoms | # Oxygen Atoms | # Chloride Atoms | # Fluorine Atoms | # Sulfur Atoms | # Bromine Atoms | # Nitrogen Atoms | Atomic Diffusion Volume for $D_a$ Calculation [3] | Gas Diffusion Coefficient $D_a$ [4] (m$^2$/h) | Atomic Volume for $D_l$ Calculation [5] (cm$^3$/mol) | Liquid Diffusion Coefficient $D_l$ [6] (m$^2$/h) | Schmidt Number $S_c$ [7] | Reynolds Number $R_e$ [7] | Sherwood Number $S_h$ [7] | Total Surface Area [8] (m$^2$) | Char. Length [9] (m) | $k_G$ [7] (m/h) | $k_L$ [7] (m/h) | $K_{OL}$ [7] (m/h) | Henry's Constant [10] | $K_{OG}$ [7] (m/h) | Emissions [7] (µg/hr) | Emissions (lb/hr) | Emissions (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carbon disulfide | 75-15-0 | X | X | 76.14 | 1090 | 1,090,000 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 50.5 | 3.96E-02 | 66.00 | 4.62E-06 | 1.4 | 18,835.9 | 102.6 | 3.90 | 1.97 | 2.06 | 6.43E-03 | 6.41E-03 | 1.24E+00 | 5.17E-03 | 2.73E+04 | 6.01E-05 | 0.53 | 0.53 | 0.53 |
| Toluene [1] | 108-88-3 | X | X | 92.14 | 2050 | 2,050,000 | 7 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 111.34 | 2.81E-02 | 118.2 | 3.28E-06 | 2.0 | 18,835.9 | 115.1 | 3.90 | 1.97 | 1.64 | 5.41E-03 | 5.35E-03 | 2.71E-01 | 1.97E-02 | 4.28E+04 | 9.43E-05 | 0.83 | 0.83 | 0.83 |
| 2-Butanone | 78-93-3 | X | | 72.11 | 6420 | 6,420,000 | 4 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 87.32 | 3.21E-02 | 96.2 | 3.70E-06 | 1.8 | 18,835.9 | 110.1 | 3.90 | 1.97 | 1.79 | 5.75E-03 | 2.39E-03 | 2.28E-03 | 1.05E+00 | 5.98E+04 | 1.32E-04 | 1.15 | 1.15 | |
| 4-Methyl-2-pentanone | 108-10-1 | X | X | 100.16 | 470 | 470,000 | 6 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 128.24 | 2.62E-02 | 140.6 | 2.96E-06 | 2.2 | 18,835.9 | 117.9 | 3.90 | 1.97 | 1.56 | 5.14E-03 | 3.25E-03 | 5.63E-03 | 5.77E-01 | 5.95E+03 | 1.31E-05 | 0.11 | 0.11 | 0.11 |
| Acetone | 67-64-1 | | | 58.08 | 114000 | 114,000,000 | 3 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 66.86 | 3.70E-02 | 74 | 4.32E-06 | 1.5 | 18,835.9 | 105.0 | 3.90 | 1.97 | 1.97 | 6.22E-03 | 2.08E-03 | 1.59E-03 | 1.31E+00 | 9.25E+05 | 2.04E-03 | 17.87 | | |
| Methylene Chloride | 75-09-2 | | X | 84.93 | 1780 | 1,780,000 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 59.46 | 3.67E-02 | 65.4 | 4.65E-06 | 1.5 | 18,835.9 | 105.3 | 3.90 | 1.97 | 1.96 | 6.45E-03 | 6.22E-03 | 8.93E-02 | 6.96E-02 | 4.31E+04 | 9.51E-05 | 0.83 | | 0.83 |
| Vinyl Chloride | 75-01-4 | X | X | 62.5 | 142 | 142,000 | 2 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 58.44 | 3.86E-02 | 62.3 | 4.78E-06 | 1.5 | 18,835.9 | 103.6 | 3.90 | 1.97 | 2.02 | 6.54E-03 | 6.52E-03 | 1.11E+00 | 5.87E-03 | 3.61E+03 | 7.96E-06 | 0.07 | 0.07 | 0.07 |
| 2,4-Dimethylphenol [1] | 105-67-9 | X | | 122.16 | 140 | 140,000 | 8 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 137.28 | 2.49E-02 | 147.8 | 2.87E-06 | 2.3 | 18,835.9 | 119.8 | 3.90 | 1.97 | 1.51 | 5.07E-03 | 1.21E-04 | 8.20E-05 | 1.47E+00 | 6.60E+01 | 1.46E-07 | 0.00 | 0.00 | |
| 4-Nitrophenol | 100-02-7 | X | X | 139.11 | 500 | 500,000 | 6 | 5 | 3 | 0 | 0 | 0 | 0 | 1 | 111.03 | 2.70E-02 | 130.1 | 3.10E-06 | 2.1 | 18,835.9 | 116.7 | 3.90 | 1.97 | 1.59 | 5.26E-03 | 2.71E-08 | 1.70E-08 | 1.59E+00 | 5.28E-02 | 1.16E-10 | 0.00 | 0.00 | 0.00 |
| Phenol [1] | 108-95-2 | X | X | 94.11 | 1200 | 1,200,000 | 6 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 96.36 | 2.98E-02 | 103.4 | 3.55E-06 | 1.9 | 18,835.9 | 112.9 | 3.90 | 1.97 | 1.70 | 5.63E-03 | 2.76E-05 | 1.63E-05 | 1.69E+00 | 1.29E+02 | 2.85E-07 | 0.00 | 0.00 | 0.00 |
| Aroclor 1242 [1] | 53469-21-9 | X | X | 291.99 | 29.6 | 29,600 | 12 | 6 | 0 | 4 | 0 | 0 | 0 | 0 | 267.88 | 1.73E-02 | 271.2 | 2.01E-06 | 3.3 | 18,835.9 | 135.2 | 3.90 | 1.97 | 1.19 | 4.24E-03 | 3.63E-03 | 2.13E-02 | 1.70E-01 | 4.19E+02 | 9.24E-07 | 0.01 | 0.01 | 0.01 |
| Aroclor 1260 [1] | 11096-82-5 | X | X | 395.33 | 112 | 112,000 | 12 | 3 | 0 | 7 | 0 | 0 | 0 | 0 | 320.44 | 1.57E-02 | 324.9 | 1.81E-06 | 3.6 | 18,835.9 | 139.6 | 3.90 | 1.97 | 1.11 | 4.02E-03 | 3.94E-03 | 1.89E-01 | 2.09E-02 | 1.72E+03 | 3.80E-06 | 0.03 | 0.03 | 0.03 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **TOTALS** | **2.74** | **2.41** |

Notes:

1 Deduction of 20 and 15 applied for calculation of atomic diffusion volumes for air and liquid, respectively (deduction applied for a hexagonal ring)

2 Analytical results from multiple samples taken from: 1.) RMU-1 standpipes over a period of May 2006 through February 2013; 2.) Tank T-160 (RMU-1 lift station) over a period of January 31, 2012 through February 15, 2012; and 3.) Tank T-102 over a period of April 3, 2012 through April 17, 2013 (applied highest detected value for each compound in this column)

3 Method for calculating total diffusion volume for air taken from Fuller et al., 1966

4 Calculation method for gas diffusion coefficient referenced from *Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design* , 2008

5 Method for calculating total diffusion volume for water was taken from the LeBas Method, 1915

6 Calculation method for liquid diffusion coefficient referenced from *Water Treatment Principles and Design, Third Edition* , 2012

7 Parameter was calculated using method presented in paper: "Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools Under Simulated Indoor Environmental Conditions," December 2002

8 Total surface area of all standpipes in RMU-2 calculated as follows: [ (12 standpipes) x (Pi) x (0.305 m radius)$^2$ ] + [ (12 cleanouts) x (Pi) x (0.102 m radius)$^2$ ] = 3.90 m$^2$

9 Characteristic length calculated as the square root of the total surface area

10 Referenced materials provided on USEPA website and CHEMFATE provided by SRC

**TABLE 5**

**FACULTATIVE POND 5 EMISSIONS**
**EMISSION INVENTORY**
**CWM CHEMICAL SERIVCES, LLC**

Mass Balance - Equation 5-30 from *Air Emission Models for Waste and Wastewater (November 1994)* :

$E = f_{air} * Q * C_i$, where,

$f_{air}$ = fraction emitted to air (assumed to equal 1 for conservative purposes)

Q = Rate of effluent discharge to facultative ponds = approx. 15,000,000 gallons / year

$C_i$ = concentration of pollutant in effluent discharge (from laboratory analysis)

| | $C_i$ | | | | | |
|---|---|---|---|---|---|---|
| | MDL | 0.5*MDL | E | E | VOC | HAP |
| Compound | (µg/L) | (µg/L) | (µg/yr) | (lb/yr) | (lb/yr) | (lb/yr) |
| Vinyl Chloride | 0.3 | 0.15 | 8.52E+06 | 0.0188 | 0.02 | 0.02 |
| Diethyl ether | Not Analyzed | --- | --- | | 0.00 | |
| 1,1,2-Trichloro-1,2,2-triflourorethane | Not Analyzed | --- | --- | | 0.00 | |
| Acetone | 1.8 | 0.9 | 5.11E+07 | 0.1127 | | |
| Methylene chloride | 0.65 | 0.325 | 1.85E+07 | 0.0407 | | 0.04 |
| 1,1-Dichloroethane | 0.31 | 0.155 | 8.80E+06 | 0.0194 | 0.02 | 0.02 |
| 2-Butanone | 2.2 | 1.1 | 6.25E+07 | 0.1377 | 0.14 | |
| Chloroform | 0.29 | 0.145 | 8.23E+06 | 0.0182 | 0.02 | 0.02 |
| 1,1,1-Trichloroethane | 0.3 | 0.15 | 8.52E+06 | 0.0188 | | 0.02 |
| Carbon Tetrachloride | 0.33 | 0.165 | 9.37E+06 | 0.0207 | 0.02 | 0.02 |
| 1,2-Dichloroethane | 0.36 | 0.18 | 1.02E+07 | 0.0225 | 0.02 | 0.02 |
| Benzene | 0.31 | 0.155 | 8.80E+06 | 0.0194 | 0.02 | 0.02 |
| Trichloroethene | 0.33 | 0.165 | 9.37E+06 | 0.0207 | 0.02 | 0.02 |
| 4-Methyl-2-Pentanone | 2.4 | 1.2 | 6.81E+07 | 0.1502 | 0.15 | 0.15 |
| Toluene | 0.35 | 0.175 | 9.94E+06 | 0.0219 | 0.02 | 0.02 |
| 1,1,2-Trichloroethane | 0.34 | 0.17 | 9.65E+06 | 0.0213 | 0.02 | |
| Tetrachloroethene | 0.38 | 0.19 | 1.08E+07 | 0.0238 | 0.02 | 0.02 |
| Chlorobenzene | 0.32 | 0.16 | 9.08E+06 | 0.02 | 0.02 | 0.02 |
| Xylenes (total) | Not Analyzed | --- | --- | | 0.00 | 0.00 |
| 1,1,2,2-Tetrachloroethane | 0.35 | 0.175 | 9.94E+06 | 0.0219 | 0.02 | 0.02 |
| 1,4-Dichlorobenzene | 0.85 | 0.425 | 2.41E+07 | 0.0532 | 0.05 | 0.05 |
| 1,2-Dichlorobenzene | 0.75 | 0.375 | 2.13E+07 | 0.0469 | 0.05 | |
| PCBs | --- | 0.2 | 1.14E+07 | 0.025 | 0.03 | 0.03 |
| | | | **TOTAL** | **0.7** | **0.7** | **0.5** **lb/yr** |

**TABLE 6**

**ESTIMATED VOC AND HAP EMISSIONS FROM STORMWATER DETENTION BASIN**
**EMISSIONS INVENTORY**
**CWM CHEMICAL SERVICES, LLC**

| Detected Compounds | CAS Number | VOC | HAP | Mol. Weight (g/mol) | Leachate Concentration [2] (µg/L) | Leachate Concentration (µg/m$^3$) | # Carbon Atoms | # Hydrogen Atoms | # Oxygen Atoms | # Chloride Atoms | # Fluorine Atoms | # Sulfur Atoms | # Bromine Atoms | # Nitrogen Atoms | Atomic Diffusion Volume for $D_a$ Calculation [3] | Gas Diffusion Coefficient $D_a$ [4] (m$^2$/h) | Atomic Volume for $D_l$ Calculation [5] (cm$^3$/mol) | Liquid Diffusion Coefficient $D_l$ [6] (m$^2$/h) | Schmidt Number $S_c$ [7] | Reynolds Number $R_e$ [7] | Sherwood Number $S_h$ [7] | Total Surface Area [8] (m$^2$) | Char. Length [9] (m) | $k_G$ [7] (m/h) | $k_L$ [7] (m/h) | $K_{OL}$ [7] (m/h) | Henry's Constant [10] | $K_{OG}$ [7] (m/h) | Emissions [7] (µg/hr) | Emissions (lb/hr) | Emissions (lb/yr) | VOC Emissions (lb/yr) | HAP Emissions (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | | | 58.08 | 0.5 | 500 | 3 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 66.86 | 3.70E-02 | 74 | 4.32E-06 | 1.5 | 5,288,426.5 | 1,759.4 | 248.07 | 15.75 | 4.13 | 6.22E-03 | 3.19E-03 | 1.59E-03 | 2.01E+00 | 3.96E+02 | 8.74E-07 | 0.01 | | | |
| Aroclor 1242 [1] | 53469-21-9 | X | X | 291.99 | 0.5 | 500 | 12 | 6 | 0 | 4 | 0 | 0 | 0 | 0 | 267.88 | 1.73E-02 | 271.2 | 2.01E-06 | 3.3 | 5,288,426.5 | 2,265.7 | 248.07 | 15.75 | 2.49 | 4.24E-03 | 3.93E-03 | 2.13E-02 | 1.84E-01 | 4.87E+02 | 1.07E-06 | 0.01 | 0.01 | 0.01 |
| Aroclor 1260 [1] | 11096-82-5 | X | X | 360.88 | 0.5 | 500 | 12 | 4 | 0 | 6 | 0 | 0 | 0 | 0 | 302.92 | 1.62E-02 | 307 | 1.87E-06 | 3.5 | 5,288,426.5 | 2,316.6 | 248.07 | 15.75 | 2.38 | 4.09E-03 | 4.05E-03 | 1.89E-01 | 2.15E-02 | 5.02E+02 | 1.11E-06 | 0.01 | 0.01 | 0.01 |
| 2,4-Dimethylphenol [1] | 105-67-9 | X | | 122.16 | 0.5 | 500 | 8 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 137.28 | 2.49E-02 | 147.8 | 2.87E-06 | 2.3 | 5,288,426.5 | 2,008.2 | 248.07 | 15.75 | 3.17 | 5.07E-03 | 3.60E-03 | 3.90E-03 | 9.22E-01 | 4.46E+02 | 9.83E-07 | 0.01 | 0.01 | |
| 4-Methylphenol [1] | 106-44-5 | X | X | 108.13 | 0.5 | 500 | 7 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 116.82 | 2.70E-02 | 125.6 | 3.16E-06 | 2.1 | 5,288,426.5 | 1,954.0 | 248.07 | 15.75 | 3.35 | 5.32E-03 | 7.08E-08 | 2.112E-08 | 3.35E+00 | 8.78E-03 | 1.94E-11 | 0.00 | 0.00 | 0.00 |
| Phenol [1] | 108-95-2 | X | X | 94.11 | 0.5 | 500 | 6 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 96.36 | 2.98E-02 | 103.4 | 3.55E-06 | 1.9 | 5,288,426.5 | 1,891.8 | 248.07 | 15.75 | 3.58 | 5.63E-03 | 5.77E-05 | 1.63E-05 | 3.54E+00 | 7.16E+00 | 1.58E-08 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **TOTALS** | **0.03** | **0.02** |

Notes:

1 Deduction of 20 and 15 applied for calculation of atomic diffusion volumes for air and liquid, respectively (deduction applied for a hexagonal ring)
2 Sample results provided by CWM Chemical Services, LLC
3 Method for calculating total diffusion volume for air taken from Fuller et al., 1966
4 Calculation method for gas diffusion coefficient referenced from *Chemical Engineering Design, Principles, Practice and Economics of Plant and Process Design* , 2008
5 Method for calculating total diffusion volume for water was taken from the LeBas Method, 1915
6 Calculation method for liquid diffusion coefficient referenced from *Water Treatment Principles and Design, Third Edition* , 2012
7 Parameter was calculated using method presented in paper: "Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools Under Simulated Indoor Environmental Conditions," December 2002 (wind speed of 11.8 mph assumed)
8 Total surface area of basin calculated as follows: 2,695 $ft^2$ = 248.07 $m^2$
9 Characteristic length calculated as the square root of the total surface area
10 Referenced materials provided on USEPA website and CHEMFATE provided by SRC

# Attachments

# Attachment 1
# Calculation of Fugitive PM-10 Emissions

**$PM_{10}$ CALCULATIONS**
**TRUCK AND WASTE SUMMARY**
**CWM CHEMICAL SERVICES, LLC**

## Truck and Waste Summary

| Vehicle Type | Code | Average Vehicle Weight (tons) Gross Weight | Empty Weight | Payload | Total Vehicles | Vehicle Route |
|---|---|---|---|---|---|---|
| Dump Truck | DT | 43.9 | 17.0 | 26.8 | 12,150 | Landfill |
| Rolloff Truck | CM | 33.4 | 21.1 | 12.2 | 6,051 | Landfill |
| Tanker Truck | TT | 30.8 | 17.4 | 13.4 | 132 | AWTS |
| Vacuum Tanker | VT | 31.3 | 15.9 | 15.4 | 8 | AWTS |
| Rolloff Truck | CM | 32.1 | 21.7 | 10.3 | 4,000 | Stabilization |
| Dump Truck | DT | 39.9 | 17.1 | 22.9 | 2,500 | Stabilization |
| Pneumatic Truck | PT | 33.8 | 17.0 | 16.8 | 88 | Stabilization |
| Tanker Truck | TT | 27.6 | 17.7 | 9.9 | 12 | Stabilization |
| Off-Road Truck | --- | 33.0 | 19.0 | 14.0 | 13,200 | Post-Stabilization [a] |
| Rolloff Truck | CM | 37.5 | 22.1 | 15.4 | 50 | Transship [b] |
| Dump Truck | DT | 38.8 | 16.8 | 22.0 | 4 | Transship [b] |
| Tanker Truck | TT | 25.5 | 17.8 | 7.7 | 34 | Transship [b] |
| Vacuum Tanker | VT | 20.4 | 17.5 | 2.9 | 4 | Transship [b] |
| Drum Truck | --- | 26.4 | 17.5 | 8.9 | 833 | Drum Building |
| Site Vehicles | --- | 2.5 | 2.5 | --- | 5,200 | AWTS |
| Delivery Trucks | --- | 5.0 | 5.0 | --- | 1,300 | AWTS |
| Personal Vehicles | --- | 1.5 | 1.5 | --- | 1,300 | AWTS |
| Personal Vehicles | --- | 1.5 | 1.5 | --- | 5,200 | Main Office |

* Based on CWM waste tracking data and non-waste vehicle estimates for the 12-month period of July 2006 - June 2007

Notes:
- a Assumes 2 loaded vehicles for each stabilization vehicle
- b Total # vehicles equals twice the actual amount of vehicles since each transship load requires 2 round trips

Total Bulk Waste = (12,150 veh)(26.8 tons/veh) + (6,051 veh)(12.2 tons/veh) + (4,000 veh)(10.3 tons/veh) + (2,500 veh)(22.9 tons/veh) + (88 veh)(16.8 tons/veh) + (12 veh)(9.9 tons/veh)

Total Bulk Waste = 499,999.2 tpy

Fractions

Dump Trucks = 383,287 tons / 499,999 tons = 0.767
Rolloff Trucks = 115,119 tons / 499,999 tons = 0.230
Pneumatic Trucks = 1,475 tons / 499,999 tons = 0.003
Tanker Trucks = 119 tons / 499,999 tons = 0.0002

Total Bulk Waste = 499,999.2 tpy

Waste Densities (according to CWM facility records):

| Truck | Density ($lb/ft^3$) |
|---|---|
| Dump | 96 |
| Rolloff | 81.5 |

Volume Calculations

$$Volume_{(dump)} = \frac{(0.767)(499{,}999\ tons)(1ft3)(2000\ lb)}{(1\ yr)(96\ lb)(1\ ton)} = 7.99E+06\ ft^3$$

$$Volume_{(rolloff)} = \frac{(0.230)(499{,}999\ tons)(1ft3)(2000\ lb)}{(1\ yr)(81.5\ lb)(1\ ton)} = 2.82E+06\ ft^3$$

$$Volume_{(pneumatic)} = \frac{(0.003)(499{,}999\ tons)(1ft3)(2000\ lb)}{(1\ yr)(81.5\ lb)(1\ ton)} = 3.62E+04\ ft^3$$

$$Volume_{(tanker)} = \frac{(0.0002)(499{,}999\ tons)(1ft3)(2000\ lb)}{(1\ yr)(81.5\ lb)(1\ ton)} = 2.92E+03\ ft^3$$

Total Volume = 1.08E+07 $ft^3$ = 4.02E+05 $yd^3$

# $PM_{10}$ CALCULATIONS
# LANDFILL OPERATIONS
# CWM CHEMICAL SERVICES, LLC

## Landfill Operation

### Waste Unloading

Batch Drop equation from AP-42, Section 13.2.4 (11/06):

$$E = k\,(0.0032)\,\frac{(u/5)^{1.3}}{(M/2)^{1.4}}$$

where:
E = emission factor (lb/ton)
k = 0.35 (for $PM_{10}$)
u = mean wind speed (mph) = 6.8 (2006 average wind speed - Model City, NY)
M = % moisture in clay/dirt mix = 14 (from AP-42, Table 13.2.4-1)

$$E = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(14/2)^{1.4}} = 1.089E\text{-}04 \text{ lb/ton}$$

| | | | |
|---|---|---|---|
| Total Waste Unloaded = | 522,499 | tons/year | (Includes stabilization materials) |
| Total Emissions = | 56.9 | lb/year | |
| Total Emissions (90% Control)[1] = | 5.69 | lb/year | |
| Total Emissions (90% Control)[1] = | 0.003 | tons/year | |

### Waste Compaction

Compaction by Bulldozing equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = \frac{(0.75)\,(1.0)\,(\text{silt}\%)^{1.5}}{(\text{moisture}\%)^{1.4}}$$

where: E = Emission rate of $PM_{10}$ in lb/hr

From Table 13.2.4-1 of AP-42 (11/06):

Clay/dirt mix:
Silt % = 9.2
Moisture % = 14

$$E = \frac{(0.75)\,(1.0)\,(9.2)^{1.5}}{(14)^{1.4}} = 0.520 \text{ lb/hr}$$

| | | |
|---|---|---|
| Total Operation hours / year = | 7272 | |
| Total Bulldozers Operating = | 2 | |
| Total Emissions = | 3.8 | tons/year |
| Total Emissions (90% Control)[1] = | 0.38 | tons/year |

Notes:
1 During disposal of identified dusty wastes, CWM Model City applies a water spray to minimize dust emissions. In addition, a dust suppressant material called Con-Cover is used to cover the waste on a daily basis. A 90% control efficiency, based on Figure 13.2.2-2 of AP-42, Section 13.2.2 (11/06), is used to account for the reduction in PM emissions due to these operational procedures which are required by the Facility's permit.

**$PM_{10}$ CALCULATIONS**
**LANDFILL CONSTRUCTION - RMU-2 LANDFILL**
**CWM CHEMICAL SERVICES, LLC**

**Landfill Construction**
Landfill Unit: RMU-2

**Material Requirements**

*Cell Construction*

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Clay | 213,000 | 181,157 |
| Coarse Stone | 189,000 | 273,011 |
| Soils | 676,000 | 666,198 |

Material Densities (Appendix A-9 of AP-40, Second Edition)

| Material | Density ($lb/ft^3$) |
|---|---|
| Clay | 63 |
| Coarse Stone | 107 |
| Soils | 73 |

*Facultative Pond 5 Construction*

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Clay | 26,110 | 22,207 |
| Coarse Stone | 2,500 | 3,611 |
| Soils | 90,990 | 89,671 |

Landfill Activity Span = 6 phases of cell construction
Facultative Pond 5 Activity Span = 1 phase of pond construction

Years 1-13: Cell Construction
Year 1: Facultative Pond 5 Construction
Years 5-20: Cover Construction

Total Landfill Life = 20 years

[Year 1 represents worst case scenario]

*Cell Construction Materials Usage per Phase* ***

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Clay | 35,500 | 30,193 |
| Coarse Stone | 31,500 | 45,502 |
| Soils | 112,667 | 111,033 |
| **Total** | **179,667** | **186,728** |

*Facultative Pond 5 Construction Materials Usage per Phase* ***

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Clay | 26,110 | 22,207 |
| Coarse Stone | 2,500 | 3,611 |
| Soils | 90,990 | 89,671 |
| **Total** | **119,600** | **115,488** |

*** No more than one phase of cell construction or Facultative Pond 5 construction is completed in one 12-month period

Truck nominal payload = 20 tons

$$\text{Trucks/year} = \frac{(186{,}728 \text{ tpy}) + (115{,}488 \text{ tpy})}{20 \text{ tons / truck}}$$

= 15,110.8 trucks/year
= 15,111 trucks/year
1,510 trucks/year of clay (RMU-2 construct
7,827 trucks/year of stone/soil (RMU-2 con
1,110 trucks/year of clay (FP5 construction
4,664 trucks/year of stone/soil (FP5 constr

*Cell Excavation*

Total Area = 44 acres
Depth of cell = 7.5 ft
Density = 73 $lb/ft^3$ (moist common earth)

$$\text{Volume} = \frac{(44 \text{ acres})(43{,}560 \text{ ft}^2)(7.5 \text{ ft})}{(1 \text{ acre})}$$

= 14,374,800 $ft^3$
= 2,395,800 $ft^3$/year
= 532,400 $yd^3$
= 88,733 $yd^3$/year

Weight (excavated material) = 524,680.2 tons (stockpiled locally)
Weight (excavated material) = 87,446.7 tons/year (stockpiled locally)

- Assume each truckload of excavated material weighs 20 tons

$$\text{Traffic} = \frac{(2{,}395{,}800 \text{ ft}^3)(73 \text{ lb})(1 \text{ truckload})}{(1 \text{ yr})(1 \text{ft}^3)(40{,}000 \text{ lb})} = 4{,}373 \text{ truckloads/yr (stockpiled locally)}$$

*Faculatative Pond 5 Excavation*

Total Area = 2.5 acres
Depth of pond = 7.5 ft
Density = 73 $lb/ft^3$ (moist common earth)

$$\text{Volume} = \frac{(2.5 \text{ acres})(43{,}560 \text{ ft}^2)(7.5 \text{ ft})}{(1 \text{ acre})}$$

= 816,750 $ft^3$
= 816,750 $ft^3$/year
= 30,250 $yd^3$
= 30,250 $yd^3$/year

Weight (excavated material) = 29,811.4 tons (stockpiled locally)
Weight (excavated material) = 29,811.4 tons/year (stockpiled locally)

- Assume each truckload of excavated material weighs 20 tons

$$\text{Traffic} = \frac{(816{,}750 \text{ ft}^3)(73 \text{ lb})(1 \text{ truckload})}{(1 \text{ yr})(1 \text{ft}^3)(40{,}000 \text{ lb})} = 1{,}491 \text{ truckloads/yr (stockpiled locally)}$$

**$PM_{10}$ CALCULATIONS**
**LANDFILL CONSTRUCTION - RMU-2 LANDFILL**
**CWM CHEMICAL SERVICES, LLC**

**Material Loading / Unloading Emissions**

Batch Drop equation from AP-42, Section 13.2.4 (11/06):

$$E = k\,(0.0032)\,\frac{(u/5)^{1.3}}{(M/2)^{1.4}}$$

where:

| | | | |
|---|---|---|---|
| E = | emission factor (lb/ton) | | |
| k = | 0.35 (for $PM_{10}$) | | |
| u = | mean wind speed (mph) = | 6.8 | (2006 average wind speed - Model City, NY) |
| $M_{clay}$ = | % moisture in clay = | 10 | (from AP-42, Table 13.2.4-1) |
| $M_{stone}$ = | % moisture in stone = | 0.7 | (from AP-42, Table 13.2.4-1) |
| $M_{topsoil/dirt}$ = | % moisture in topsoil/dirt mix = | 12 | (from AP-42, Table 13.2.4-1) |

$$E_{(clay)} = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(10/2)^{1.4}} = 1.744E\text{-}04 \text{ lb/ton}$$

$$E_{(stone)} = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(0.7/2)^{1.4}} = 7.217E\text{-}03 \text{ lb/ton}$$

$$E_{(topsoil/dirt)} = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(12/2)^{1.4}} = 1.351E\text{-}04 \text{ lb/ton}$$

*Summary - Cell Construction*

| Material | Usage/Year (tons) | EF (lb/ton) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 30,193 | 1.744E-04 | 5.3 |
| Coarse Stone | 45,502 | 7.217E-03 | 328.4 |
| Soils | 111,033 | 1.351E-04 | 15.0 |

*Summary - Facultative Pond 5 Construction*

| Material | Usage/Year (tons) | EF (lb/ton) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 22,207 | 1.744E-04 | 3.9 |
| Coarse Stone | 3,611 | 7.217E-03 | 26.1 |
| Soils | 89,671 | 1.351E-04 | 12.1 |

*Summary - Excavation*

| Material | Usage/Year (tons) | EF (lb/ton) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils (Total) | 117,258 | 1.351E-04 | 15.8 |

**$PM_{10}$ CALCULATIONS**
**LANDFILL CONSTRUCTION - RMU-2 LANDFILL**
**CWM CHEMICAL SERVICES, LLC**

**Bulldozing Emissions**

Compaction by Bulldozing equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = \frac{(0.75)\ (1.0)\ (silt\%)^{1.5}}{(moisture\%)^{1.4}}$$

where: E = Emission rate of $PM_{10}$ in lb/hr

From Table 13.2.4-1 of AP-42 (11/06):

| Clay: | | Stone: | |
|---|---|---|---|
| Silt % = | 6 | Silt % = | 1.6 |
| Moisture % = | 10 | Moisture % = | 0.7 |

Topsoil/Dirt:
Silt % = 9
Moisture % = 12

$$E_{(clay)} = \frac{(0.75)\ (1.0)\ (6)^{1.5}}{(10)^{1.4}} = 4.388E\text{-}01 \text{ lb/hr}$$

$$E_{(stone)} = \frac{(0.75)\ (1.0)\ (1.6)^{1.5}}{(0.7)^{1.4}} = 2.501E+00 \text{ lb/hr}$$

$$E_{(topsoil/dirt)} = \frac{(0.75)\ (1.0)\ (9)^{1.5}}{(12)^{1.4}} = 6.246E\text{-}01 \text{ lb/hr}$$

Total Construction hours / year = 1,404 (9 hours/day, 6 days/week, 26 weeks/year)
Total Bulldozers (Cell Construction) = 3
Total Bulldozers (Pond Construction) = 1

- Proportion total hours by fraction of each material to get $PM_{10}$ emissions for cell construction, cover construction, and excavation

Total Material = 186,728 tons + 115,448 tons + 87,447 tons + 29,811 tons = 419,474 tons

*Summary - Cell Construction*

| Material | Usage/Year (tons) | EF (lb/hr) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 30,193 | 4.388E-01 | 133.0 |
| Coarse Stone | 45,502 | 2.501E+00 | 1,142.7 |
| Soils | 111,033 | 2.501E+00 | 2,788.3 |

*Summary - Facultative Pond 5 Construction*

| Material | Usage/Year (tons) | EF (lb/hr) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 22,207 | 4.388E-01 | 32.6 |
| Coarse Stone | 3,611 | 2.501E+00 | 30.2 |
| Soils | 89,671 | 6.246E-01 | 187.4 |

*Summary - Excavation*

| Material | Usage/Year (tons) | EF (lb/hr) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils (Cell) | 87,447 | 6.246E-01 | 548.4 |
| Soils (Pond) | 29,811 | 6.246E-01 | 62.3 |

**$PM_{10}$ CALCULATIONS**
**LANDFILL CONSTRUCTION - RMU-2 LANDFILL**
**CWM CHEMICAL SERVICES, LLC**

**Grading Emissions**

Grading equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = (0.60)\ (0.51)\ (\text{veh speed})^2$$

Assume avg. grader speed = 7.39 mph (650 fpm)

E = 16.711 lb / VMT (independent of material being graded)

Assume equipment blades are 10 feet wide
Assume grading depth of 0.5 feet (6 inches)

1 cubic yard of material graded every 5.4 feet
1 VMT (grader) = 977.8 $yd^3$ of material graded

EF = 0.017 lb $PM_{10}$ / $yd^3$

*Summary - Cell Construction*

| Material | Usage/Year ($yd^3$) | EF (lb/$yd^3$) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 35,500 | 1.709E-02 | 606.7 |
| Coarse Stone | 31,500 | 1.709E-02 | 538.4 |
| Soils | 112,667 | 1.709E-02 | 1,925.6 |

*Summary - Facultative Pond 5 Construction*

| Material | Usage/Year ($yd^3$) | EF (lb/$yd^3$) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 26,110 | 1.709E-02 | 446.2 |
| Coarse Stone | 2,500 | 1.709E-02 | 42.7 |
| Soils | 90,990 | 1.709E-02 | 1,555.1 |

*Summary - Excavation*

| Material | Usage/Year ($yd^3$) | EF (lb/$yd^3$) | $PM_{10}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils (Total) | 118,983 | 1.709E-02 | 2,033.6 |

**$PM_{10}$ CALCULATIONS**
**PAVED / UNPAVED ROAD DUST**
**CWM CHEMICAL SERVICES, LLC**

**Paved / Unpaved Roads**

| Road Segment # | Vehicles on Segment | NO. OF VEHICLES [a] PER YEAR | AVERAGE FULL VEHICLE WEIGHT [b] (tons) | AVERAGE EMPTY VEHICLE WEIGHT [b] (tons) | ACTUAL MEAN VEHICLE WEIGHT [b] (tons) | MILES TRAVELED (c) (MILES) | SILT CONTENT [d] ($g/m^2$) | PM10 Emission Rate (lb/VMT) [e] | Uncontrolled PM10 (TPY) | Efficiency (%) [f] PM10 (TPY) | Controlled PM10 [g] (TPY) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PAVED** | | | | | | | | | | **PAVED** | |
| 1-24 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 7,838.8 | 7.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 60.3 | 7.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 2,842.5 | 7.4 | | | | |
| | Transship | 92 | 32.4 | 20.1 | 26.2 | 39.6 | 7.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 358.8 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 2,239.5 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 559.9 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 2,799.4 | 7.4 | | | | |
| | RMU-2 Stone/Soil | 7,827 | 36.8 | 16.8 | 26.8 | 3,370.8 | 7.4 | | | | |
| | FP5 Stone/Soil | 4,664 | 36.8 | 16.8 | 26.8 | 2,008.7 | 7.4 | | | | |
| Total/Average | | 51,357 | | | 21.5 | 22,118.5 | 7.4 | 0.311 | 3.437 | 90 | 0.34 |
| 2-24 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 7,039.1 | 7.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 54.1 | 7.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 2,552.5 | 7.4 | | | | |
| | Transship | 92 | 32.4 | 20.1 | 26.2 | 35.6 | 7.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 322.2 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 2,011.1 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 502.8 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 2,513.8 | 7.4 | | | | |
| | FP5 Stone/Soil | 4,664 | 36.8 | 16.8 | 26.8 | 1,803.8 | 7.4 | | | | |
| Total/Average | | 43,530 | | | 20.6 | 16,834.9 | 7.4 | 0.297 | 2.499 | 90 | 0.25 |
| 2-3 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 11,899.6 | 7.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 91.5 | 7.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 4,315.0 | 7.4 | | | | |
| | Transship | 92 | 32.4 | 20.1 | 26.2 | 60.1 | 7.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 544.6 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 3,399.7 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 849.9 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 849.9 | 7.4 | | | | |
| | FP5 Stone/Soil | 4,664 | 36.8 | 16.8 | 26.8 | 3,049.3 | 7.4 | | | | |
| Total/Average | | 38,330 | | | 23.1 | 25,059.8 | 7.4 | 0.335 | 4.197 | 90 | 0.42 |
| 8-24 | RMU-2 Stone/Soil | 7,827 | 36.8 | 16.8 | 26.8 | 2,273.9 | 7.4 | | | | |
| Total/Average | | 7,827 | | | 26.8 | 2,273.9 | 7.4 | 0.388 | 0.442 | 90 | 0.04 |
| 4-10 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 4,391.7 | 7.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 33.8 | 7.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 1,592.5 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 3,185.0 | 7.4 | | | | |
| | Transship | 92 | 32.4 | 20.1 | 26.2 | 22.2 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,254.7 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 313.7 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 313.7 | 7.4 | | | | |
| | FP5 Clay | 1,110 | 36.8 | 16.8 | 26.8 | 267.9 | 7.4 | | | | |
| Total/Average | | 47,143 | | | 23.7 | 11,375.1 | 7.4 | 0.343 | 1.951 | 90 | 0.20 |
| 5-6 | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 727.5 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 1,455.0 | 7.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 91.8 | 7.4 | | | | |
| Total/Average | | 20,633 | | | 26.3 | 2,274.3 | 7.4 | 0.382 | 0.434 | 90 | 0.04 |
| 6-7 | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 1,055.0 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 2,110.0 | 7.4 | | | | |
| Total/Average | | 19,800 | | | 26.5 | 3,165.0 | 7.4 | 0.385 | 0.609 | 90 | 0.06 |
| 8-25 | Drums | 833 | 26.4 | 17.5 | 22.0 | 491.3 | 7.4 | | | | |
| | RMU-2 Stone/Soil | 7,827 | 36.8 | 16.8 | 26.8 | 4,616.0 | 7.4 | | | | |
| Total/Average | | 8,660 | | | 26.3 | 5,107 | 7.4 | 0.382 | 0.974 | 90 | 0.10 |
| 6-25 | Drums | 833 | 26.4 | 17.5 | 22.0 | 137.9 | 7.4 | | | | |
| Total/Average | | 833 | | | 22.0 | 137.9 | 7.4 | 0.318 | 0.022 | 90 | 0.00 |
| 22-23 | Drums | 833 | 26.4 | 17.5 | 22.0 | 78.9 | 7.4 | | | | |
| Total/Average | | 833 | | | 22.0 | 78.9 | 7.4 | 0.318 | 0.013 | 90 | 0.00 |
| 14-25 | RMU-2 Stone/Soil | 7,827 | 36.8 | 16.8 | 26.8 | 2,410.3 | 7.4 | | | | |
| Total/Average | | 7,827 | | | 26.8 | 2,410 | 7.4 | 0.388 | 0.468 | 90 | 0.05 |
| 10-11 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 2,992.1 | 7.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 23.0 | 7.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 1,085.0 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 2,170.0 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 854.8 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 213.7 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 213.7 | 7.4 | | | | |
| | FP5 Clay | 1,110 | 36.8 | 16.8 | 26.8 | 182.5 | 7.4 | | | | |
| Total/Average | | 47,051 | | | 23.7 | 7,735.0 | 7.4 | 0.343 | 1.327 | 90 | 0.13 |
| 11-26 | AWTS | 140 | 30.8 | 17.3 | 24.0 | 33.2 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,233.0 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 308.3 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 308.3 | 7.4 | | | | |
| | FP5 Clay | 1,110 | 36.8 | 16.8 | 26.8 | 263.3 | 7.4 | | | | |
| Total/Average | | 9,050 | | | 6.0 | 2,146.0 | 7.4 | 0.085 | 0.091 | 90 | 0.01 |
| 12-26 | AWTS | 140 | 30.8 | 17.3 | 24.0 | 4.9 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 181.2 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 45.3 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 45.3 | 7.4 | | | | |
| Total/Average | | 7,940 | | | 3.1 | 276.7 | 7.4 | 0.043 | 0.006 | 90 | 0.00 |
| 19-26 | FP5 Clay | 1,110 | 36.8 | 16.8 | 26.8 | 179.6 | 7.4 | | | | |
| Total/Average | | 1,110 | | | 26.8 | 179.6 | 7.4 | 0.388 | 0.035 | 90 | 0.00 |
| 11-13 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 3,295.5 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 2,390.0 | 7.4 | | | | |
| Total/Average | | 31,401 | | | 28.0 | 5,685.5 | 7.4 | 0.407 | 1.156 | 90 | 0.12 |
| 13-14 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 4,715.7 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 3,420.0 | 7.4 | | | | |
| Total/Average | | 31,401 | | | 28.0 | 8,135.7 | 7.4 | 0.407 | 1.654 | 90 | 0.17 |
| 16-17 | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 407.1 | 7.4 | | | | |
| Total/Average | | 1,510 | | | 26.8 | 407.1 | 7.4 | 0.388 | 0.079 | 90 | 0.01 |
| 18-19 | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 576.4 | 7.4 | | | | |
| Total/Average | | 1,510 | | | 26.8 | 576.4 | 7.4 | 0.388 | 0.112 | 90 | 0.01 |
| | | | | | | | | | | **Total** | **1.95** |

**$PM_{10}$ CALCULATIONS**
**PAVED / UNPAVED ROAD DUST**
**CWM CHEMICAL SERVICES, LLC**

| Road Segment # | Vehicles on Segment | NO. OF VEHICLES [a] PER YEAR | AVERAGE FULL VEHICLE WEIGHT [b] (tons) | AVERAGE EMPTY VEHICLE WEIGHT [b] (tons) | ACTUAL MEAN VEHICLE WEIGHT [b] (tons) | MILES TRAVELED (c) (MILES) | SILT CONTENT [d] ($g/m^2$) | PM10 Emission Rate (lb/VMT) [e] | Uncontrolled PM10 (TPY) | Efficiency (%) [f] PM10 (TPY) | Controlled PM10 [g] (TPY) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **UNPAVED** | | | | | | | | | | **UNPAVED** | |
| 3-4 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 5,074.2 | 6.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 39.0 | 6.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 1,840.0 | 6.4 | | | | |
| | Transship | 92 | 32.4 | 20.1 | 26.2 | 25.6 | 6.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 232.2 | 6.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,449.7 | 6.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 362.4 | 6.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 362.4 | 6.4 | | | | |
| Total/Average | | 33,666 | | | 22.6 | 9,385.7 | 6.4 | 2.115 | 9.926 | 90 | 0.99 |
| | | | | | | | | | | | |
| 4-5 | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 1,740.0 | 6.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 3,480.0 | 6.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 219.6 | 6.4 | | | | |
| Total/Average | | 20,633 | | | 26.3 | 5,439.6 | 6.4 | 2.263 | 6.156 | 90 | 0.62 |
| | | | | | | | | | | | |
| 9-10 | Transship | 92 | 32.4 | 20.1 | 26.2 | 14.1 | 6.4 | | | | |
| Total/Average | | 92 | | | 26.2 | 14.1 | 6.4 | 2.261 | 0.016 | 90 | 0.00 |
| | | | | | | | | | | | |
| 14-16 | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 607.3 | 6.4 | | | | |
| Total/Average | | 1,510 | | | 26.8 | 607.3 | 6.4 | 2.280 | 0.692 | 90 | 0.07 |
| | | | | | | | | | | | |
| 17-18 | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 877.2 | 6.4 | | | | |
| Total/Average | | 1,510 | | | 26.8 | 877.2 | 6.4 | 2.280 | 1.000 | 90 | 0.10 |
| | | | | | | | | | | | |
| 19-20 | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 1,465.0 | 6.4 | | | | |
| | FP5 Clay | 1,110 | 36.8 | 16.8 | 26.8 | 1,077.5 | | | | | |
| Total/Average | | 2,620 | | | 26.8 | 2,543 | 6.4 | 2.280 | 2.899 | 90 | 0.29 |
| | | | | | | | | | | | |
| 8-22 | Drums | 833 | 26.4 | 17.5 | 22.0 | 220.9 | 6.4 | | | | |
| Total/Average | | 833 | | | 22.0 | 220.9 | 6.4 | 2.087 | 0.230 | 90 | 0.02 |
| | | | | | | | | | | | |
| 14-21 | RMU-2 Stone/Soil | 7,827 | 36.8 | 16.8 | 26.8 | 2,042.7 | 6.4 | | | | |
| | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 394.0 | 6.4 | | | | |
| | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 4,750.2 | 6.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 3,445.0 | 6.4 | | | | |
| Total/Average | | 40,737 | | | 27.7 | 10,631.8 | 6.4 | 2.316 | 12.312 | 90 | 1.23 |
| | | | | | | | | | | **Total** | **3.32** |

EQUATIONS:

A Fugitive emissions from paved site roads are based on emission factors from AP-42 Section 13.2.1.3 (Equation 1 for paved roads).
Constant 'k' (particle size multiplier) from AP-42 Table 13.2-1.1.

Calculations

$E\ (lb/VMT) = [k(sL)^{.91}(W)^{1.02}]$

$E(TPY) = E(lb/VMT)*(VMT/truck)*(truck/d)*(d/week)*(week/yr)/2000$

Variables/Constants

k = particle size multiplier (dimensionless)
K(PM10) = 0.0022 lb/VMT
W = Average weight of vehicle in tons
sL = silt loading sL = 7.4 $g/m^2$

B Fugitive emissions from trucks driving on unpaved surfaces, will use emission factor equation in AP-42 Section 13.2.2.4 (Equation 1a for unpaved roads)

Calculations

$E\ (lb/VMT) = [k(s/12)^a(W/3)^b]$

$E(TPY) = E(lb/VMT)*(VMT/truck)*(truck/yr)/2000$

Variables/Constants

k = particle size multiplier (dimensionless)
k(PM10) = 1.5 lb/VMT

a = Constant a(PM10) = 0.9
b = Constant b(PM10) = 0.45
s = silt content (%)
(measured or estimated - varies for different sources/materials - see below)

s = 6.4 %

NOTES:

a Number of vehicles information was provided by Site specific data which was supplied by the Site (July 2006 - June 2007)
b Vehicle weight information was provided by Site specific data which was supplied by the Site (July 2006 - June 2007)
c The round-trip distance traveled on the roads determined from analysis of CAD drawing of site (See Below)
d Silt content was referenced from Section 13.2.1 or 13.2.2 from AP-42.
e PM emissions were calculated using equations as shown above.
f Control efficiencies for paved and unpaved roads (and surfaces treated as unpaved roads) were referenced from Figure 13.2.2-2 of AP-42, Section 13.2.2 (11/06); water trucks are used at the Facility to control dust emissions from paved and unpaved roads, and are required by the Facility's permit.
g Controlled PM emissions were calculated by applying the control efficiency to the calculated PM-TPY value.

***Distances determined from AutoCAD analysis of Site Drawing***

| Segment | Length (ft) |
|---|---|
| 1-24 | 1137 |
| 2-24 | 1021 |
| 2-3 | 1726 |
| 8-24 | 767 |
| 4-10 | 637 |
| 5-6 | 291 |
| 6-7 | 422 |
| 8-25 | 1557 |
| 6-25 | 437 |
| 22-23 | 250 |
| 14-25 | 813 |
| 10-11 | 434 |
| 11-26 | 626 |
| 12-26 | 92 |
| 19-26 | 427 |
| 11-13 | 478 |
| 16-17 | 712 |
| 18-19 | 1008 |
| 3-4 | 736 |
| 4-5 | 696 |
| 9-10 | 405 |
| 14-16 | 1062 |
| 17-18 | 1534 |
| 19-20 | 2562 |
| 8-22 | 700 |
| 13-14 | 684 |
| 14-21 | 689 |

# $PM_{10}$ CALCULATIONS
# SILO LOADING / STABILIZATION BAGHOUSES
# CWM CHEMICAL SERVICES, LLC

**Cement Kiln Silo Loading**

- Cement Kiln Silo

Total Waste Stabilized at Facility = 150,000.0 tons/year

- Assume that 15% CKD is added to treat waste

CKD Consumption = 22,500.0 tons/year

* Section 11.12 of AP-42 (6/06) lists controlled emission factor for cement loading to elevated storage silo (pneumatic) as 0.00099 lb/ton loaded (Table 11.12-2)

** Assume that all particulate matter is $PM_{10}$ to be conservative

$PM_{10}$ emissions = 22.28 lb/year
$PM_{10}$ emissions = 0.011 TPY

**Lime Silo (AWTS Facility)**

From Facility Records:

2005 Lime Consumption = 110 tons
2006 Lime Consumption = 110 tons

* Section 11.17 of AP-42 (2/98) lists emission factor for lime loading (enclosed truck) as:
0.61 lb/ton (Table 11.17-4)

** Assume that all particulate matter is $PM_{10}$ to be conservative

$PM_{10}$ emissions = 67.10 lb/year
$PM_{10}$ emissions = 0.03 TPY

**Stabilization Baghouses**

- 2 stabilization baghouses in operation

- Facility records indicate that approximately 200 lb of particulates are removed from hoppers every 2 weeks

Collected PM = 5,200 lb/year

- Assume 99 percent capture efficiency in stabilization baghouse
- Assume that all particulate matter is $PM_{10}$

$PM_{10}$ Emissions = 52.5 lb/year (Controlled emissions)

Baghouse Flowrates:

| | | | Fraction of Total |
|---|---|---|---|
| Baghouse 1 = | 90,000 | cfm | 0.643 |
| Baghouse 2 = | 50,000 | cfm | 0.357 |

- Proportion emissions according to flowrate in each baghouse and adjust to 500,000 TPY

Baghouse #1 Emissions = 344.4 lb/year
Baghouse #1 Emissions = 0.17 tons/year
Baghouse #2 Emissions = 191.3 lb/year
Baghouse #2 Emissions = 0.10 tons/year

**$PM_{10}$ CALCULATIONS**
**LANDFILL TOTALS**
**CWM CHEMICAL SERVICES, LLC**

**Totals**

| *Process* | **$PM_{10}$ Emissions (lb/year)** | **$PM_{10}$ Emissions (TPY)** |
|---|---|---|
| *Landfill Operation* | | |
| Waste Unloading | 5.7 | 0.00 |
| Waste Compaction | 756.6 | 0.38 |
| Paved Roads | 3,901.0 | 1.95 |
| Unpaved Roads | 6,646.4 | 3.32 |
| **Totals** | **11,309.7** | **5.65** |
| *Landfill Construction (RMU-2)* | | |
| Material Loading/Unloading | 406.5 | 0.20 |
| Bulldozing/Compaction | 4,925.0 | 2.46 |
| Grading | 7,148.4 | 3.57 |
| **Totals** | **12,479.9** | **6.24** |
| *Silo Loading* | | |
| Cement Kiln Silo | 22.3 | 0.011 |
| Lime Silo (AWTS Facility) | 67.1 | 0.03 |
| **Totals** | **89.4** | **0.04** |
| *Stabilization Baghouses* | | |
| Baghouse # 1 | 344.4 | 0.17 |
| Baghouse # 2 | 191.3 | 0.10 |
| **Totals** | **535.8** | **0.27** |
| **Facility Totals** | **24,414.7** | **12.21** |

# Attachment 2
# Calculation of Fugitive PM2.5 Emissions

# $PM_{2.5}$ CALCULATIONS
# TRUCK AND WASTE SUMMARY
# CWM CHEMICAL SERVICES, LLC

**Truck and Waste Summary**

| Vehicle Type | Code | Average Vehicle Weight (tons) Gross Weight | Empty Weight | Payload | Total Vehicles | Vehicle Route |
|---|---|---|---|---|---|---|
| Dump Truck | DT | 43.9 | 17.0 | 26.8 | 12,150 | Landfill |
| Rolloff Truck | CM | 33.4 | 21.1 | 12.2 | 6,051 | Landfill |
| Tanker Truck | TT | 30.8 | 17.4 | 13.4 | 132 | AWTS |
| Vacuum Tanker | VT | 31.3 | 15.9 | 15.4 | 8 | AWTS |
| Rolloff Truck | CM | 32.1 | 21.7 | 10.3 | 4,000 | Stabilization |
| Dump Truck | DT | 39.9 | 17.1 | 22.9 | 2,500 | Stabilization |
| Pneumatic Truck | PT | 33.8 | 17.0 | 16.8 | 88 | Stabilization |
| Tanker Truck | TT | 27.6 | 17.7 | 9.9 | 12 | Stabilization |
| Off-Road Truck | --- | 33.0 | 19.0 | 14.0 | 13,200 | Post-Stabilization [a] |
| Rolloff Truck | CM | 37.5 | 22.1 | 15.4 | 50 | Transship [b] |
| Dump Truck | DT | 38.8 | 16.8 | 22.0 | 4 | Transship [b] |
| Tanker Truck | TT | 25.5 | 17.8 | 7.7 | 34 | Transship [b] |
| Vacuum Tanker | VT | 20.4 | 17.5 | 2.9 | 4 | Transship [b] |
| Drum Truck | --- | 26.4 | 17.5 | 8.9 | 833 | Drum Building |
| Site Vehicles | --- | 2.5 | 2.5 | --- | 5,200 | AWTS |
| Delivery Trucks | --- | 5.0 | 5.0 | --- | 1,300 | AWTS |
| Personal Vehicles | --- | 1.5 | 1.5 | --- | 1,300 | AWTS |
| Personal Vehicles | --- | 1.5 | 1.5 | --- | 5,200 | Main Office |

* Based on CWM waste tracking data and non-waste vehicle estimates for the 12-month period of July 2006 - June 2007

Notes:

a Assumes 2 loaded vehicles for each stabilization vehicle

b Total # vehicles equals twice the actual amount of vehicles since each transship load requires 2 round trips

Total Bulk Waste = (12,150 veh)(26.8 tons/veh) + (6,051 veh)(12.2 tons/veh) + (4,000 veh)(10.3 tons/veh) + (2,500 veh)(22.9 tons/veh) + (88 veh)(16.8 tons/veh) + (12 veh)(9.9 tons/veh)

Total Bulk Waste = 499,999.2 tpy

Fractions

Dump Trucks = 383,287 tons / 499,999 tons = 0.767

Rolloff Trucks = 115,119 tons / 499,999 tons = 0.230

Pneumatic Trucks = 1,475 tons / 499,999 tons = 0.003

Tanker Trucks = 119 tons / 499,999 tons = 0.0002

To be conservative, assume bulk waste increase of 0%

Total Bulk Waste = 499,999.2 tpy

Waste Densities (according to CWM facility records):

| Truck | Density ($lb/ft^3$) |
|---|---|
| Dump | 96 |
| Rolloff | 81.5 |

Volume Calculations

$$\text{Volume}_{(dump)} = \frac{(0.767)(499{,}999 \text{ tons})(1\text{ft3})(2000 \text{ lb})}{(1 \text{ yr})(96 \text{ lb})(1 \text{ ton})} = 7.99\text{E+06} \ ft^3$$

$$\text{Volume}_{(rolloff)} = \frac{(0.230)(499{,}999 \text{ tons})(1\text{ft3})(2000 \text{ lb})}{(1 \text{ yr})(81.5 \text{ lb})(1 \text{ ton})} = 2.82\text{E+06} \ ft^3$$

$$\text{Volume}_{(pneumatic)} = \frac{(0.003)(499{,}999 \text{ tons})(1\text{ft3})(2000 \text{ lb})}{(1 \text{ yr})(81.5 \text{ lb})(1 \text{ ton})} = 3.62\text{E+04} \ ft^3$$

$$\text{Volume}_{(tanker)} = \frac{(0.0002)(499{,}999 \text{ tons})(1\text{ft3})(2000 \text{ lb})}{(1 \text{ yr})(81.5 \text{ lb})(1 \text{ ton})} = 2.92\text{E+03} \ ft^3$$

Total Volume = 1.08E+07 $ft^3$ = 4.02E+05 $yd^3$

# $PM_{2.5}$ CALCULATIONS
# LANDFILL OPERATIONS
# CWM CHEMICAL SERVICES, LLC

## Landfill Operation

### Waste Unloading

Batch Drop equation from AP-42, Section 13.2.4 (11/06):

$$E = k\ (0.0032)\ \frac{(u / 5)^{1.3}}{(M / 2)^{1.4}}$$

where:
E = emission factor (lb/ton)
k = 0.053 (for $PM_{2.5}$)
u = mean wind speed (mph) = 6.8 (2006 average wind speed - Model City, NY)
M = % moisture in clay/dirt mix = 14 (from AP-42, Table 13.2.4-1)

$$E = k\ (0.0032)\ \frac{(6.8 / 5)^{1.3}}{(14 / 2)^{1.4}} = 1.649E\text{-}05 \text{ lb/ton}$$

| | | | |
|---|---|---|---|
| Total Waste Unloaded = | 522,499 | tons/year | (Includes stabilization materials) |
| Total Emissions = | 8.6 | lb/year | |
| Total Emissions (90% Control)[1] = | 0.86 | lb/year | |
| Total Emissions (90% Control)[1] = | 0.000 | tons/year | |

### Waste Compaction

Compaction by Bulldozing equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = \frac{(0.105)\ (5.7)\ (\text{silt}\%)^{1.2}}{(\text{moisture}\%)^{1.3}}$$

where: E = Emission rate of $PM_{2.5}$ in lb/hr

From Table 13.2.4-1 of AP-42 (11/06):

Clay/dirt mix:
Silt % = 9.2
Moisture % = 14

$$E = \frac{(0.105)\ (5.7)\ (9.2)^{1.2}}{(14)^{1.3}} = 0.278 \text{ lb/hr}$$

| | | |
|---|---|---|
| Total Operation hours / year = | 7272 | |
| Total Bulldozers Operating = | 2 | |
| Total Emissions = | 2.0 | tons/year |
| Total Emissions (90% Control)[1] = | 0.20 | tons/year |

Notes:
1 During disposal of identified dusty wastes, CWM Model City applies a water spray to minimize dust emissions. In addition, a dust suppressant material called Con-Cover is used to cover the waste on a daily basis. A 90% control efficiency, based on Figure 13.2.2-2 of AP-42, Section 13.2.2 (11/06), is used to account for the reduction in PM emissions due to these operational procedures which are required by the Facility's permit.

# $PM_{2.5}$ CALCULATIONS
# LANDFILL CONSTRUCTION - RMU-2 LANDFILL
# CWM CHEMICAL SERVICES

**Landfill Construction**
Landfill Unit: RMU-2

**Material Requirements**

*Cell Construction*

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Clay | 213,000 | 181,157 |
| Coarse Stone | 189,000 | 273,011 |
| Soils | 676,000 | 666,198 |

Material Densities (Appendix A-9 of AP-40, Second Edition)

| Material | Density ($lb/ft^3$) |
|---|---|
| Clay | 63 |
| Coarse Stone | 107 |
| Soils | 73 |

*Facultative Pond 5 Construction*

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Clay | 26,110 | 22,207 |
| Coarse Stone | 2,500 | 3,611 |
| Soils | 90,990 | 89,671 |

Landfill Activity Span = 6 phases of cell construction
Facultative Pond 5 Activity Span = 1 phase of cover construction

Years 1-13: Cell Construction
Year 1: Facultative Pond 5 Construction
Years 5-20: Cover Construction

Total Landfill Life = 20 years

[Year 1 represents worst case scenario]

*Cell Construction Materials Usage per Phase* ***

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Clay | 35,500 | 30,193 |
| Coarse Stone | 31,500 | 45,502 |
| Soils | 112,667 | 111,033 |
| **Total** | **179,667** | **186,728** |

*Facultative Pond 5 Construction Materials Usage per Phase* ***

| Material | Volume ($yd^3$) | Weight (tons) |
|---|---|---|
| Clay | 26,110 | 22,207 |
| Coarse Stone | 2,500 | 3,611 |
| Soils | 90,990 | 89,671 |
| **Total** | **119,600** | **115,488** |

*** No more than one phase of cell construction or Facultative Pond 5 construction is completed in one 12-month period

Truck nominal payload = 20 tons

$$\text{Trucks/year} = \frac{(186{,}728 \text{ tpy}) + (115{,}488 \text{ tpy})}{20 \text{ tons / truck}}$$

= 15,110.8 trucks/year
= 15,111 trucks/year
1,510 trucks/year of clay (RMU-2 construct
7,827 trucks/year of stone/soil (RMU-2 con
1,110 trucks/year of clay (FP5 construction
4,664 trucks/year of stone/soil (FP5 constru

*Cell Excavation*

Total Area = 44 acres
Depth of cell = 7.5 ft
Density = 73 $lb/ft^3$ (moist common earth)

$$\text{Volume} = \frac{(44 \text{ acres})(43{,}560 \text{ ft}^2)(7.5 \text{ ft})}{(1 \text{ acre})}$$

= 14,374,800 $ft^3$
= 2,395,800 $ft^3$/year
= 532,400 $yd^3$
= 88,733 $yd^3$/year

Weight (excavated material) = 524,680.2 tons (stockpiled locally)
Weight (excavated material) = 87,447 tons/year (stockpiled locally)

- Assume each truckload of excavated material weighs 20 tons

$$\text{Traffic} = \frac{(2{,}395{,}800 \text{ ft}^3)(73 \text{ lb})(1 \text{ truckload})}{(1 \text{ yr})(1 \text{ft}^3)(40{,}000 \text{ lb})}$$

= 4,373 truckloads/yr (stockpiled locally)

*Faculatative Pond 5 Excavation*

Total Area = 2.5 acres
Depth of pond = 7.5 ft
Density = 73 $lb/ft^3$ (moist common earth)

$$\text{Volume} = \frac{(2.5 \text{ acres})(43{,}560 \text{ ft}^2)(7.5 \text{ ft})}{(1 \text{ acre})}$$

= 816,750 $ft^3$
= 816,750 $ft^3$/year
= 30,250 $yd^3$
= 30,250 $yd^3$/year

Weight (excavated material) = 29,811.4 tons (stockpiled locally)
Weight (excavated material) = 29,811.4 tons/year (stockpiled locally)

- Assume each truckload of excavated material weighs 20 tons

$$\text{Traffic} = \frac{(816{,}750 \text{ ft}^3)(73 \text{ lb})(1 \text{ truckload})}{(1 \text{ yr})(1 \text{ft}^3)(40{,}000 \text{ lb})}$$

= 1,491 truckloads/yr (stockpiled locally)

# $PM_{2.5}$ CALCULATIONS
# LANDFILL CONSTRUCTION - RMU-2 LANDFILL
# CWM CHEMICAL SERVICES

**Material Loading / Unloading Emissions**

Batch Drop equation from AP-42, Section 13.2.4 (11/06):

$$E = k\,(0.0032)\,\frac{(u/5)^{1.3}}{(M/2)^{1.4}}$$

where:

| | | | |
|---|---|---|---|
| E = | emission factor (lb/ton) | | |
| k = | 0.053 (for $PM_{2.5}$) | | |
| u = | mean wind speed (mph) = | 6.8 | (2006 average wind speed - Model City, NY) |
| $M_{clay}$ = | % moisture in clay = | 10 | (from AP-42, Table 13.2.4-1) |
| $M_{stone}$ = | % moisture in stone = | 0.7 | (from AP-42, Table 13.2.4-1) |
| $M_{topsoil/dirt}$ = | % moisture in topsoil/dirt mix = | 12 | (from AP-42, Table 13.2.4-1) |

$$E_{(clay)} = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(10/2)^{1.4}} = 2.641E\text{-}05 \text{ lb/ton}$$

$$E_{(stone)} = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(0.7/2)^{1.4}} = 1.093E\text{-}03 \text{ lb/ton}$$

$$E_{(topsoil/dirt)} = k\,(0.0032)\,\frac{(6.8/5)^{1.3}}{(12/2)^{1.4}} = 2.046E\text{-}05 \text{ lb/ton}$$

*Summary - Cell Construction*

| Material | Usage/Year (tons) | EF (lb/ton) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 30,193 | 2.641E-05 | 0.8 |
| Coarse Stone | 45,502 | 1.093E-03 | 49.7 |
| Soils | 111,033 | 2.046E-05 | 2.3 |

*Summary - Facultative Pond 5 Construction*

| Material | Usage/Year (tons) | EF (lb/ton) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 22,207 | 2.641E-05 | 0.6 |
| Coarse Stone | 3,611 | 1.093E-03 | 3.9 |
| Soils | 89,671 | 2.046E-05 | 1.8 |

*Summary - Excavation*

| Material | Usage/Year (tons) | EF (lb/ton) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils (Total) | 117,258 | 2.046E-05 | 2.4 |

# $PM_{2.5}$ CALCULATIONS
# LANDFILL CONSTRUCTION - RMU-2 LANDFILL
# CWM CHEMICAL SERVICES

**Bulldozing Emissions**

Compaction by Bulldozing equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = \frac{(0.105)\ (5.7)\ (silt\%)^{1.2}}{(moisture\%)^{1.3}}$$

where: E = Emission rate of $PM_{10}$ in lb/hr

From Table 13.2.4-1 of AP-42 (11/06):

| Clay: | | Stone: | |
|---|---|---|---|
| Silt % = | 6 | Silt % = | 1.6 |
| Moisture % = | 10 | Moisture % = | 0.7 |

Topsoil/Dirt:

| | |
|---|---|
| Silt % = | 9 |
| Moisture % = | 12 |

$$E_{(clay)} = \frac{(0.105)\ (5.7)\ (6)^{1.2}}{(10)^{1.3}} = 2.575E\text{-}01 \text{ lb/hr}$$

$$E_{(stone)} = \frac{(0.105)\ (5.7)\ (1.6)^{1.2}}{(0.7)^{1.3}} = 1.673E+00 \text{ lb/hr}$$

$$E_{(topsoil/dirt)} = \frac{(0.105)\ (5.7)\ (9)^{1.2}}{(12)^{1.3}} = 3.305E\text{-}01 \text{ lb/hr}$$

| | | |
|---|---|---|
| Total Construction hours / year = | 1,404 | (9 hours/day, 6 days/week, 26 weeks/year) |
| Total Bulldozers (Cell Construction) = | 3 | |
| Total Bulldozers (Pond Construction) = | 1 | |

- Proportion total hours by fraction of each material to get $PM_{2.5}$ emissions for cell construction, cover construction, and excavation

Total Material = 186,728 tons + 115,448 tons + 87,447 tons + 29,811 tons = 419,474 tons

*Summary - Cell Construction*

| Material | Usage/Year (tons) | EF (lb/hr) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 30,193 | 2.575E-01 | 78.1 |
| Coarse Stone | 45,502 | 1.673E+00 | 764.2 |
| Soils | 111,033 | 1.673E+00 | 1,864.7 |

*Summary - Facultative Pond 5 Construction*

| Material | Usage/Year (tons) | EF (lb/hr) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 22,207 | 2.575E-01 | 19.1 |
| Coarse Stone | 3,611 | 1.673E+00 | 20.2 |
| Soils | 89,671 | 3.305E-01 | 99.2 |

*Summary - Excavation*

| Material | Usage/Year (tons) | EF (lb/hr) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils (Cell) | 87,447 | 3.305E-01 | 290.2 |
| Soils (Pond) | 29,811 | 3.305E-01 | 33.0 |

# $PM_{2.5}$ CALCULATIONS
# LANDFILL CONSTRUCTION - RMU-2 LANDFILL
# CWM CHEMICAL SERVICES

**Grading Emissions**

Grading equation from Table 11.9-1 of Supplement E of AP-42 Fourth Edition (7/98):

$$E = (0.031)\ (0.040)\ (\text{veh speed})^{2.5}$$

Assume avg. grader speed = 7.39 mph (650 fpm)

E = 0.184 lb / VMT (independent of material being graded)

Assume equipment blades are 10 feet wide
Assume grading depth of 0.5 feet (6 inches)

1 cubic yard of material graded every 5.4 feet
1 VMT (grader) = 977.8 $yd^3$ of material graded

EF = 0.0002 lb $PM_{2.5}$ / $yd^3$

*Summary - Cell Construction*

| Material | Usage/Year ($yd^3$) | EF (lb/$yd^3$) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 35,500 | 1.883E-04 | 6.7 |
| Coarse Stone | 31,500 | 1.883E-04 | 5.9 |
| Soils | 112,667 | 1.883E-04 | 21.2 |

*Summary - Cover Construction*

| Material | Usage/Year ($yd^3$) | EF (lb/$yd^3$) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Clay | 26,110 | 1.883E-04 | 4.9 |
| Coarse Stone | 2,500 | 1.883E-04 | 0.5 |
| Soils | 90,990 | 1.883E-04 | 17.1 |

*Summary - Excavation*

| Material | Usage/Year ($yd^3$) | EF (lb/$yd^3$) | $PM_{2.5}$ Emissions (lb/yr) |
|---|---|---|---|
| Soils (Total) | 118,983 | 1.883E-04 | 22.4 |

# $PM_{2.5}$ CALCULATIONS
# PAVED / UNPAVED ROAD DUST
# CWM CHEMICAL SERVICES, LLC

**Paved / Unpaved Roads**

| Road Segment # | Vehicles on Segment | NO. OF VEHICLES [a] PER YEAR | AVERAGE FULL VEHICLE WEIGHT [b] (tons) | AVERAGE EMPTY VEHICLE WEIGHT [b] (tons) | ACTUAL MEAN VEHICLE WEIGHT [b] (tons) | MILES TRAVELED (c) (MILES) | SILT CONTENT [d] ($g/m^2$) | PM2.5 Emission Rate (lb/VMT) [e] | Uncontrolled PM2.5 (TPY) | Efficiency (%) [f] PM2.5 (TPY) | Controlled PM2.5 [g] (TPY) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PAVED | | | | | | PAVED | |
| 1-24 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 7,838.8 | 7.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 60.3 | 7.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 2,842.5 | 7.4 | | | | |
| | Transship | 92 | 32.4 | 20.1 | 26.2 | 39.6 | 7.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 358.8 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 2,239.5 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 559.9 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 2,799.4 | 7.4 | | | | |
| | RMU-2 Stone/Soil | 7,827 | 36.8 | 16.8 | 26.8 | 3,370.8 | 7.4 | | | | |
| | FP5 Stone/Soil | 4,664 | 36.8 | 16.8 | 26.8 | 2,008.7 | 7.4 | | | | |
| Total/Average | | 51,357 | | | 21.5 | 22,118.5 | 7.4 | 0.076 | 0.844 | 40 | 0.51 |
| 2-24 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 7,039.1 | 7.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 54.1 | 7.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 2,552.5 | 7.4 | | | | |
| | Transship | 92 | 32.4 | 20.1 | 26.2 | 35.6 | 7.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 322.2 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 2,011.1 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 502.8 | 7.4 | | | | |
| | Personal Veh. | 6,500 | 1.5 | 1.5 | 1.5 | 2,513.8 | 7.4 | | | | |
| | FP5 Stone/Soil | 4,664 | 36.8 | 16.8 | 26.8 | 1,803.8 | 7.4 | | | | |
| Total/Average | | 43,530 | | | 20.6 | 16,834.9 | 7.4 | 0.073 | 0.613 | 40 | 0.37 |
| 2-3 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 11,899.6 | 7.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 91.5 | 7.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 4,315.0 | 7.4 | | | | |
| | Transship | 92 | 32.4 | 20.1 | 26.2 | 60.1 | 7.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 544.6 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 3,399.7 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 849.9 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 849.9 | 7.4 | | | | |
| | FP5 Stone/Soil | 4,664 | 36.8 | 16.8 | 26.8 | 3,049.3 | 7.4 | | | | |
| Total/Average | | 38,330 | | | 23.1 | 25,059.8 | 7.4 | 0.082 | 1.030 | 40 | 0.62 |
| 8-24 | RMU-2 Stone/Soil | 7,827 | 36.8 | 16.8 | 26.8 | 2,273.9 | 7.4 | | | | |
| Total/Average | | 7,827 | | | 26.8 | 2,273.9 | 7.4 | 0.095 | 0.108 | 40 | 0.07 |
| 4-10 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 4,391.7 | 7.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 33.8 | 7.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 1,592.5 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 3,185.0 | 7.4 | | | | |
| | Transship | 92 | 32.4 | 20.1 | 26.2 | 22.2 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,254.7 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 313.7 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 313.7 | 7.4 | | | | |
| | FP5 Clay | 1,110 | 36.8 | 16.8 | 26.8 | 267.9 | 7.4 | | | | |
| Total/Average | | 47,143 | | | 23.7 | 11,375.1 | 7.4 | 0.084 | 0.479 | 40 | 0.29 |
| 5-6 | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 727.5 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 1,455.0 | 7.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 91.8 | 7.4 | | | | |
| Total/Average | | 20,633 | | | 26.3 | 2,274.3 | 7.4 | 0.094 | 0.107 | 40 | 0.06 |
| 6-7 | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 1,055.0 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 2,110.0 | 7.4 | | | | |
| Total/Average | | 19,800 | | | 26.5 | 3,165.0 | 7.4 | 0.094 | 0.149 | 40 | 0.09 |
| 8-25 | Drums | 833 | 26.4 | 17.5 | 22.0 | 491.3 | 7.4 | | | | |
| | RMU-2 Stone/Soil | 7,827 | 36.8 | 16.8 | 26.8 | 4,616.0 | 7.4 | | | | |
| Total/Average | | 8,660 | | | 26.3 | 5,107.3 | 7.4 | 0.094 | 0.239 | 40 | 0.14 |
| 6-25 | Drums | 833 | 26.4 | 17.5 | 22.0 | 137.9 | 7.4 | | | | |
| Total/Average | | 833 | | | 22.0 | 137.9 | 7.4 | 0.078 | 0.005 | 40 | 0.00 |
| 22-23 | Drums | 833 | 26.4 | 17.5 | 22.0 | 78.9 | 7.4 | | | | |
| Total/Average | | 833 | | | 22.0 | 78.9 | 7.4 | 0.078 | 0.003 | 40 | 0.00 |
| 14-25 | RMU-2 Stone/Soil | 7,827 | 36.8 | 16.8 | 26.8 | 2,042.7 | 7.4 | | | | |
| Total/Average | | 7,827 | | | 26.8 | 2,043 | 7.4 | 0.095 | 0.097 | 40 | 0.06 |
| 10-11 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 2,992.1 | 7.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 23.0 | 7.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 1,085.0 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 2,170.0 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 854.8 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 213.7 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 213.7 | 7.4 | | | | |
| | FP5 Clay | 1,110 | 36.8 | 16.8 | 26.8 | 182.5 | 7.4 | | | | |
| Total/Average | | 47,051 | | | 23.7 | 7,735.0 | 7.4 | 0.084 | 0.326 | 40 | 0.20 |
| 11-26 | AWTS | 140 | 30.8 | 17.3 | 24.0 | 33.2 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,233.0 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 308.3 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 308.3 | 7.4 | | | | |
| | FP5 Clay | 1,110 | 36.8 | 16.8 | 26.8 | 263.3 | 7.4 | | | | |
| Total/Average | | 9,050 | | | 6.0 | 2,146.0 | 7.4 | 0.021 | 0.022 | 40 | 0.01 |
| 12-26 | AWTS | 140 | 30.8 | 17.3 | 24.0 | 4.9 | 7.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 181.2 | 7.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 45.3 | 7.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 45.3 | 7.4 | | | | |
| Total/Average | | 7,940 | | | 3.1 | 276.7 | 7.4 | 0.011 | 0.001 | 40 | 0.00 |
| 19-26 | FP5 Clay | 1,110 | 36.8 | 16.8 | 26.8 | 179.6 | 7.4 | | | | |
| Total/Average | | 1,110 | | | 26.8 | 179.6 | 7.4 | 0.095 | 0.009 | 40 | 0.01 |
| 11-13 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 3,295.5 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 2,390.0 | 7.4 | | | | |
| Total/Average | | 31,401 | | | 28.0 | 5,685.5 | 7.4 | 0.100 | 0.284 | 40 | 0.17 |
| 13-14 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 4,715.7 | 7.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 3,420.0 | 7.4 | | | | |
| Total/Average | | 31,401 | | | 28.0 | 8,135.7 | 7.4 | 0.100 | 0.406 | 40 | 0.24 |
| 16-17 | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 407.1 | 7.4 | | | | |
| Total/Average | | 1,510 | | | 26.8 | 407.1 | 7.4 | 0.095 | 0.019 | 40 | 0.01 |
| 18-19 | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 576.4 | 7.4 | | | | |
| Total/Average | | 1,510 | | | 26.8 | 576.4 | 7.4 | 0.095 | 0.027 | 40 | 0.02 |
| | | | | | | | | | | Total | 2.86 |

# $PM_{2.5}$ CALCULATIONS
# PAVED / UNPAVED ROAD DUST
# CWM CHEMICAL SERVICES, LLC

| Road Segment # | Vehicles on Segment | NO. OF VEHICLES[a] PER YEAR | AVERAGE FULL VEHICLE WEIGHT[b] (tons) | AVERAGE EMPTY VEHICLE WEIGHT[b] (tons) | ACTUAL MEAN VEHICLE WEIGHT[b] (tons) | MILES TRAVELED (c) (MILES) | SILT CONTENT[d] ($g/m^2$) | PM2.5 Emission Rate (lb/VMT) [e] | Uncontrolled PM2.5 (TPY) | Efficiency (%) [f] PM2.5 (TPY) | Controlled PM2.5[g] (TPY) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **UNPAVED** | | | | | | | | | | **UNPAVED** | |
| 3-4 | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 5,074.2 | 6.4 | | | | |
| | AWTS | 140 | 30.8 | 17.3 | 24.0 | 39.0 | 6.4 | | | | |
| | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 1,840.0 | 6.4 | | | | |
| | Transship | 92 | 32.4 | 20.1 | 26.2 | 25.6 | 6.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 232.2 | 6.4 | | | | |
| | Site Vehicles | 5,200 | 2.5 | 2.5 | 2.5 | 1,449.7 | 6.4 | | | | |
| | Delivery Trucks | 1,300 | 5.0 | 5.0 | 5.0 | 362.4 | 6.4 | | | | |
| | Personal Veh. | 1,300 | 1.5 | 1.5 | 1.5 | 362.4 | 6.4 | | | | |
| Total/Average | | 33,666 | | | 22.6 | 9,385.7 | 6.4 | 0.212 | 0.993 | 40 | 0.60 |
| 4-5 | Stabilization | 6,600 | 35.1 | 19.9 | 27.5 | 1,740.0 | 6.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 3,480.0 | 6.4 | | | | |
| | Drums | 833 | 26.4 | 17.5 | 22.0 | 219.6 | 6.4 | | | | |
| Total/Average | | 20,633 | | | 26.3 | 5,439.6 | 6.4 | 0.226 | 0.616 | 40 | 0.37 |
| 9-10 | Transship | 92 | 32.4 | 20.1 | 26.2 | 14.1 | 6.4 | | | | |
| Total/Average | | 92 | | | 26.2 | 14.1 | 6.4 | 0.226 | 0.002 | 40 | 0.00 |
| 14-16 | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 607.3 | 6.4 | | | | |
| Total/Average | | 1,510 | | | 26.8 | 607.3 | 6.4 | 0.228 | 0.069 | 40 | 0.04 |
| 17-18 | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 877.2 | 6.4 | | | | |
| Total/Average | | 1,510 | | | 26.8 | 877.2 | 6.4 | 0.228 | 0.100 | 40 | 0.06 |
| 19-20 | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 1,465.0 | 6.4 | | | | |
| | FP-5 Clay | 1,110 | 36.8 | 16.8 | 26.8 | 1,077.5 | | | | | |
| Total/Average | | 2,620 | | | 26.8 | 2,542.6 | 6.4 | 0.228 | 0.290 | 40 | 0.17 |
| 8-22 | Drums | 833 | 26.4 | 17.5 | 22.0 | 220.9 | 6.4 | | | | |
| Total/Average | | 833 | | | 22.0 | 220.9 | 6.4 | 0.209 | 0.023 | 40 | 0.01 |
| 14-21 | RMU-2 Stone/Soil | 7,827 | 36.8 | 16.8 | 26.8 | 2,042.7 | 6.4 | | | | |
| | RMU-2 Clay | 1,510 | 36.8 | 16.8 | 26.8 | 394.0 | 6.4 | | | | |
| | Landfill Disposal | 18,201 | 40.4 | 18.4 | 29.4 | 4,750.2 | 6.4 | | | | |
| | Post-Stabilization | 13,200 | 33.0 | 19.0 | 26.0 | 3,445.0 | 6.4 | | | | |
| Total/Average | | 40,737 | | | 27.7 | 10,631.8 | 6.4 | 0.232 | 1.231 | 40 | 0.74 |
| | | | | | | | | | | **Total** | **1.99** |

EQUATIONS:

A Fugitive emissions from paved site roads are based on emission factors from AP-42 Section 13.2.1.3 (Equation 1 for paved roads).
Constant 'k' (particle size multiplier) from AP-42 Table 13.2-1.1.

Calculations

$E\ (lb/VMT) = [k(sL)^{.91}(W)^{1.02}]$

$E(TPY) = E(lb/VMT)*(VMT/truck)*(truck/d)*(d/week)*(week/yr)/2000$

Variables/Constants

k = particle size multiplier (dimensionless)
K(PM2.5) = 0.00054 lb/VMT
W = Average weight of vehicle in tons
sL = silt loading sL = 7.4 $g/m^2$

B Fugitive emissions from trucks driving on unpaved surfaces, will use emission factor equation in AP-42 Section 13.2.2.4 (Equation 1a for unpaved roads)

Calculations

$E\ (lb/VMT) = [k(s/12)^{a}(W/3)^{b}]$

$E(TPY) = E(lb/VMT)*(VMT/truck)*(truck/yr)/2000$

Variables/Constants

k = particle size multiplier (dimensionless)
k(PM2.5) = 0.15 lb/VMT

a = Constant a(PM2.5) = 0.9
b = Constant b(PM2.5) = 0.45
s = silt content (%)
(measured or estimated - varies for different sources/materials - see below)
s = 6.4 %

Notes:

a Number of vehicles information was provided by Site specific data which was supplied by the Site (July 2006 - June 2007)
b Vehicle weight information was provided by Site specific data which was supplied by the Site (July 2006 - June 2007)
c The round-trip distance traveled on the roads determined from analysis of CAD drawing of site (See Below)
d Silt content was referenced from Section 13.2.1 or 13.2.2 from AP-42.
e PM emissions were calculated using equations as shown above.
f Control efficiencies for paved and unpaved roads (and surfaces treated as unpaved roads) were referenced from Figure 13.2.2-2 of AP-42, Section 13.2.2 (11/06); water trucks are used at the Facility to control dust emissions from paved and unpaved roads, and are required by the Facility's permit.
g Controlled PM emissions were calculated by applying the control efficiency to the calculated PM-TPY value.

***Distances determined from AutoCAD analysis of Site Drawing***

| Segment | Length (ft) |
|---|---|
| 1-24 | 1137 |
| 2-24 | 1021 |
| 2-3 | 1726 |
| 8-24 | 767 |
| 4-10 | 637 |
| 5-6 | 291 |
| 6-7 | 422 |
| 8-25 | 1557 |
| 6-25 | 437 |
| 22-23 | 250 |
| 14-25 | 813 |
| 10-11 | 434 |
| 11-26 | 626 |
| 12-26 | 92 |
| 19-26 | 427 |
| 11-13 | 478 |
| 16-17 | 712 |
| 18-19 | 1008 |
| 3-4 | 736 |
| 4-5 | 696 |
| 9-10 | 405 |
| 14-16 | 1062 |
| 17-18 | 1534 |
| 19-20 | 2562 |
| 8-22 | 700 |
| 13-14 | 684 |
| 14-21 | 689 |

# $PM_{2.5}$ CALCULATIONS
# SILO LOADING AND STABILIZATION BAGHOUSES
# CWM CHEMICAL SERVICES, LLC

**Cement Kiln Silo Loading**

- Cement Kiln Silo

Total Waste Stabilized at Facility = 150,000.0 tons/year

- Assume that 15% CKD is added to treat waste

CKD Consumption = 22,500.0 tons/year

* Section 11.12 of AP-42 (6/06) lists controlled emission factor for cement loading to elevated storage silo (pneumatic) as 0.00099 lb/ton loaded (Table 11.12-2)

** Assume that all particulate matter is $PM_{2.5}$ to be conservative

$PM_{2.5}$ emissions = 22.28 lb/year
$PM_{2.5}$ emissions = 0.011 TPY

**Lime Silo (AWTS Facility)**

From Facility Records:

2005 Lime Consumption = 110 tons
2006 Lime Consumption = 110 tons

* Section 11.17 of AP-42 (2/98) lists emission factor for lime loading (enclosed truck) as:
0.61 lb/ton (Table 11.17-4)

** Assume that all particulate matter is $PM_{2.5}$ to be conservative

$PM_{2.5}$ emissions = 67.10 lb/year
$PM_{2.5}$ emissions = 0.03 TPY

**Stabilization Baghouses**

- 2 stabilization baghouses in operation

- Facility records indicate that approximately 200 lb of particulates are removed from hoppers every 2 weeks

Collected PM = 5,200 lb/year

- Assume 99 percent capture efficiency in stabilization baghouse
** Assume that all particulate matter is $PM_{2.5}$ to be conservative

$PM_{2.5}$ Emissions = 52.5 lb/year (Controlled emissions)

Baghouse Flowrates:

| | | | Fraction of Total |
|---|---|---|---|
| Baghouse 1 = | 90,000 | cfm | 0.643 |
| Baghouse 2 = | 50,000 | cfm | 0.357 |

- Proportion emissions according to flowrate in each baghouse and adjust to 500,000 TPY

Baghouse #1 Emissions = 344.4 lb/year
Baghouse #1 Emissions = 0.17 tons/year
Baghouse #2 Emissions = 191.3 lb/year
Baghouse #2 Emissions = 0.10 tons/year

**$PM_{2.5}$ CALCULATIONS**
**LANDFILL TOTALS**
**CWM CHEMICAL SERVICES, LLC**

**Totals**

| *Process* | **$PM_{2.5}$ Emissions (lb/year)** | **$PM_{2.5}$ Emissions (TPY)** |
|---|---|---|
| *Landfill Operation* | | |
| Waste Unloading | 0.9 | 0.00 |
| Waste Compaction | 403.9 | 0.20 |
| Paved Roads | 5,724.1 | 2.86 |
| Unpaved Roads | 3,987.8 | 1.99 |
| **Totals** | **10,116.7** | **5.06** |
| *Landfill Construction (RMU-2)* | | |
| Material Loading/Unloading | 61.6 | 0.03 |
| Bulldozing/Compaction | 3,168.8 | 1.58 |
| Grading | 78.7 | 0.04 |
| **Totals** | **3,309.1** | **1.65** |
| *Silo Loading* | | |
| Cement Kiln Silo | 22.3 | 0.011 |
| Lime Silo (AWTS Facility) | 67.1 | 0.03 |
| **Totals** | **89.4** | **0.04** |
| *Stabilization Baghouses* | | |
| Baghouse # 1 | 344.4 | 0.17 |
| Baghouse # 2 | 191.3 | 0.10 |
| **Totals** | **535.8** | **0.27** |
| **Facility Totals** | **14,050.9** | **7.03** |

# Attachment 3

# USEPA Paper *"Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools under Simulated Indoor Environmental Conditions"*

*Ann. occup. Hyg.*, Vol. 47, No. 4, pp. 279–286, 2003
Published by Oxford University Press
DOI: 10.1093/annhyg/meg035

# Overall Mass Transfer Coefficient for Pollutant Emissions from Small Water Pools under Simulated Indoor Environmental Conditions

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Received 5 August 2002; in final form 20 December 2002

**Small chamber tests were conducted to experimentally determine the overall mass transfer coefficient for pollutant emissions from still aqueous solutions under simulated indoor (residential or occupational) environmental conditions. The tests covered six organic compounds with a Henry's constant range from $3.33 \times 10^{-7}$ to $3.67 \times 10^{-3}$ (atm m$^3$/mol). The estimated overall liquid phase mass transfer coefficients for still solutions varied from $1.8 \times 10^{-6}$ to $5.7 \times 10^{-3}$ m/h; the estimated liquid phase mass transfer coefficients were $9.7 \times 10^{-3}$ m/h for the reference compound (oxygen) and $5.00 \times 10^{-3}$ to $6.04 \times 10^{-3}$ m/h for the test compounds. An empirical model is proposed to estimate the overall mass transfer coefficient, which can be used to predict pollutant emissions from still aqueous solutions (e.g. pools and puddles) in indoor environments.**

*Keywords:* aqueous solution; emission; indoor environment; mass transfer coefficient; water

## INTRODUCTION

The overall mass transfer coefficient, also known as the total transfer velocity, is a key parameter in predicting the rate of pollutant emissions from aqueous solutions. It is well established that, based on the classic two-resistance theory, the emission rate can be estimated by equation (1) or, equivalently, equation (2) (Lyman *et al.*, 1990).

$$R = SK_{OL}(C_L - C_G/H) \quad (1)$$

$$R = SK_{OG}(C_L H - C_G) \quad (2)$$

where $R$ is the emission rate (μg/h), $S$ is the source area (m$^2$), $K_{OL}$ is the overall liquid phase mass transfer coefficient (m/h), $K_{OG}$ is the overall gas phase mass transfer coefficient (m/h), $C_L$ is the pollutant concentration in the liquid (μg/m$^3$), $C_G$ is the pollutant concentration in air (μg/m$^3$) and $H$ is the dimensionless Henry's constant $[(\mu g/m^3)_{air}/(\mu g/m^3)_{liquid}]$. The two overall mass transfer coefficients, $K_{OL}$ and $K_{OG}$, are defined by equations (3) and (4), respectively.

$$1/K_{OL} = (1/k_L) + (1/k_G H) \quad (3)$$

$$1/K_{OG} = (H/k_L) + (1/k_G) \quad (4)$$

where $k_L$ is the liquid phase mass transfer coefficient (m/h) and $k_G$ is the gas phase mass transfer coefficient (m/h). $K_{OL}$ and $K_{OG}$ are so closely related that one can regard them as the measurement of the same physical property on different scales, a case similar to weighing an object in kilograms and pounds. The conversion factor between $K_{OL}$ and $K_{OG}$ is the Henry's constant (equation 5).

$$K_{OL} = HK_{OG} \quad (5)$$

The difference between the phase mass transfer coefficient ($k_L$ or $k_G$) and the overall mass transfer coefficient ($K_{OL}$ or $K_{OG}$) is that the former considers the transfer velocity in a single phase (either liquid or

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Table 1. Selected properties of the test compounds at 25°C

| Compound | Formula | Molecular weight | Vapor pressure[a] (mmHg) | Henry's constant[b] | | $D_a$[c] ($m^2$/h) | $D_L$[d] ($m^2$/h) |
|---|---|---|---|---|---|---|---|
| | | | | (atm $m^3$/mol) | (dimensionless) | | |
| Chloroform | $CHCl_3$ | 119.4 | 198 | $3.67 \times 10^{-3}$ | $1.50 \times 10^{-1}$ | $3.28 \times 10^{-2}$ | $3.90 \times 10^{-6}$ |
| Butyl acetate | $CH_3COOC_4H_9$ | 116.2 | 11.6 | $2.81 \times 10^{-4}$ | $1.15 \times 10^{-2}$ | $2.61 \times 10^{-2}$ | $2.79 \times 10_{-6}$ |
| Ethyl acetate | $CH_3COOC_2H_5$ | 88.10 | 93.6 | $1.34 \times 10^{-4}$ | $5.48 \times 10^{-3}$ | $3.14 \times 10^{-2}$ | $3.45 \times 10^{-6}$ |
| 1-Butanol | $C_4H_9OH$ | 74.12 | 7.07 | $8.81 \times 10^{-6}$ | $3.60 \times 10^{-4}$ | $3.24 \times 10^{-2}$ | $3.54 \times 10^{-6}$ |
| 1-Propanol | $C_3H_7OH$ | 60.09 | 20.8 | $7.41 \times 10^{-6}$ | $3.03 \times 10^{-4}$ | $3.71 \times 10^{-2}$ | $4.08 \times 10^{-6}$ |
| Phenol | $C_6H_5OH$ | 94.11 | 0.53 | $3.33 \times 10^{-7}$ | $1.36 \times 10^{-5}$ | $3.07 \times 10^{-2}$ | $3.55 \times 10^{-6}$ |

[a]From Yaws (1994).
[b]From Howard and Meylan (1997).
[c]$D_a$ is diffusivity in air, calculated with the method of Fuller *et al.* (1966).
[d]$D_L$ is diffusivity in water, calculated with the method of Hayduk and Laudie (1974).

gas) while the latter considers both phases. In other words, the overall mass transfer coefficient represents the combined effects of $k_L$, $k_G$ and $H$.

Since Henry's constants are available in the literature for most compounds of interest, estimation of either overall mass transfer coefficient becomes the main issue for predicting pollutant emissions from aqueous solutions. Ways to estimate the phase mass transfer coefficients ($k_L$ and $k_G$) have been thoroughly studied in the ambient environment, in which the sources of interest include oceans, lakes, rivers and waste water treatment facilities. Excellent summaries on this subject are given by Lyman *et al.* (1990) and Schwarzenbach *et al.* (1993). For example, Southworth (1979) used equations (6) and (7) to calculate $k_L$ and $k_G$, respectively.

$$k_L = 23.51(V_{curr}^{0.969}/Z^{0.673})\sqrt{32/M} \quad (6)$$

$$k_G = 1137.5(V_{wind} + V_{curr})\sqrt{18/M} \quad (7)$$

where $k_G$ and $k_L$ are in cm/h, $V_{curr}$ is the river current velocity (m/s), $V_{wind}$ is the wind speed (m/s), $Z$ is the depth of water (m) and $M$ is the molecular weight of the chemical of interest (g/mol). The applicability of these ambient models to indoor environments is doubtful, however, because the conditions in the latter environments, occupational or residential, can be drastically different from those found outdoors. For instance, the velocity (or speed) of indoor air is usually much lower, typically 5–10 cm/s, and source areas are much smaller too. If the water is virtually still, equation (6) gives 0 for $k_L$.

In a comprehensive study on emissions from water use to indoor air (EPA, 2000), lumped overall mass transfer coefficients ($SK_{OL}$) were reported for washing machine, dishwasher, shower and bathtub. The absolute values of $k_G$ and $k_L$ were not determined, however.

This study concerns pollutant emissions from still aqueous solutions in the indoor environment. Examples of such emission sources include buckets of water-based hard surface cleaners used by janitors, water-based cleaners applied to horizontal surfaces and puddles of water-based insecticides applied to the floor. A more complex case is the emission of organic solvents from latex paint applied to a wall. The objective of this work was two-fold: (i) to experimentally determine the overall mass transfer coefficients for organic compounds with a wide range of Henry's constants under simulated indoor environmental conditions; (ii) to develop an empirical model to estimate the overall mass transfer coefficients for still aqueous solutions. The results of this work can be used to predict pollutant emissions from aqueous solutions in the forms of pools, puddles and films in residential and occupational environments.

## METHODS

Six test compounds were selected (Table 1). They cover a range of Henry's constant from $3.33 \times 10^{-7}$ to $3.67 \times 10^{-3}$ (atm $m^3$/mol) or $1.36 \times 10^{-5}$ to $1.50 \times 10^{-1}$ (dimensionless). Their dilute solutions, ranging from $3.99 \times 10^{-6}$ to $5.65 \times 10^{-3}$ mol/l, were prepared one day before the chamber tests by dissolving a known amount of pure compound in deionized water. Prior to the start of chamber tests, the concentration of the stock solution was analyzed by flash vaporization of the liquid onto Tenax sorbent tubes with subsequent analysis by gas chromatography–mass spectroscopy (GC/MS). The source containers were identical circular pools made from stainless steel. They had an inside diameter of 7.4 cm, an outside diameter (including the edges at the top) of 8.9 cm and a depth of 3.1 cm. The emissions tests were conducted in two identical 53 l stainless steel environmental chambers (Tichenor *et al.*, 1990) with a ventilation rate of 1 air change/h, a temperature of 23.5°C and a relative humidity of inlet air of 20%. Temperature was measured by thermocouples (model E49008U-00-04; Inotek Technologies) and relative humidity by humidity probes (model HHT-2WC-RP-TTB; HyCal Sensing Products). Controlled by small circulation fans, the air speeds in the chambers were measured with a calibrated hot-wire anemometer (1213 Indoor Climate

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Analyzer; Brüel & Kjær) at five locations, 1 cm over the pool. The two chambers differed only in air speeds: 12.6 ± 4.5 cm/s in chamber 1 and 21.6 ± 7.9 cm/s in chamber 2. Prior to a test, the source container was filled with test solution and then placed at the center of the chamber bottom. The test start time was recorded as the chamber door closed. Air samples were collected onto Tenax TA sorbent tubes (Supelco) with mass flow controllers and analyzed by GC with a mass selective detector (6890/5973; Hewlett Packard) equipped with a 30 m DB624 column (0.25 mm i.d. × 1.4 μm film thickness). Samples collected on the sorbents were introduced into the GC by a multitube thermal desorption unit (ATD 400; Perkin Elmer).

## RESULTS

### *Summary of test parameters*

A total of 14 chamber tests were conducted, including one duplicate in each chamber. The test conditions are summarized in Table 2.

### *Time–concentration profiles*

The time–concentration profiles were strongly affected by the Henry's constants. For chloroform, which has the largest Henry's constant among the test compounds, the two chambers had almost identical results, indicating that the emissions were limited by the liquid phase mass transfer. In addition, the emission rates decreased significantly over time due to exhaustion of the source (Fig. 1). For phenol, which has the smallest Henry's constant among the test compounds, the difference between the two chambers was significant, indicating that the emissions were limited by the gas phase mass transfer (Fig. 2). The time–concentration profiles for the remaining compounds were between these two extreme cases.

### *Estimation of the overall liquid phase mass transfer coefficient ($K_{OL}$)*

The overall liquid phase mass transfer coefficient ($K_{OL}$) was estimated by fitting the following mass balance model (equations 8–10) to the chamber concentration data with $K_{OL}$ being the only unknown parameter.

$$V(dC_G/dt) = SK_{OL}(C_L - C_G/H) - QC_G \quad (8)$$

$$dW_L/dt = -SK_{OL}(C_L - C_G/H) \quad (9)$$

$$C_L = W_L/[V_L - (r_w t/\rho_w)] \quad (10)$$

where $V$ is the chamber volume ($m^3$), $t$ is the time (h), $Q$ is the air exchange flow rate ($m^3$/h), $W_L$ is the amount of test compound in the liquid (μg), $V_L$ is the initial volume of liquid ($m^3$), $r_w$ is the water evaporation rate (g/h) and $\rho_w$ is the density of water ($g/m^3$). Data fitting software SCIENTIST (MicroMath Scientific Software, Salt Lake City, UT) was used for the non-linear regression, and the initial conditions were $t = 0$, $C_G = 0$ and $W_L = C_{L0} \times V_L$, where $C_{L0}$ is the initial concentration in the liquid. The estimated $K_{OL}$ values and their associated standard errors for the non-linear regression are given in the last column of Table 2.

## AN EMPIRICAL MODEL FOR ESTIMATING $K_{OL}$ AND $K_{OG}$

### *Approach*

In order to use equations (1) and (2) as predictive models, one must know how to estimate the overall mass transfer coefficient for a given compound. The objective here is to develop a parameter estimation method for pollutant emissions from still aqueous solutions under indoor environmental conditions. The proposed model calculates the overall mass transfer coefficient ($K_{OL}$ or $K_{OG}$) in three steps: (i) calculate the gas phase mass transfer coefficient ($k_G$) from the Sherwood number; (ii) calculate the liquid phase mass transfer coefficient ($k_L$) from that for a reference compound; (iii) calculate the overall mass transfer coefficient from equation (3) or (4). Details are discussed below.

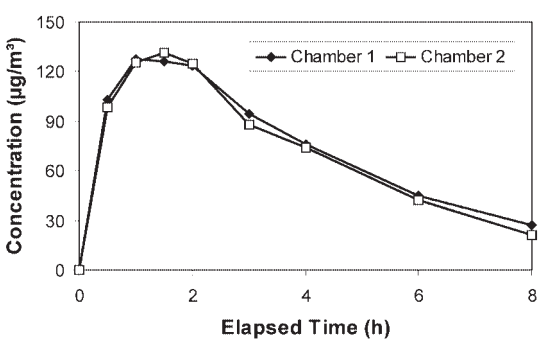



**Fig. 1.** Time–concentration profile for chloroform.

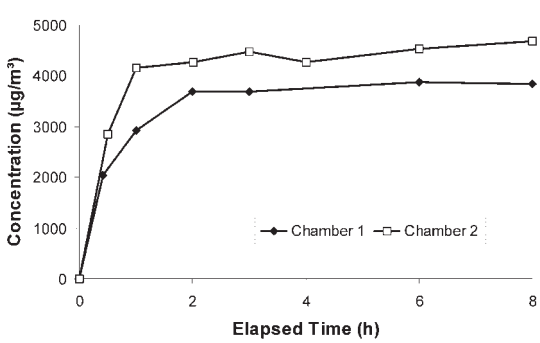



**Fig. 2.** Time–concentration profile for phenol.

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Table 2. Conditions of 14 chamber tests and estimated overall liquid phase mass transfer coefficients[a]

| Test no. | Chemical | Chamber ID[b] | Ach (per h) | $C_{L0}$ (mol/l) | $V_L$ (ml) | $T$ (°C) | RH (%) | | $r_w$ (g/h) | Estimated $K_{OL}$ (m/h) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Inlet | Outlet | | |
| 1 | Chloroform | 1 | 1.05 | $3.99 \times 10^{-6}$ | 98.3 | 23.3 ± 0.03 | 14.0 ± 0.10 | 62.0 ± 0.86 | 0.524 | $(5.68 \pm 0.47) \times 10^{-3}$ |
| 2 | Chloroform | 2 | 1.05 | $3.99 \times 10^{-6}$ | 98.1 | 23.5 ± 0.03 | 14.2 ± 0.12 | 69.7 ± 0.79 | 0.625 | $(5.60 \pm 0.52) \times 10^{-3}$ |
| 3 | Butyl acetate | 1 | 1.05 | $5.23 \times 10^{-5}$ | 96.7 | 23.4 ± 0.10 | 13.7 ± 0.13 | 60.3 ± 1.2 | 0.510 | $(5.17 \pm 0.27) \times 10^{-3}$ |
| 4 | Butyl acetate | 2 | 1.07 | $5.23 \times 10^{-5}$ | 97.4 | 23.5 ± 0.07 | 13.7 ± 0.09 | 69.8 ± 1.7 | 0.649 | $(5.00 \pm 0.26) \times 10^{-3}$ |
| 5 | Butyl acetate | 1 | 1.06 | $5.61 \times 10^{-5}$ | 95.8 | 23.3 ± 0.06 | 12.7 ± 0.13 | 57.8 ± 2.0 | 0.540 | $(4.02 \pm 0.26) \times 10^{-3}$ |
| 6 | Butyl acetate | 2 | 1.08 | $5.61 \times 10^{-5}$ | 99.5 | 23.5 ± 0.04 | 12.6 ± 0.15 | 68.8 ± 1.3 | 0.644 | $(4.41 \pm 0.29) \times 10^{-3}$ |
| 7 | Ethyl acetate | 1 | 1.05 | $7.54 \times 10^{-5}$ | 95.7 | 23.3 ± 0.03 | 14.0 ± 0.40 | 61.0 ± 0.89 | 0.555 | $(5.03 \pm 0.22) \times 10^{-3}$ |
| 8 | Ethyl acetate | 2 | 1.06 | $7.54 \times 10^{-5}$ | 98.6 | 23.5 ± 0.03 | 13.8 ± 0.25 | 69.4 ± 0.89 | 0.680 | $(5.28 \pm 0.26) \times 10^{-3}$ |
| 9 | 1-Butanol | 1 | 1.05 | $1.33 \times 10^{-3}$ | 92.6 | 23.4 ± 0.25 | 14.5 ± 0.17 | 58.8 ± 1/86 | 0.541 | $(1.44 \pm 0.06) \times 10^{-3}$ |
| 10 | 1-Butanol | 2 | 1.05 | $1.33 \times 10^{-3}$ | 96.3 | 23.6 ± 0.14 | 14.1 ± 0.15 | 71.3 ± 1.4 | 0.669 | $(1.52 \pm 0.10) \times 10^{-3}$ |
| 11 | 1-Propanol | 1 | 1.05 | $9.78 \times 10^{-3}$ | 101 | 23.3 ± 0.03 | 13.6 ± 0.15 | 59.6 ± 1.15 | 0.555 | $(1.33 \pm 0.05) \times 10^{-3}$ |
| 12 | 1-Propanol | 2 | 1.06 | $9.78 \times 10–^{3}$ | 98.0 | 23.5 ± 0.03 | 13.5 ± 0.10 | 69.0 ± 2.5 | 0.660 | $(1.85 \pm 0.09) \times 10^{-3}$ |
| 13 | Phenol | 1 | 1.05 | $5.65 \times 10–^{3}$ | 93.1 | 23.6 ± 0.30 | 14.7 ± 0.16 | 59.8 ± 1.94 | 0.565 | $(1.80 \pm 0.06) \times 10^{-4}$ |
| 14 | Phenol | 2 | 1.05 | $5.65 \times 10–^{3}$ | 93.3 | 23.7 ± 0.15 | 14.7 ± 0.19 | 69.4 ± 2.4 | 0.634 | $(2.68 \pm 0.11) \times 10^{-4}$ |

Ach, air exchange rate; $C_{L0}$, initial concentration in liquid; $V_L$, initial volume of liquid; $T$, temperature; RH, relative humidity; $r_w$, water evaporation rate.
[a]The test duration was 4 h for tests 3 and 4 and 8 h for the rest.
[b]The air speed was 12.6 ± 4.5 cm/s in chamber 1 and 21.6 ± 7.9 cm/s in chamber 2.

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*Estimation of gas phase mass transfer coefficient ($k_G$)*

Several methods have been developed to estimate the gas phase mass transfer coefficient in indoor environments. A brief review of these methods is given by Guo (2002). The method used here is based on the Sherwood number ($S_h$), which is a dimensionless number related to $k_G$ (equation 11) and can be correlated to Schmidt and Reynolds numbers ($S_c$ and $R_e$). A series of correlations have been developed between $S_h$, $S_c$ and $R_e$ (Bennet and Myers, 1982; White, 1988). For example, equation (12) applies to laminar flow conditions and is often used for indoor environments.

$$S_h = (k_G L)/D_a \quad (11)$$

where $L$ is the characteristic length (m), calculated from the square root of the source area, and $D_a$ is the diffusivity in air ($m^2$/h).

$$S_h = 0.664 S_c^{1/3} R_e^{1/2} \quad (12)$$

where $S_c$ and $R_e$ are defined by equations (13) and (14), respectively.

$$S_c = \mu/(\rho D_a) \quad (13)$$

$$R_e = (Lu\rho)/\mu \quad (14)$$

where $u$ is the air velocity (m/h), $\rho$ is the density of air ($g/m^3$) and $\mu$ is the viscosity of air (g/m/h). The accuracy of this method was evaluated by using the water evaporation data from the 14 chamber tests (column 10 in Table 2). The $k_G$ values for water evaporation were estimated from equation (15).

$$r_w = S k_G (C_{sw} - C_w) \quad (15)$$

where $r_w$ is the experimental water evaporation rate (g/h), $C_{sw}$ is the saturation concentration for water vapor at chamber temperature, converted from vapor pressure ($g/m^3$), and $C_w$ is the experimental water vapor concentration in the chamber, converted from relative humidity ($g/m^3$). As shown in Table 3, the calculated gas phase mass transfer coefficients agreed well with the experimental results.

*Estimation of liquid phase mass transfer coefficient ($k_L$)*

With the overall liquid phase mass transfer coefficient ($K_{OL}$) presented in Table 2, the gas phase mass transfer coefficient ($k_G$) calculated from the Sherwood number and Henry's constant ($H$) from Table 1, the liquid phase mass transfer coefficients ($k_L$) can be calculated from equation (3). This direct calculation approach worked well for compounds with dimensionless Henry's constants $>10^{-3}$. With smaller Henry's constants, however, the calculation failed (see column 4 in Table 4) due to error propagation: the calculation involves subtraction between two large numbers to yield a small number.

The authors then used a different method to estimate $k_L$. It has been reported that $k_L$ is proportional to

Table 3. Experimental and calculated gas phase mass transfer coefficients ($k_G$ ) for water evaporation from small pools

| Chamber | $k_G$ (m/h) | | Relative error (%) |
|---|---|---|---|
| | Experimental | Calculated (equation 11) | |
| 1 | 14.2 ± 0.92 ($n$ = 7) | 16.8 | 17 |
| 2 | 22.3 ± 0.88 ($n$ = 7) | 22.0 | –1.3 |

Table 4. Estimated liquid phase mass transfer coefficient ($k_L$) from experimental $K_{OL}$

| Test no. | Compound | Chamber | Estimated $k_L$ (m/h) | |
|---|---|---|---|---|
| | | | Direct from equation (3) | From equation (18) |
| 1 | Chloroform | 1 | $5.71 \times 10^{-3}$ | $5.91 \times 10^{-3}$ |
| 2 | Chloroform | 2 | $5.62 \times 10^{-3}$ | $5.91 \times 10^{-3}$ |
| 3 | Butyl acetate | 1 | $5.52 \times 10^{-3}$ | $5.00 \times 10^{-3}$ |
| 4 | Butyl acetate | 2 | $5.84 \times 10^{-3}$ | $5.00 \times 10^{-3}$ |
| 5 | Butyl acetate | 1 | $4.23 \times 10^{-3}$ | $5.00 \times 10^{-3}$ |
| 6 | Butyl acetate | 2 | $4.60 \times 10^{-3}$ | $5.00 \times 10^{-3}$ |
| 7 | Ethyl acetate | 1 | $5.68 \times 10^{-3}$ | $5.55 \times 10^{-3}$ |
| 8 | Ethyl acetate | 2 | $6.42 \times 10^{-3}$ | $5.55 \times 10^{-3}$ |
| 9 | 1-Butanol | 1 | $2.80 \times 10^{-3}$ | $5.63 \times 10^{-3}$ |
| 10 | 1-Butanol | 2 | $2.49 \times 10^{-3}$ | $5.63 \times 10^{-3}$ |
| 11 | 1-Propanol | 1 | $2.60 \times 10^{-3}$ | $6.04 \times 10^{-3}$ |
| 12 | 1-Propanol | 2 | $3.83 \times 10^{-3}$ | $6.04 \times 10^{-3}$ |
| 13 | Phenol | 1 | $-2.71 \times 10^{-4}$ | $5.63 \times 10^{-3}$ |
| 14 | Phenol | 2 | $-3.00 \times 10^{-4}$ | $5.63 \times 10^{-3}$ |

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the square root of the molecular diffusivity in water (Mackay and Yeun, 1983). Since the diffusivity can be readily calculated by existing methods (Hayduk and Laudie, 1974), the problem is reduced to selecting a reference compound and estimating its $k_L$. The liquid phase mass transfer coefficient for a given compound X can then be calculated from equation (16), in which oxygen was chosen as the reference compound. It should be pointed out that any compound can serve as the reference. The only reason to select oxygen here is for comparison with the literature values.

$$k_L(X) = k_L(O_2)\sqrt{\frac{D_L(X)}{D_L(O_2)}} \quad (16)$$

Substituting equation (16) into equation (3) yields:

$$k_L(O_2) = \frac{k_G H K_{OL}}{k_G H - K_{OL}}\sqrt{\frac{D_L(O_2)}{D_L(X)}} \quad (17)$$

A single value of $k_L(O_2)$ was estimated by applying equation (17) to the 14 experimental $K_{OL}$ values (Table 2). Other input data included $H$ and $D_L(X)$ from Table 1, $k_G$ from the Sherwood number and $D_L(O_2) = 1.07 \times 10^{-5}$ m$^2$/h at 23.5°C from the Hayduk and Laudie (1974) method. The non-linear regression yielded a $k_L(O_2)$ value of $(9.78 \pm 0.36) \times 10^{-3}$ m/h. This value is fairly close to the literature value of 0.0144 m/h for ambient water bodies suggested by Schwarzenbach *et al.* (1993). This agreement suggests that the area of the source does not affect $k_L$ if the water is still.

Substituting the values for $k_L(O_2)$ and $D_L(O_2)$ into equation (16) gives:

$$k_L(X) = 2.99\sqrt{D_L(X)} \quad (18)$$

where $k_L(X)$ and $D_L(X)$ are in m/h and m$^2$/h, respectively. Equation (18) can be used to estimate $k_L$ for any chemical emissions from still water. The estimated $k_L$ values for the test compounds are presented in the last column of Table 4.

*Calculation of $K_{OL}$*

Using $k_G$ from the Sherwood number and $k_L$ from equation (18), one can calculate $K_{OL}$ from equation (3). Figure 3 compares the calculated $K_{OL}$ with the experimental values. On average, the relative predictive error was 22.1%. In general, compounds with smaller Henry's constants tend to have greater relative errors. A complete example of estimating $K_{OL}$ is provided in the Appendix.

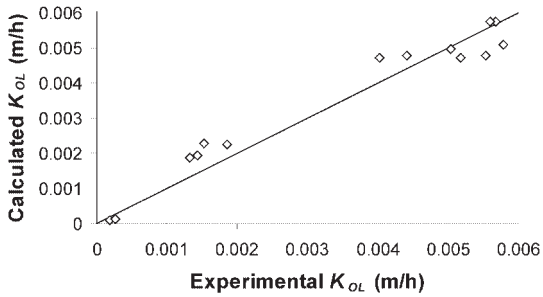



**Fig. 3.** Comparison between experimental and calculated overall liquid phase mass transfer coefficients. The solid line represents linearity.

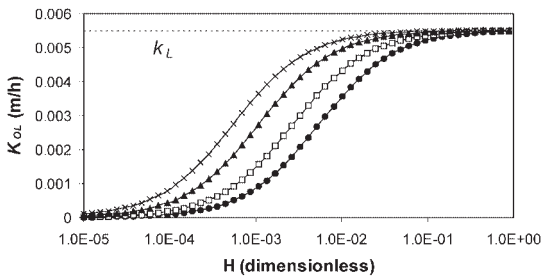



**Fig. 4.** Overall liquid phase mass transfer coefficient ($K_{OL}$) as a function of Henry's constant ($H$) and gas phase mass transfer coefficient ($k_G$). The curves from left to right are for $k_G$ = 1, 2, 5 and 10 m/h, respectively.

## DISCUSSION

Independent estimation of $k_G$ and $k_L$ allows one to study the effect of the Henry's constant on the overall mass transfer coefficient by using equation (3) or (4). Figure 4 shows $K_{OL}$ as a function of $H$ and $k_G$, assuming that the diffusivity in water is $3.6 \times 10^{-6}$ m$^2$/h, which is roughly the average for the test compounds. When the Henry's constant becomes large, all curves converge to a single value of $k_L$. The curves do not converge to a single value, however, when the Henry's constant becomes very small. Assuming that the gas phase mass transfer coefficient typically varies from 1 to 10 m/h in indoor environments, the $k_G/k_L$ ratio for still aqueous solutions would be in the range 180–1800. These values are significantly higher than the reported values (54–78) for a bathtub with a simulated person present (EPA, 2000).

As a practical matter, researchers often want to know under what conditions $K_{OL}$ can be approximated by either $k_L$ or $k_G$. There have been many discussions on this matter for the ambient environment (e.g. Munz and Roberts, 1989). In general, it depends on whether the gas or liquid phase mass transfer resistance is dominant in the overall mass transfer resistance ($1/K_{OL}$ or $1/K_{OL}$). Using the results of this work, Fig. 5 illustrates the contribution of the gas phase mass transfer resistance $1/(Hk_G)$ to $1/K_{OL}$

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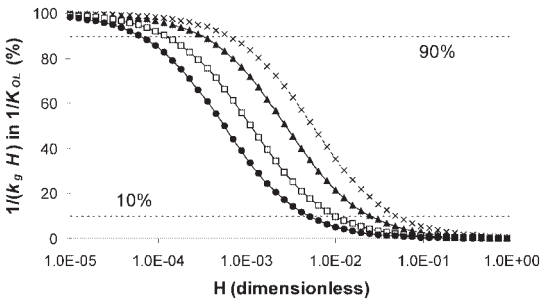



**Fig. 5.** Contribution of the gas phase mass transfer resistance $[1/(k_G H)]$ to the overall mass transfer resistance $(1/K_{OL})$. The curves from left to right are for $k_G$ = 10, 5, 2 and 1 m/h, respectively.

as a function of $H$ and $k_G$. For still water under indoor environmental conditions, the authors suggest that $K_{OL}$ be approximated by $k_L$ when $H > 10^{-1}$ and by $k_G$ when $H < 10^{-4}$, where $H$ is dimensionless.

Previous studies (for example, Schwarzenbach *et al.*, 1993) indicate that the depth of the water pool affects the liquid phase mass transfer coefficient. Thus, the applicability of equation (18) to liquid puddles and films is yet to be further evaluated. On the other hand, according to Schwarzenbach *et al.* (1993), the values of $k_L$ for still water imply a 'stagnant water film' of no greater than 200 μm. We therefore speculate that equation (18) can be applied to liquid puddles and films with a depth >200 μm.

## CONCLUSION

The emissions of six volatile organic compounds from pools of dilute aqueous solutions were tested under simulated indoor environmental conditions. These compounds cover a range of Henry's constant from $3.33 \times 10^{-7}$ to $3.67 \times 10^{-3}$ atm m$^3$/mol. The experimentally determined overall liquid phase mass transfer coefficient ($K_{OL}$) ranged from $2.68 \times 10^{-4}$ to $5.68 \times 10^{-3}$ m/h. Using these values, the liquid phase mass transfer coefficient ($k_L$) for still water was estimated to be $(9.78 \pm 0.36) \times 10^{-3}$ m/h for the reference compound ($O_2$). An empirical model was proposed to estimate $K_{OL}$ and $K_{OG}$ based on equations (3) and (4), respectively, with $k_L$ calculated from equation (18) and $k_G$ from the Sherwood number (equation 11). With this empirical model, one can use equations (1) and (2) as genuine predictive models for pollutant emissions from still aqueous solutions in indoor environments.

## APPENDIX. AN EXAMPLE OF USING THE PROPOSED EMPIRICAL MODEL

*Problem*

Estimate the overall liquid phase mass transfer coefficient ($K_{OL}$) for 1-hexanal emissions from a water pool, given the following parameters: molecular formula, $C_6H_{12}O$; Henry's constant, 0.0105 (dimensionless); pool diameter, 0.20 m; air speed in room, 15 cm/s (540 m/h); air and liquid temperature, 25°C. Additional parameters needed for the calculation are summarized in Table A1. All the values are at 25°C.

Step 1: Calculate Schmidt number using equation (13)

$$S_c = \mu/(\rho D_a) = 66.8/(1180 \times 0.0270) = 2.097$$

Step 2: Calculate Reynolds number using equation (14)

$$R_e = (Lu\rho)/\mu = (0.447 \times 540 \times 1180)/66.8 = 4264$$

Step 3: Calculate Sherwood number using equation (12)

$$S_h = 0.664 S_c^{1/3} R_e^{1/2} = 0.664 \times 2.097^{1/3} \times 4262^{1/2} = 55.5$$

Step 4: Calculate $k_G$ using equation (11)

$$k_G = (S_h D_a)/L = (55.5 \times 0.0270)/0.447 = 3.35 \text{ (m/h)}$$

Step 5: Calculate $k_L$ using equation (16)

$$k_L(Hx) = 2.99\sqrt{D_L(Hx)}$$

$$k_L(Hx) = 2.99\sqrt{2.96 \times 10^{-6}} = 5.14 \times 10^{-3} \text{ m/h}$$

Step 6: Calculate $K_{OL}$

Rearranging equation (3) yields

Table A1. Additional parameters needed to calculate $K_{OL}$ for 1-hexanal

| Parameter | Symbol | Value | Data source or method |
|---|---|---|---|
| Density of air | ρ | 1180 g/m$^3$ | Literature |
| Viscosity of air | μ | 66.8 g/h/m | Literature |
| Characteristic length of the pool | $L$ | 0.447 m | Square root of source area |
| Diffusivity in air for 1-hexanal | $D_a(Hx)$ | $2.70 \times 10^{-2}$ m$^2$/h | FSG method[a] |
| Diffusivity in water for 1-hexanal | $D_L(Hx)$ | $2.78 \times 10^{-6}$ m$^2$/h | Hayduk & Laudie method[b] |

[a]Fuller *et al.* (1966).
[b]Hayduk and Laudie (1974).

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$$K_{OL} = (k_L k_G H)/(k_L + k_G H)$$

$$K_{OL} = \frac{5.14 \times 10^{-3} \times 3.35 \times 0.0105}{5.14 \times 10^{-3} + 3.35 \times 0.0105} = 4.48 \times 10^{-3}\ \text{m/h}$$

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# Attachment 4
# Historical Sampling Results for RMU-1 Leachate

| | | 1208078-01 | 1202062-01 | 1107076-01 | 1102051-01 | 1007059-01 | 1002080-01 | 0907120-01 | 0902088-01 | 0807173-01 | 0802071-01 | 0707061-01 | 0702073-01 | 0607077-01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 08/22/12 | 02/14/12 | 07/19/11 | 02/15/11 | 07/13/10 | 02/18/10 | 07/21/09 | 02/17/09 | 07/29/08 | 02/13/08 | 07/12/07 | 02/12/07 | 07/14/06 |
| Analyte | Units | L55 | L55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 | L-55 |
| 1,1,1-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane-d4 | [surr] | 90.1% | 102% | 101% | 100% | 92.0% | 103% | 101% | 90.6% | 106% | 100% | 99.6% | 107% | 113% |
| 1,2-Dichloropropane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,3-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,4-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Butanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Chloroethylvinyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 [1] | <50.0 [1] | <50.0 |
| 2-Hexanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 4-Bromofluorobenzene | [surr] | 90.6% | 94.9% | 98.8% | 93.8% | 90.0% | 91.8% | 96.6% | 92.1% | 104% | 102% | 91.5% | 99.9% | 102% |
| 4-Methyl-2-pentanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Acetone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Benzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromodichloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromoform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromomethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon disulfide | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon tetrachloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| cis-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Dibromochloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Diethyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethylbenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Methylene chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Styrene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Tetrachloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene-d8 | [surr] | 101% | 101% | 102% | 96.2% | 93.1% | 97.0% | 100% | 95.3% | 107% | 101% | 96.5% | 109% | 104% |
| trans-1,2-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| trans-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichlorofluoromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Xylenes, total | ug/L | <150 | <150 | <150 | <150 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |

| | | 1208078-02 | 1202062-02 | 1107076-02 | 1102051-02 | 1007059-02 | 1002080-02 | 0907120-02 | 0902088-02 | 902088-02RE | 0807173-02 | 0802071-02 | 0707061-02 | 0702073-02 | 0607077-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 08/22/12 | 02/14/12 | 07/19/11 | 02/15/11 | 07/13/10 | 02/18/10 | 07/21/09 | 02/17/09 | 02/17/09 | 07/29/08 | 02/13/08 | 07/12/07 | 02/12/07 | 07/14/06 |
| Analyte | Units | L56 | L56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 | L-56 |
| 1,1,1-Trichloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichlorobenzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane-d4 | [surr] | 93.1% | 102% | 104% | 102% | 91.5% | 106% | 99.6% | 90.7% | 98.6% | 104% | 99.7% | 97.4% | 109% | 111% |
| 1,2-Dichloropropane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,3-Dichlorobenzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,4-Dichlorobenzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Butanone | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | 53.3 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Chloroethylvinyl ether | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 [1] | <50.0 [1] | <50.0 [1] | <50.0 |
| 2-Hexanone | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 4-Bromofluorobenzene | [surr] | 95.5% | 93.5% | 100% | 96.1% | 91.9% | 96.2% | 97.0% | 90.9% | 99.2% | 104% | 99.8% | 91.8% | 102% | 100% |
| 4-Methyl-2-pentanone | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Acetone | ug/L | 849 | <50.0 | 877 | <50.0 | <50.0 | <50.0 | <50.0 | 1170 | 1070 | <50.0 | <50.0 | <50.0 | 86.7 | 126 |
| Benzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromodichloromethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromoform | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromomethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon disulfide | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon tetrachloride | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chlorobenzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroform | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloromethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| cis-1,3-Dichloropropene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Dibromochloromethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Diethyl ether | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethyl acetate | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethylbenzene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Methylene chloride | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Styrene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Tetrachloroethene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene-d8 | [surr] | 106% | 98.3% | 104% | 98.9% | 93.8% | 101% | 98.7% | 96.4% | 103% | 103% | 99.3% | 94.4% | 109% | 102% |
| trans-1,2-Dichloroethene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| trans-1,3-Dichloropropene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichloroethene | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichlorofluoromethane | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl acetate | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl chloride | ug/L | <100 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Xylenes, total | ug/L | <300 | <150 | <150 | <150 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |

| | | 1208078-03 | 1202062-03 | 1107076-03 | 1102051-03 | 1007059-03 | 1002080-03 | 0907120-03 | 0902088-03 | 0807173-03 | 0802071-03 | 0707061-03 | 0702073-03 | 0607077-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 08/22/12 | 02/14/12 | 07/19/11 | 02/15/11 | 07/13/10 | 02/18/10 | 07/21/09 | 02/17/09 | 07/29/08 | 02/13/08 | 07/12/07 | 02/12/07 | 07/14/06 |
| Analyte | Units | L57 | L57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 | L-57 |
| 1,1,1-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane-d4 | [surr] | 91.7% | 101% | 96.2% | 99.8% | 90.7% | 105% | 97.6% | 93.1% | 103% | 99.8% | 95.7% | 105% | 113% |
| 1,2-Dichloropropane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,3-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,4-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Butanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Chloroethylvinyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 [1] | <50.0 [1] | <50.0 |
| 2-Hexanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 4-Bromofluorobenzene | [surr] | 91.8% | 95.2% | 93.9% | 94.4% | 90.0% | 94.6% | 94.0% | 94.8% | 102% | 102% | 91.0% | 101% | 103% |
| 4-Methyl-2-pentanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Acetone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Benzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromodichloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromoform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromomethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon disulfide | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon tetrachloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| cis-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Dibromochloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Diethyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethylbenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Methylene chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Styrene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Tetrachloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene-d8 | [surr] | 103% | 97.7% | 96.4% | 97.0% | 91.6% | 99.8% | 96.4% | 99.0% | 102% | 102% | 94.2% | 107% | 106% |
| trans-1,2-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| trans-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichlorofluoromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Xylenes, total | ug/L | <150 | <150 | <150 | <150 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |

| Analyte | Units | 1208078-04<br>08/22/12<br>L58 | 1202062-04<br>02/14/12<br>L58 | 1107076-04<br>07/19/11<br>L-58 | 1102051-04<br>02/15/11<br>L-58 | 1007059-04<br>07/13/10<br>L-58 | 1002080-04<br>02/18/10<br>L-58 | 0907120-04<br>07/21/09<br>L-58 | 0905095-01<br>05/18/09<br>L-58 | 0902088-04<br>02/17/09<br>L-58 | 0807173-04<br>07/29/08<br>L-58 | 0802071-04<br>02/13/08<br>L-58 | 0707061-04<br>07/12/07<br>L-58 | 0702073-04<br>02/12/07<br>L-58 | 0607077-04<br>07/14/06<br>L-58 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1,2-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,1-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,2-Dichloroethane-d4 | [surr] | 87.6% | 103% | 101% | 102% | 93.1% | 106% | 96.8% | 99.2% | 92.3% | 106% | 100% | 95.8% | 109% | 112% |
| 1,2-Dichloropropane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,3-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 1,4-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Butanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 2-Chloroethylvinyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 [1] | <50.0 [1] | <50.0 |
| 2-Hexanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| 4-Bromofluorobenzene | [surr] | 88.5% | 96.0% | 98.6% | 97.6% | 91.5% | 95.5% | 92.0% | 96.7% | 96.2% | 105% | 100% | 89.2% | 99.3% | 102% |
| 4-Methyl-2-pentanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Acetone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Benzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromodichloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromoform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Bromomethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon disulfide | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Carbon tetrachloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloroform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Chloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| cis-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Dibromochloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Diethyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Ethylbenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Methylene chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Styrene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Tetrachloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Toluene-d8 | [surr] | 98.8% | 102% | 101% | 100% | 94.0% | 101% | 96.6% | 99.1% | 101% | 105% | 99.1% | 93.9% | 110% | 103% |
| trans-1,2-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| trans-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Trichlorofluoromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |
| Vinyl chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [1] | <50.0 | <50.0 | <50.0 |
| Xylenes, total | ug/L | <150 | <150 | <150 | <150 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 |

| | | 1208078-05 | 1202062-05 | 1107076-05 | 1102051-05 | 1007059-05 | 1002080-05 | 0907120-05 | 0902088-05 | 0807173-05 | 0802071-05 | 0707061-05 | 0702073-05 | 0607077-05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 08/22/12 | 02/14/12 | 07/19/11 | 02/15/11 | 07/13/10 | 02/18/10 | 07/21/09 | 02/17/09 | 07/29/08 | 02/13/08 | 07/12/07 | 02/12/07 | 07/14/06 |
| Analyte | Units | L59 | L59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 | L-59 |
| 1,1,1-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,1,2-Trichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,1-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,1-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,2-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,2-Dichloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,2-Dichloroethane-d4 | [surr] | 90.8% | 106% | 103% | 103% | 92.8% | 107% | 100% | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,2-Dichloropropane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 [1] | <200 [1] | <50.0 [1] | <50.0 |
| 1,3-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 1,4-Dichlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 2-Butanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 2-Chloroethylvinyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 2-Hexanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 4-Bromofluorobenzene | [surr] | 91.0% | 96.2% | 97.7% | 97.1% | 91.2% | 95.7% | 97.6% | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| 4-Methyl-2-pentanone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | 95.4% | 103% | 97.3% | 95.3% | 108% | 112% |
| Acetone | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Benzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Bromodichloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Bromoform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Bromomethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Carbon disulfide | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Carbon tetrachloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Chlorobenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 [1] | <200 | <50.0 | <50.0 |
| Chloroethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Chloroform | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Chloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| cis-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Dibromochloromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Diethyl ether | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Ethyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Ethylbenzene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Methylene chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Styrene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Tetrachloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | 102% | 102% | 97.0% | 92.8% | 109% | 102% |
| Toluene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Toluene-d8 | [surr] | 101% | 103% | 104% | 100% | 94.7% | 100% | 98.2% | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| trans-1,2-Dichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| trans-1,3-Dichloropropene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | 97.9% | 102% | 98.0% | 89.5% | 100% | 100% |
| Trichloroethene | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Trichlorofluoromethane | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Vinyl acetate | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |
| Vinyl chloride | ug/L | <50.0 | <50.0 | <50.0 | <50.0 | <50.0 [2] | <50.0 | <50.0 | <100 | <100 | <100 [1] | <200 | <50.0 | <50.0 |
| Xylenes, total | ug/L | <150 | <150 | <150 | <150 | <50.0 | <50.0 | <50.0 | <100 | <100 | <100 | <200 | <50.0 | <50.0 |

| | | 1302105-01 | 1211120-01 | 1208112-01 | 1205142-01 | 1202076-01 | 1112105-01 | 1111006-01 | 1102051-06 | 1012072-01 | 1007059-06 | 1005079-01 | 1002080-06 | 0912112-01 | 0907120-06 | 0905095-02 | 0902088-06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/25/13 | 11/30/12 | 08/30/12 | 05/25/12 | 02/16/12 | 12/22/11 | 11/01/11 | 02/15/11 | 12/15/10 | 07/13/10 | 05/18/10 | 02/18/10 | 12/21/09 | 07/21/09 | 05/18/09 | 02/17/09 |
| Analyte | Units | L60 | L60 | L60 | L60 | L60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 |
| 1,1,1-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,1,2-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,1-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,1-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,2-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,2-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 104% | 107% | 98.2% | 92.7% | 103% | 104% | 99.6% | 102% | 110% | 92.0% | 89.9% | 104% | 95.8% | 97.6% | 99.1% | 93.1% |
| 1,2-Dichloropropane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,3-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 1,4-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 2-Butanone | ug/L | <200 | <200 | 270 | <200 | 349 | 242 | 122 | 137 | 152 | 201 | 189 | 212 | 140 | 271 | 385 | <100 |
| 2-Chloroethylvinyl ether | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 [4] | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 2-Hexanone | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| 4-Bromofluorobenzene | [surr] | 101% | 100% | 93.6% | 89.3% | 97.0% | 93.6% | 96.1% | 95.0% | 102% | 92.3% | 94.8% | 93.2% | 98.1% | 96.1% | 97.0% | 94.3% |
| 4-Methyl-2-pentanone | ug/L | <200 | <200 | <200 | <200 | 105 | <100 | <100 | <100 | <100 | 130 | <100 | 105 | <100 | <200 | 175 | <100 |
| Acetone | ug/L | <200 | 318 | 640 | 516 | 924 | 764 | 448 | 593 | 558 | 645 | 619 | 805 | 646 | 1050 | 1340 | 338 |
| Benzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Bromodichloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Bromoform | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Bromomethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Carbon disulfide | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Carbon tetrachloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Chlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Chloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Chloroform | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Chloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| cis-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Dibromochloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Diethyl ether | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Ethyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Ethylbenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Methylene chloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Styrene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 [4] | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Tetrachloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Toluene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Toluene-d8 | [surr] | 107% | 105% | 98.7% | 94.0% | 99.1% | 99.6% | 101% | 98.5% | 103% | 92.6% | 96.4% | 100% | 99.9% | 96.8% | 98.1% | 98.1% |
| trans-1,2-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| trans-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Trichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Trichlorofluoromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Vinyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Vinyl chloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <100 | <100 [4] | <100 | <100 | <100 | <200 | <50.0 | <100 |
| Xylenes, total | ug/L | <600 | <600 | <600 | <600 | <300 | <300 | <300 | <300 | <100 | <100 | <100 | <100 | <100 | <200 | <50.0 | <100 |

| | | 0812030-01 | 0807173-06 | 0805043-01 | 0802071-06 | 0712071-01 | 0707061-06 | 0705127-01 | 0702073-06 | 702073-06RE | 0612057-01 | 0607077-06 | 0605021-01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 12/05/08 | 07/29/08 | 05/08/08 | 02/13/08 | 12/13/07 | 07/12/07 | 05/17/07 | 02/12/07 | 02/12/07 | 12/07/06 | 07/14/06 | 05/02/06 |
| Analyte | Units | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 | L-60 |
| 1,1,1-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,1,2-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,1-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,1-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,2-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,2-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 93.6% | 106% | 102% | 99.1% | 106% | 98.4% | 115% | 113% | 78.3% | 117% | 110% | 106% |
| 1,2-Dichloropropane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,3-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 1,4-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 2-Butanone | ug/L | <200 | 205 | 255 | 222 | <100 | <200 | <200 | 482 | 295 | 239 | 124 | 240 |
| 2-Chloroethylvinyl ether | ug/L | <200 | <200 | <200 | <200 [1] | <100 [1] | <200 [1] | <200 [1] | <50.0 [1] | <200 [1] | <100 | <50.0 | <100 |
| 2-Hexanone | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| 4-Bromofluorobenzene | [surr] | 96.2% | 104% | 104% | 102% | 104% | 91.6% | 99.1% | 104% | 93.6% | 107% | 101% | 96.7% |
| 4-Methyl-2-pentanone | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | 247 | <200 | <100 | 60.7 | 118 |
| Acetone | ug/L | 543 | 954 | 1270 | 955 | 153 | 728 | 716 | 2480 [2] | 1320 | 1190 | 385 | 1110 |
| Benzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Bromodichloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Bromoform | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Bromomethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Carbon disulfide | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Carbon tetrachloride | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Chlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Chloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Chloroform | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Chloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| cis-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Dibromochloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Diethyl ether | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Ethyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Ethylbenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Methylene chloride | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Styrene | ug/L | <200 | <200 | <200 | <200 [1] | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Tetrachloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Toluene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Toluene-d8 | [surr] | 101% | 107% | 106% | 99.9% | 104% | 97.0% | 95.4% | 114% | 100% | 108% | 101% | 103% |
| trans-1,2-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| trans-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Trichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Trichlorofluoromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Vinyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |
| Vinyl chloride | ug/L | <200 | <200 | <200 | <200 [1] | <100 | <200 | <200 | 75.1 | <200 | <100 | <50.0 | <100 |
| Xylenes, total | ug/L | <200 | <200 | <200 | <200 | <100 | <200 | <200 | <50.0 | <200 | <100 | <50.0 | <100 |

| | | 1302105-02 | 1211120-02 | 1208078-06 | 1205142-02 | 1202062-06 | 1112105-02 | 1107076-06 | 1105128-01 | 1102051-07 | 1012072-02 | 1007059-07 | 1005079-02 | 1002080-07 | 0912057-01 | 0907120-07 | 0905095-03 | 0902088-07 | 0812030-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/25/13 | 11/30/12 | 08/22/12 | 05/25/12 | 02/14/12 | 12/22/11 | 07/19/11 | 05/23/11 | 02/15/11 | 12/15/10 | 07/13/10 | 05/18/10 | 02/18/10 | 12/10/09 | 07/21/09 | 05/18/09 | 02/17/09 | 12/05/08 |
| Analyte | Units | L61 | L61 | L61 | L61 | L61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 |
| 1,1,1-Trichloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,1,2,2-Tetrachloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,1,2-Trichloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,1-Dichloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,1-Dichloroethene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,2-Dichlorobenzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,2-Dichloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,2-Dichloroethane-d4 | [surr] | 101% | 111% | 90.1% | 96.1% | 104% | 104% | 102% | 102% | 98.8% | 106% | 90.9% | 92.4% | 101% | 99.5% | 99.7% | 100% | 97.7% | 92.1% |
| 1,2-Dichloropropane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,3-Dichlorobenzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 1,4-Dichlorobenzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 2-Butanone | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 2-Chloroethylvinyl ether | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 [6] | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 2-Hexanone | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| 4-Bromofluorobenzene | [surr] | 96.1% | 103% | 91.1% | 89.1% | 97.0% | 97.1% | 99.5% | 96.4% | 97.5% | 99.9% | 91.8% | 97.2% | 92.8% | 99.3% | 96.0% | 97.7% | 101% | 96.9% |
| 4-Methyl-2-pentanone | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Acetone | ug/L | <200 | <200 | <500 | 435 | <100 | 265 | <100 | <100 | 234 | 107 | 128 | 613 | <100 | <100 | <100 | <100 | <100 | 360 |
| Benzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Bromodichloromethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Bromoform | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Bromomethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Carbon disulfide | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Carbon tetrachloride | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Chlorobenzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Chloroethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Chloroform | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Chloromethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| cis-1,3-Dichloropropene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Dibromochloromethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Diethyl ether | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Ethyl acetate | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Ethylbenzene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Methylene chloride | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Styrene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 [6] | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Tetrachloroethene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Toluene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Toluene-d8 | [surr] | 102% | 107% | 102% | 95.4% | 101% | 99.9% | 101% | 99.3% | 97.0% | 101% | 92.5% | 97.6% | 97.4% | 102% | 98.2% | 99.9% | 102% | 101% |
| trans-1,2-Dichloroethene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| trans-1,3-Dichloropropene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Trichloroethene | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Trichlorofluoromethane | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Vinyl acetate | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Vinyl chloride | ug/L | <200 | <200 | <500 | <200 | <100 | <100 | <100 | <100 | <100 | <100 | <100 [6] | <100 | <100 | <100 | <100 | <100 | <100 | <200 |
| Xylenes, total | ug/L | <600 | <600 | <1500 | <600 | <300 | <300 | <300 | <300 | <300 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <200 |

| | | 0807173-07 | 0802071-07 | 0707061-07 | 0705127-02 | 0702073-07 | 702073-07RE | 0612057-02 | 612057-02RE | 0607077-07 | 607077-07RE | 0605021-02 | 605021-02RE | 605021-02RE2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 07/29/08 | 02/13/08 | 07/12/07 | 05/17/07 | 02/12/07 | 02/12/07 | 12/07/06 | 12/07/06 | 07/14/06 | 07/14/06 | 05/02/06 | 05/02/06 | 05/02/06 |
| Analyte | Units | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 | L-61 |
| 1,1,1-Trichloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,1-Dichloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,1-Dichloroethene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,2-Dichloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 100% | 98.4% | 94.9% | 116% | 111% | 79.3% | 112% | 112% | 109% | 103% | 98.9% | 52.0% | 96.3% |
| 1,2-Dichloropropane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 2-Butanone | ug/L | <500 | <500 | <1000 | <1000 | 1080 [2] | <1000 | 213 | <200 | 905 | <1000 | 865 | <1000 | <1000 |
| 2-Chloroethylvinyl ether | ug/L | <500 | <500 [1] | <1000 [1] | <1000 [1] | <50.0 [1] | <1000 [1] | <100 | <200 [3] | <50.0 | <1000 | <100 | <1000 | <1000 |
| 2-Hexanone | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 98.5% | 98.2% | 89.6% | 102% | 104% | 93.2% | 103% | 102% | 97.0% | 95.6% | 93.4% | 48.1% | 92.1% |
| 4-Methyl-2-pentanone | ug/L | <500 | <500 | <1000 | <1000 | 470 | <1000 | <100 | <200 | 258 | <1000 | 330 | <1000 | <1000 |
| Acetone | ug/L | 7480 | 909 | 7100 | 6150 | 9050 [2] | 6470 | 2610 [2] | 2250 | 12000 [2] | 8280 | 10400 [2] | 8580 | 8990 [4] |
| Benzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Bromodichloromethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Bromoform | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Bromomethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Carbon disulfide | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | 50.7 | <1000 | <100 | <1000 | <1000 |
| Carbon tetrachloride | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Chlorobenzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Chloroethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Chloroform | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Chloromethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Dibromochloromethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Diethyl ether | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Ethyl acetate | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Ethylbenzene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Methylene chloride | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Styrene | ug/L | <500 | <500 [1] | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Tetrachloroethene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Toluene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Toluene-d8 | [surr] | 98.7% | 99.5% | 92.8% | 97.2% | 112% | 99.8% | 103% | 105% | 100% | 95.5% | 100% | 51.7% | 98.5% |
| trans-1,2-Dichloroethene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Trichloroethene | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Trichlorofluoromethane | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Vinyl acetate | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Vinyl chloride | ug/L | <500 | <500 [1] | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |
| Xylenes, total | ug/L | <500 | <500 | <1000 | <1000 | <50.0 | <1000 | <100 | <200 | <50.0 | <1000 | <100 | <1000 | <1000 |

| | | 1302105-03 | 1211120-03 | 1208078-07 | 1205142-03 | 1202062-07 | 1112105-03 | 1107076-07 | 1105128-02 | 1102051-08 | 1012072-03 | 1007059-08 | 1005079-03 | 1002080-08 | 0912057-02 | 0907120-08 | 0905095-04 | 0902088-08 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/25/13 | 11/30/12 | 08/22/12 | 05/25/12 | 02/14/12 | 12/22/11 | 07/19/11 | 05/23/11 | 02/15/11 | 12/15/10 | 07/13/10 | 05/18/10 | 02/18/10 | 12/10/09 | 07/21/09 | 05/18/09 | 02/17/09 |
| Analyte | Units | L62 | L62 | L62 | L62 | L62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 |
| 1,1,1-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,1,2-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,1-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,1-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,2-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,2-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 99.8% | 113% | 92.1% | 107% | 104% | 103% | 104% | 101% | 107% | 114% | 90.4% | 90.2% | 107% | 100% | 94.9% | 99.1% | 95.1% |
| 1,2-Dichloropropane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,3-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 1,4-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 2-Butanone | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | 125 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 2-Chloroethylvinyl ether | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 [3] | <100 | <100 | <100 | <100 | <100 | <100 |
| 2-Hexanone | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 4-Bromofluorobenzene | [surr] | 96.9% | 106% | 94.7% | 102% | 96.8% | 94.4% | 99.0% | 97.7% | 100% | 102% | 91.6% | 90.1% | 95.2% | 98.3% | 91.7% | 97.0% | 97.9% |
| 4-Methyl-2-pentanone | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Acetone | ug/L | 400 | <200 | 650 | <200 | 171 | 263 | 1490 | <100 | 349 | <50.0 | 103 | <100 | 117 | 571 | 616 | 299 | 306 |
| Benzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Bromodichloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Bromoform | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 [3] | <100 | <100 | <100 | <100 | <100 | <100 |
| Bromomethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Carbon disulfide | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Carbon tetrachloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Chlorobenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Chloroethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Chloroform | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Chloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| cis-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Dibromochloromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Diethyl ether | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Ethyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Ethylbenzene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Methylene chloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Styrene | ug/L | <600 | <600 | <600 | <600 | <300 | <300 | <300 | <300 | <150 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Tetrachloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Toluene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Toluene-d8 | [surr] | 103% | 111% | 105% | 107% | 103% | 99.9% | 103% | 99.6% | 100% | 102% | 94.0% | 94.4% | 101% | 102% | 94.7% | 98.2% | 100% |
| trans-1,2-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| trans-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Trichloroethene | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Trichlorofluoromethane | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Vinyl acetate | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Vinyl chloride | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 [3] | <100 | <100 | <100 | <100 | <100 | <100 |
| Xylenes, total | ug/L | <200 | <200 | <200 | <200 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |

| | | 0812030-03 | 0807173-08 | 807173-08RE | 0805043-02 | 0802071-08 | 0712071-02 | 0707061-08 | 0705127-03 | 0702073-08 | 0612057-03 | 0607077-08 | 0605021-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 12/05/08 | 07/29/08 | 07/29/08 | 05/08/08 | 02/13/08 | 12/13/07 | 07/12/07 | 05/17/07 | 02/12/07 | 12/07/06 | 07/14/06 | 05/02/06 |
| Analyte | Units | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 | L-62 |
| 1,1,1-Trichloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,1,2-Trichloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,1-Dichloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,1-Dichloroethene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,2-Dichlorobenzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,2-Dichloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 94.4% | 106% | 109% | 98.8% | 105% | 108% | 91.6% | 118% | 109% | 115% | 112% | 99.2% |
| 1,2-Dichloropropane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,3-Dichlorobenzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 1,4-Dichlorobenzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 2-Butanone | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 2-Chloroethylvinyl ether | ug/L | <100 | <100 | <200 | <100 [1] | <100 [1] | <200 [1] | <200 [1] | <50.0 [1] | <50.0 [1] | <100 | <50.0 | <100 |
| 2-Hexanone | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| 4-Bromofluorobenzene | [surr] | 97.8% | 106% | 107% | 103% | 103% | 106% | 85.4% | 99.1% | 101% | 105% | 106% | 92.7% |
| 4-Methyl-2-pentanone | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Acetone | ug/L | 1990 | 2230 | 2690 | 686 | 229 | 340 | 1980 | 194 | <50.0 | <100 | 120 | <100 |
| Benzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Bromodichloromethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Bromoform | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Bromomethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Carbon disulfide | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Carbon tetrachloride | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Chlorobenzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Chloroethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Chloroform | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Chloromethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| cis-1,3-Dichloropropene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Dibromochloromethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Diethyl ether | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Ethyl acetate | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Ethylbenzene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Methylene chloride | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Styrene | ug/L | <100 | <100 | <200 | <100 [1] | <100 [1] | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Tetrachloroethene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Toluene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Toluene-d8 | [surr] | 102% | 106% | 106% | 103% | 106% | 106% | 89.3% | 95.8% | 111% | 105% | 103% | 99.1% |
| trans-1,2-Dichloroethene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| trans-1,3-Dichloropropene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Trichloroethene | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Trichlorofluoromethane | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Vinyl acetate | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Vinyl chloride | ug/L | <100 | <100 | <200 | <100 [1] | <100 [1] | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |
| Xylenes, total | ug/L | <100 | <100 | <200 | <100 | <100 | <200 | <200 | <50.0 | <50.0 | <100 | <50.0 | <100 |

| | | 1302105-04 | 1211120-04 | 1208078-08 | 1205142-04 | 1202062-08 | 1112105-04 | 1107076-08 | 1105128-03 | 1102051-09 | 1012072-04 | 1007059-09 | 1005079-04 | 1002080-09 | 0912057-03 | 0907120-09 | 0905095-05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/25/13 | 11/30/12 | 08/22/12 | 05/25/12 | 02/14/12 | 12/22/11 | 07/19/11 | 05/23/11 | 02/15/11 | 12/15/10 | 07/13/10 | 05/18/10 | 02/18/10 | 12/10/09 | 07/21/09 | 05/18/09 |
| Analyte | Units | L63 | L63 | L63 | L63 | L63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 |
| 1,1,1-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,1,2-Trichloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,1-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,1-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,2-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,2-Dichloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 104% | 108% | 91.1% | 97.2% | 96.2% | 99.3% | 99.8% | 103% | 102% | 113% | 87.9% | 89.6% | 104% | 100% | 99.4% | 99.0% |
| 1,2-Dichloropropane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,3-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 1,4-Dichlorobenzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 2-Butanone | ug/L | 305 | 302 | 239 | <200 | <200 | 331 | 293 | <100 | 266 | 216 | 399 | 472 | 699 | 420 | 673 | 877 |
| 2-Chloroethylvinyl ether | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 [5] | <200 | <200 | <200 | <500 | <100 |
| 2-Hexanone | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| 4-Bromofluorobenzene | [surr] | 99.6% | 102% | 92.4% | 94.0% | 90.2% | 93.3% | 97.7% | 97.7% | 96.9% | 104% | 87.5% | 93.9% | 94.5% | 98.1% | 97.9% | 95.5% |
| 4-Methyl-2-pentanone | ug/L | <200 | <200 | <200 | <200 | <200 | 180 | <200 | <100 | <200 | <200 | 255 | 296 | 328 | <200 | <500 | 446 |
| Acetone | ug/L | 860 | 1260 | 1040 | 735 | 511 | 1300 | 889 | 164 | 985 | 846 | 1180 | 1330 | 2520 | 1210 | 2090 | 2880 |
| Benzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Bromodichloromethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Bromoform | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Bromomethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Carbon disulfide | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Carbon tetrachloride | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Chlorobenzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Chloroethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Chloroform | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Chloromethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| cis-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Dibromochloromethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Diethyl ether | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Ethyl acetate | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Ethylbenzene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Methylene chloride | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Styrene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 [5] | <200 | <200 | <200 | <500 | <100 |
| Tetrachloroethene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Toluene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Toluene-d8 | [surr] | 106% | 105% | 104% | 98.7% | 96.9% | 98.4% | 100% | 101% | 98.0% | 106% | 89.3% | 96.1% | 99.7% | 103% | 98.8% | 97.9% |
| trans-1,2-Dichloroethene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| trans-1,3-Dichloropropene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Trichloroethene | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Trichlorofluoromethane | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Vinyl acetate | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |
| Vinyl chloride | ug/L | <200 | <200 | <200 | <200 | <200 | <100 | <200 | <100 | <200 | <200 | <200 [5] | <200 | <200 | <200 | <500 | <100 |
| Xylenes, total | ug/L | <600 | <600 | <600 | <600 | <600 | <300 | <600 | <300 | <600 | <200 | <200 | <200 | <200 | <200 | <500 | <100 |

| | | 0902088-09 | 0812030-04 | 0807173-09 | 0805043-03 | 0802071-09 | 0712071-03 | 0707061-09 | 0705127-04 | 0702073-09 | 0612057-04 | 0610203-01 | 0607077-09 | 0605021-04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/17/09 | 12/05/08 | 07/29/08 | 05/08/08 | 02/13/08 | 12/13/07 | 07/12/07 | 05/17/07 | 02/12/07 | 12/07/06 | 10/20/06 | 07/14/06 | 05/02/06 |
| Analyte | Units | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 | L-63 |
| 1,1,1-Trichloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,1,2,2-Tetrachloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,1,2-Trichloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,1-Dichloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | 11.8 | <50.0 | <100 |
| 1,1-Dichloroethene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,2-Dichlorobenzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,2-Dichloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,2-Dichloroethane-d4 | [surr] | 94.4% | 93.8% | 103% | 103% | 99.1% | 104% | 91.9% | 117% | 111% | 116% | 207% | 109% | 98.5% |
| 1,2-Dichloropropane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,3-Dichlorobenzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 1,4-Dichlorobenzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 2-Butanone | ug/L | <100 | 127 | <100 | 111 | <100 | <100 | <100 | 121 | 146 | <100 | 502 | 55.0 | <100 |
| 2-Chloroethylvinyl ether | ug/L | <100 | <100 | <100 | <100 | <100 [1] | <100 [1] | <100 [1] | <50.0 | <50.0 [1] | <100 | <10.0 | <50.0 | <100 |
| 2-Hexanone | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| 4-Bromofluorobenzene | [surr] | 95.5% | 97.3% | 103% | 104% | 102% | 101% | 86.8% | 100% | 103% | 105% | 194% | 98.5% | 92.6% |
| 4-Methyl-2-pentanone | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | 60.7 | 92.4 | <100 | 232 | <50.0 | <100 |
| Acetone | ug/L | 945 | 852 | 312 | 507 | 350 | 280 | 256 | 637 | 903 | 634 | 2240 | 287 | <100 |
| Benzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Bromodichloromethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Bromoform | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Bromomethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Carbon disulfide | ug/L | <100 | <100 | <100 | <100 | 281 | 223 | <100 | 121 | 495 | <100 | 1090 | 76.4 | <100 |
| Carbon tetrachloride | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Chlorobenzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Chloroethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Chloroform | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Chloromethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| cis-1,3-Dichloropropene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Dibromochloromethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Diethyl ether | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Ethyl acetate | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Ethylbenzene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Methylene chloride | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Styrene | ug/L | <100 | <100 | <100 | <100 | <100 [1] | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Tetrachloroethene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Toluene | ug/L | 629 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | 22.9 | <50.0 | <100 |
| Toluene-d8 | [surr] | 99.0% | 102% | 102% | 105% | 101% | 101% | 88.8% | 95.5% | 112% | 106% | 204% | 100% | 101% |
| trans-1,2-Dichloroethene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| trans-1,3-Dichloropropene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Trichloroethene | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Trichlorofluoromethane | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Vinyl acetate | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |
| Vinyl chloride | ug/L | <100 | <100 | <100 | <100 | <100 [1] | <100 | <100 | 55.8 | <50.0 | <100 | 142 | <50.0 | <100 |
| Xylenes, total | ug/L | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <50.0 | <50.0 | <100 | <10.0 | <50.0 | <100 |

| | | 1302105-05 | 1211120-05 | 1208078-09 | 1205142-05 | 1202076-02 | 1112081-01 | 1107076-09 | 1105128-04 | 1102051-10 | 1012072-05 | 1007059-10 | 1005079-05 | 1002080-10 | 0912057-04 | 0907120-10 | 0905095-06 | 0902088-10 | 0807173-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/25/13 | 11/30/12 | 08/22/12 | 05/25/12 | 02/16/12 | 12/19/11 | 07/19/11 | 05/23/11 | 02/15/11 | 12/15/10 | 07/13/10 | 05/18/10 | 02/18/10 | 12/10/09 | 07/21/09 | 05/18/09 | 02/17/09 | 07/29/08 |
| Analyte | Units | L64 | L64 | L64 | L64 | L64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 |
| 1,1,1-Trichloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,1,2,2-Tetrachloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,1,2-Trichloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,1-Dichloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,1-Dichloroethene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,2-Dichlorobenzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,2-Dichloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,2-Dichloroethane-d4 | [surr] | 103% | 108% | 92.7% | 93.7% | 105% | 96.5% | 98.6% | 102% | 102% | 113% | 89.8% | 90.7% | 105% | 95.8% | 100% | 102% | 95.2% | 102% |
| 1,2-Dichloropropane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,3-Dichlorobenzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 1,4-Dichlorobenzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 2-Butanone | ug/L | <10000 | <10000 | <10000 | <5000 | 4880 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | 668 | <500 | <1000 | 822 | <200 | <500 |
| 2-Chloroethylvinyl ether | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 [5] | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 2-Hexanone | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| 4-Bromofluorobenzene | [surr] | 99.7% | 105% | 94.4% | 89.8% | 98.5% | 94.2% | 98.2% | 97.3% | 95.8% | 103% | 91.0% | 93.5% | 94.4% | 94.5% | 97.6% | 98.8% | 96.5% | 100% |
| 4-Methyl-2-pentanone | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | 344 | <200 | <500 |
| Acetone | ug/L | 27700 | 98600 | 114000 | 51600 | 56800 | 12700 | 19900 | 12100 | 13800 | 45800 | 24300 | 10100 | 16400 | 1570 | 11800 | 7500 [4] | 560 | 20200 [2] |
| Benzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Bromodichloromethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Bromoform | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Bromomethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Carbon disulfide | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Carbon tetrachloride | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Chlorobenzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Chloroethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Chloroform | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Chloromethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| cis-1,3-Dichloropropene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Dibromochloromethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Diethyl ether | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Ethyl acetate | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Ethylbenzene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Methylene chloride | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Styrene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 [5] | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Tetrachloroethene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Toluene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | 1120 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | 216 | <200 | 638 |
| Toluene-d8 | [surr] | 103% | 107% | 105% | 94.4% | 101% | 100% | 99.8% | 99.9% | 96.8% | 105% | 92.3% | 94.5% | 100% | 97.6% | 99.1% | 99.9% | 101% | 101% |
| trans-1,2-Dichloroethene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| trans-1,3-Dichloropropene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Trichloroethene | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Trichlorofluoromethane | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Vinyl acetate | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Vinyl chloride | ug/L | <10000 | <10000 | <10000 | <5000 | <2500 | <1000 | <2500 | <1000 | <1000 | <2500 | <1000 [5] | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |
| Xylenes, total | ug/L | <30000 | <30000 | <30000 | <15000 | <7500 | <3000 | <7500 | <3000 | <3000 | <2500 | <1000 | <1000 | <500 | <500 | <1000 | <100 | <200 | <500 |

| | | 807173-10RE | 0805043-04 | 805043-04RE | 0802071-10 | 0712071-04 | 0707061-10 | 0705127-05 | 0702073-10 | 702073-10RE | 0612057-05 | 0607077-10 | 607077-10RE | 0605021-05 | 605021-05RE | 605021-05RE2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 07/29/08 | 05/08/08 | 05/08/08 | 02/13/08 | 12/13/07 | 07/12/07 | 05/17/07 | 02/12/07 | 02/12/07 | 12/07/06 | 07/14/06 | 07/14/06 | 05/02/06 | 05/02/06 | 05/02/06 |
| Analyte | Units | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 | L-64 |
| 1,1,1-Trichloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,1-Dichloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,1-Dichloroethene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,2-Dichloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 104% | 101% | 98.7% | 97.3% | 103% | 96.1% | 117% | 107% | 73.7% | 115% | 106% | 104% | 100% | 52.3% | 94.6% |
| 1,2-Dichloropropane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 2-Butanone | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | 58.0 | <1000 | <100 | 452 | <2500 | 342 | <1000 | <1000 |
| 2-Chloroethylvinyl ether | ug/L | <2500 | <500 | <2500 | <1000 [1] | <2500 [1] | <2500 [1] | <1000 [1] | <50.0 [1] | <1000 [1] | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 2-Hexanone | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 104% | 104% | 103% | 96.4% | 103% | 87.9% | 100% | 99.7% | 89.2% | 104% | 95.8% | 94.5% | 95.0% | 48.1% | 92.6% |
| 4-Methyl-2-pentanone | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | 102 | <2500 | 109 | <1000 | <1000 |
| Acetone | ug/L | 6630 [4] | 17000 [2] | 8670 [4] | 1000 | 8780 | 34300 | 2480 | 14500 [2] | 10300 | 1520 | 20900 [2] | 13300 | 16500 [2] | 12700 | 12600 [3] |
| Benzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Bromodichloromethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Bromoform | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Bromomethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Carbon disulfide | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Carbon tetrachloride | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Chlorobenzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Chloroethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Chloroform | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Chloromethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Dibromochloromethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Diethyl ether | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Ethyl acetate | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Ethylbenzene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Methylene chloride | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Styrene | ug/L | <2500 | <500 | <2500 | <1000 [1] | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Tetrachloroethene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Toluene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | 2050 [2] | 1790 | 1130 | 543 | <2500 | 871 | <1000 | <1000 |
| Toluene-d8 | [surr] | 104% | 104% | 102% | 98.0% | 101% | 91.1% | 95.3% | 109% | 93.6% | 104% | 97.5% | 94.8% | 102% | 51.1% | 99.2% |
| trans-1,2-Dichloroethene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Trichloroethene | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Trichlorofluoromethane | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Vinyl acetate | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Vinyl chloride | ug/L | <2500 | <500 | <2500 | <1000 [1] | <2500 | <2500 | <1000 | 84.5 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |
| Xylenes, total | ug/L | <2500 | <500 | <2500 | <1000 | <2500 | <2500 | <1000 | <50.0 | <1000 | <100 | <50.0 | <2500 | <100 | <1000 | <1000 |

| | | 1304080-06 | 1304062-06 | 1304052-06 | 1304045-06 | 1304041-06 | 1304036-06 | 1304035-03 | 1304014-06 | 1304011-06 | 1304010-03 | 1303119-06 | 1303105-06 | 1303098-06 | 1303097-03 | 1303061-06 | 1303055-06 | 1303052-06 | 1303051-01 | 1303019-06 | 1303011-06 | 1303010-06 | 1303009-06 | 1302122-06 | 1302114-06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 04/17/13 | 04/13/13 | 04/12/13 | 04/11/13 | 04/10/13 | 04/09/13 | 04/08/13 | 04/03/13 | 04/02/13 | 04/01/13 | 03/26/13 | 03/22/13 | 03/21/13 | 03/20/13 | 03/14/13 | 03/13/13 | 03/12/13 | 03/11/13 | 03/05/13 | 03/04/13 | 03/03/13 | 03/02/13 | 02/28/13 | 02/27/13 |
| | | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 |
| Analyte | Units | 4/17/2013 7:0 | 4/15/2013 6:4 | 4/12/2013 6:4 | 4/11/2013 7:0 | 4/10/2013 6:3 | 4/9/2013 6:55 | 4/9/2013 6:55 | 4/3/2013 6:45 | 4/2/2013 6:44 | 4/2/2013 6:48 | 3/26/2013 6:5 | 3/22/2013 6:3 | 3/21/2013 7:0 | 3/21/2013 7:0 | 3/14/2013 6:3 | 3/13/2013 6:5 | 3/12/2013 6:4 | 3/12/2013 6:3 | 3/5/2013 6:35 | 3/4/2013 6:40 | 3/4/2013 6:40 | 3/4/2013 6:40 | 2/28/2013 6:3 | 2/27/2013 6:3 |
| Chloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Vinyl chloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromomethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Trichlorofluoromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Diethyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Acetone | ug/L | 2570 | 2510 | 2850 | 4720 | 6000 | 5810 | 6200 | <2500 | 36500 | 37400 | 4590 | 4910 | 5480 | 5480 | 3300 | 3490 | 3390 | 3980 | 3140 | 3150 | 2870 | 3140 | 16100 | 11300 |
| 1,1-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Methylene chloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Carbon disulfide | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,2-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Vinyl acetate | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 2-Butanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | 1140 | <1000 | <1000 | <1000 | <1000 | 6420 | <1000 |
| Ethyl acetate | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chloroform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,1-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Carbon tetrachloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 107% | 109% | 106% | 107% | 106% | 105% | 107% | 109% | 109% | 106% | 104% | 103% | 104% | 105% | 104% | 102% | 103% | 104% | 109% | 107% | 111% | 111% | 102% | 110% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Benzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Trichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichloropropane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromodichloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 2-Chloroethylvinyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Methyl-2-pentanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | 1290 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Toluene-d8 | [surr] | 104% | 108% | 106% | 104% | 105% | 105% | 107% | 102% | 103% | 101% | 103% | 103% | 104% | 105% | 105% | 102% | 104% | 104% | 106% | 106% | 104% | 106% | 100% | 107% |
| Toluene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 96.7% | 99.8% | 100% | 100% | 100% | 103% | 107% | 99.4% | 102% | 98.9% | 99.4% | 101% | 101% | 103% | 101% | 99.6% | 100% | 100% | 99.2% | 101% | 97.3% | 99.7% | 99.3% | 104% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Tetrachloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Dibromochloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Ethylbenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Xylenes, total | ug/L | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <7500 | <7500 | <7500 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 |
| Styrene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromoform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |

| | | 1302113-03 | 1302083-06 | 1302076-06 | 1302065-06 | 1302059-06 | 1302049-06 | 1302041-06 | 1302040-03 | 1302019-06 | 1302016-06 | 1302001-06 | 1301138-06 | 1301126-06 | 1301122-06 | 1301094-06 | 1301083-06 | 1301082-06 | 1301073-01 | 1301061-06 | 1301053-06 | 1301047-03 | 1301018-06 | 1301005-01 | 1301001-06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 02/26/13 | 02/20/13 | 02/19/13 | 02/15/13 | 02/14/13 | 02/13/13 | 02/12/13 | 02/11/13 | 02/06/13 | 02/05/13 | 02/01/13 | 01/31/13 | 01/30/13 | 01/29/13 | 01/23/13 | 01/21/13 | 01/20/13 | 01/18/13 | 01/16/13 | 01/15/13 | 01/14/13 | 01/07/13 | 01/02/13 | 01/01/13 |
| | | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 |
| Analyte | Units | 2/26/2013 1:1 | 2/20/2013 6:2 | 2/19/2013 6:3 | 2/15/2013 6:4 | 2/14/2013 6:3 | 2/13/2013 6:3 | 2/12/2013 6:3 | 2/12/2013 6:2 | 2/6/2013 6:39 | 2/5/2013 6:48 | 2/1/2013 7:0 | 1/31/2013 6:3 | 1/30/2013 6:4 | 1/29/2013 6:2 | 1/23/2013 7:0 | 1/21/2013 6:4 | 1/21/2013 6:4 | 1/18/2013 8:3 | 1/16/2013 6:4 | 1/15/2013 6:3 | 1/14/2013 10 | 1/7/2013 6:36 | 1/2/2013 9:56 | 1/2/2013 6:25 |
| Chloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Vinyl chloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromomethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Acetone | ug/L | 3380 | 5190 | 14800 | 3930 | 3420 | 4090 | <2500 | <2500 | 3990 | 3430 | 2900 | 2900 | 3920 | 5460 | 3620 | 3750 | 3540 | 3040 | 2690 | 3280 | 6230 | 6230 | 5410 | 5590 |
| 1,1-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1,1,1-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Carbon tetrachloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 94.2% | 107% | 111% | 107% | 104% | 112% | 111% | 111% | 107% | 102% | 106% | 107% | 110% | 106% | 106% | 107% | 106% | 108% | 109% | 107% | 95.2% | 103% | 102% | 105% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1,2-Dichloropropane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 2-Chloroethylvinyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Methyl-2-pentanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Toluene-d8 | [surr] | 99.3% | 102% | 106% | 103% | 102% | 107% | 106% | 107% | 104% | 101% | 100% | 104% | 106% | 102% | 105% | 104% | 100% | 104% | 104% | 105% | 96.0% | 103% | 99.6% | 103% |
| Toluene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 96.7% | 92.2% | 97.2% | 94.9% | 96.5% | 100% | 100% | 98.4% | 96.9% | 93.2% | 95.3% | 97.6% | 99.8% | 95.9% | 95.6% | 96.0% | 92.9% | 95.9% | 95.5% | 96.2% | 92.6% | 97.3% | 95.2% | 98.1% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| Xylenes, total | ug/L | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <7500 | <7500 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 |
| Styrene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromoform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 12/31/12 | 12/26/12 | 12/25/12 | 12/24/12 | 12/21/12 | 12/19/12 | 12/18/12 | 12/17/12 | 12/12/12 | 12/11/12 | 12/10/12 | 12/05/12 | 12/04/12 | 11/29/12 | 11/21/12 | 11/12/12 | 11/11/12 | 11/10/12 | 11/09/12 | 11/05/12 | 11/04/12 | 11/02/12 | 11/01/12 | 10/31/12 |
| | | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| Analyte | Units | 12/31/2012 1 | 12/26/2012 1 | 12/26/2012 8 | 12/24/2012 1 | 12/21/2012 6 | 12/19/2012 6 | 12/18/2012 1 | 12/17/2012 1 | 12/12/2012 1 | 12/11/2012 6 | 12/10/2012 6 | 12/5/2012 6:5 | 12/4/2012 11 | 11/30/2012 6 | 11/21/2012 6 | 11/12/2012 6 | 11/12/2012 6 | 11/12/2012 6 | 11/9/2012 6:2 | 11/5/2012 6:3 | 11/5/2012 6:3 | 11/2/2012 8:4 | 11/1/2012 10 | 10/31/2012 6 |
| Chloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| Diethyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Acetone | ug/L | 5620 | 4270 | 3900 | 3710 | 5040 | 4810 | 6160 | 5680 | 5660 | 5270 | 5770 | 5460 | 5830 | 7480 | 5440 | 4350 | 3610 | 4220 | 3290 | 1890 | 1760 | 1080 | <1000 | <1000 |
| 1,1-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| Carbon disulfide | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,2-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 2-Butanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Ethyl acetate | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chloroform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,1-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Carbon tetrachloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 105% | 109% | 109% | 108% | 113% | 105% | 107% | 91.5% | 99.7% | 101% | 103% | 99.3% | 102% | 114% | 109% | 105% | 107% | 105% | 100% | 106% | 106% | 100% | 92.2% | 90.6% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1,2-Dichloropropane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 2-Chloroethylvinyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Methyl-2-pentanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Toluene-d8 | [surr] | 102% | 105% | 107% | 106% | 109% | 104% | 110% | 90.7% | 95.5% | 95.0% | 96.9% | 94.5% | 96.7% | 108% | 105% | 104% | 106% | 104% | 100% | 108% | 106% | 102% | 94.3% | 93.9% |
| Toluene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 98.9% | 101% | 105% | 101% | 105% | 102% | 105% | 83.1% [2] | 87.4% | 89.5% | 91.0% | 90.9% | 94.4% | 105% | 101% | 99.1% | 100% | 98.9% | 95.4% | 102% | 99.3% | 96.9% | 89.8% | 88.9% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1,1,2,2-Tetrachloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 1,4-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <500 | <500 | <500 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10/30/12 | 10/29/12 | 10/28/12 | 10/27/12 | 10/26/12 | 10/25/12 | 10/24/12 | 10/23/12 | 10/19/12 | 10/16/12 | 10/15/12 | 10/12/12 | 10/11/12 | 10/10/12 | 10/02/12 | 10/01/12 | 09/28/12 | 09/27/12 | 09/26/12 | 09/20/12 | 09/18/12 | 09/16/12 | 09/15/12 | 09/14/12 |
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| Analyte | Units | 10/30/2012 6 | 10/29/2012 6 | 10/29/2012 6 | 10/29/2012 6 | 10/26/2012 6 | 10/25/2012 6 | 10/24/2012 6 | 10/23/2012 6 | 10/19/2012 1 | 10/16/2012 6 | 10/15/2012 1 | 10/12/2012 8 | 10/11/2012 6 | 10/10/2012 1 | 10/2/2012 7:( | 10/1/2012 11 | 9/28/2012 7:( | 9/27/2012 10 | 9/27/2012 11 | 9/20/2012 8:3 | 9/18/2012 1:3 | 9/17/2012 9:4 | 9/17/2012 9:3 | 9/14/2012 7:( |
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| 1,2-Dichloroethane-d4 | [surr] | 94.4% | 94.5% | 96.0% | 94.8% | 94.3% | 89.7% | 92.8% | 94.7% | 109% | 115% | 120% [1] | 114% | 108% | 108% | 101% | 113% | 105% | 104% | 108% | 100% | 102% | 96.8% | 101% | 90.2% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| Toluene-d8 | [surr] | 97.4% | 94.2% | 97.4% | 94.8% | 94.4% | 91.7% | 95.3% | 93.7% | 104% | 99.7% | 108% | 100% | 95.6% | 98.0% | 93.1% | 102% | 98.5% | 98.3% | 101% | 97.3% | 99.4% | 94.7% | 102% | 95.7% |
| Toluene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <2500 | <1000 | <1000 | <1000 | <1000 | <1000 |
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| 4-Bromofluorobenzene | [surr] | 92.4% | 89.3% | 92.6% | 91.9% | 90.7% | 89.5% | 94.4% | 92.3% | 102% | 98.4% | 105% | 98.7% | 95.6% | 95.2% | 91.6% | 101% | 97.8% | 95.1% | 99.7% | 95.7% | 99.1% | 93.6% | 100% | 93.0% |
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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| | | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 |
| Analyte | Units | 9/13/2012 7:0 | 9/12/2012 7:0 | 9/11/2012 8:2 | 9/10/2012 7:0 | 9/10/2012 7:0 | 9/10/2012 7:0 | 9/10/2012 7:0 | 9/5/2012 7:0 | 9/5/2012 7:0 | 8/31/2012 7:0 | 8/30/2012 8:2 | 8/29/2012 7:0 | 8/28/2012 7:0 | 8/22/2012 7:0 | 8/22/2012 7:0 | 8/15/2012 7:0 | 8/10/2012 7:0 | 8/9/2012 11:2 | 8/7/2012 7:0 | 8/6/2012 9:15 | 7/30/2012 10 | 7/27/2012 8:3 | 7/26/2012 11 | 7/26/2012 9:3 |
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| 1,1,1-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Carbon tetrachloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 86.0% | 95.7% | 93.3% | 101% | 89.7% | 102% | 102% | 101% | 101% | 99.1% | 96.4% | 98.3% | 97.8% | 91.6% | 93.2% | 104% | 98.2% | 104% | 103% | 109% | 89.6% | 102% | 102% | 101% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Benzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Trichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,2-Dichloropropane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Bromodichloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 2-Chloroethylvinyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 4-Methyl-2-pentanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Toluene-d8 | [surr] | 94.6% | 97.4% | 97.8% | 97.1% | 94.7% | 95.9% | 96.8% | 96.6% | 97.4% | 96.9% | 94.1% | 97.3% | 95.8% | 104% | 105% | 104% | 101% | 101% | 99.7% | 104% | 101% | 102% | 100% | 83.2% [1] |
| Toluene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 4-Bromofluorobenzene | [surr] | 93.0% | 95.2% | 95.0% | 95.1% | 93.8% | 94.9% | 95.5% | 95.0% | 95.4% | 95.2% | 91.9% | 94.7% | 93.0% | 93.7% | 95.7% | 97.6% | 94.7% | 97.3% | 94.0% | 101% | 99.0% | 97.9% | 96.4% | 87.9% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Tetrachloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Dibromochloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Chlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Ethylbenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Xylenes, total | ug/L | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <7500 | <7500 | <3000 | <3000 | <7500 | <3000 | <3000 | <3000 | <3000 | <7500 | <3000 |
| Styrene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| Bromoform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <2500 | <2500 | <1000 | <1000 | <2500 | <1000 | <1000 | <1000 | <1000 | <2500 | <1000 |

| | | 1207071-06 | 1207067-06 | 1207063-03 | 1207045-06 | 1207035-06 | 1207034-01 | 1207009-06 | 1206099-06 | 1206098-03 | 1206077-06 | 1206076-03 | 1206061-06 | 1206056-06 | 1206055-03 | 1206017-06 | 1206013-06 | 1206009-03 | 1206005-04 | 1205167-03 | 1205160-06 | 1205117-06 | 1205097-06 | 1205084-06 | 1205074-06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 07/19/12 | 07/18/12 | 07/17/12 | 07/12/12 | 07/11/12 | 07/10/12 | 07/03/12 | 06/26/12 | 06/25/12 | 06/19/12 | 06/18/12 | 06/14/12 | 06/13/12 | 06/12/12 | 06/06/12 | 06/05/12 | 06/04/12 | 06/03/12 | 05/31/12 | 05/30/12 | 05/22/12 | 05/17/12 | 05/15/12 | 05/14/12 |
| | | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 | T-102 |
| Analyte | Units | 7/19/2012 7:( | 7/18/2012 7:( | 7/17/2012 10 | 7/12/2012 7:( | 7/11/2012 7:( | 7/11/2012 7:( | 7/3/2012 7:44 | 6/26/2012 7:( | 6/25/2012 1:1 | 6/19/2012 7:( | 6/19/2012 7:( | 6/14/2012 9:3 | 6/13/2012 7:( | 6/13/2012 7:( | 6/6/2012 7:0( | 6/5/2012 7:15 | 6/4/2012 11:1 | 6/4/2012 7:0( | 5/31/2012 1( | 5/30/2012 7:( | 5/22/2012 7:( | 5/17/2012 8:( | 5/15/2012 7:( | 5/14/2012 7:( |
| Chloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Vinyl chloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromomethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Trichlorofluoromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Diethyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Acetone | ug/L | 11100 | 8240 | 9150 | 5900 | 5330 | 9290 | 8290 | 11000 | 13900 | 7820 | 7900 | 4690 | 5910 | 6700 | 3250 | 5130 | 5410 | 7380 | 7880 | 7500 | 7400 | 4040 | 2590 | 2720 |
| 1,1-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Methylene chloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | 1780 | <1000 | <1000 | 1640 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Carbon disulfide | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,2-Dichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Vinyl acetate | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 2-Butanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | 1910 | <1000 | <1000 | 2370 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Ethyl acetate | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chloroform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,1-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Carbon tetrachloride | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichloroethane-d4 | [surr] | 109% | 98.5% | 96.3% | 91.5% | 90.3% | 92.0% | 98.6% | 105% | 110% | 104% | 102% | 89.9% | 95.4% | 95.4% | 104% | 104% | 103% | 104% | 99.6% | 100% | 98.6% | 89.0% | 89.5% | 86.9% |
| 1,2-Dichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Benzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Trichloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichloropropane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromodichloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 2-Chloroethylvinyl ether | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Methyl-2-pentanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| cis-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Toluene-d8 | [surr] | 98.5% | 92.9% | 90.5% | 92.2% | 92.6% | 92.5% | 96.5% | 95.6% | 101% | 97.7% | 97.4% | 90.0% | 96.0% | 95.5% | 104% | 103% | 103% | 104% | 97.6% | 101% | 95.9% | 97.4% | 95.6% | 94.1% |
| Toluene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| trans-1,3-Dichloropropene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2-Trichloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 4-Bromofluorobenzene | [surr] | 97.8% | 91.6% | 90.5% | 91.3% | 92.4% | 91.9% | 94.4% | 96.9% | 102% | 97.9% | 97.6% | 88.6% | 93.0% | 93.6% | 102% | 100% | 100% | 102% | 94.9% | 97.0% | 94.1% | 94.6% | 91.5% | 93.9% |
| 2-Hexanone | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Tetrachloroethene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Dibromochloromethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Chlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Ethylbenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Xylenes, total | ug/L | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 |
| Styrene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| Bromoform | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,1,2,2-Tetrachloroethane | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,3-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,4-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |
| 1,2-Dichlorobenzene | ug/L | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 |

**Leachate Analytical Data - T-160**
**AWTS & FacPond Evaluation**

**CWM Chemical Services, LLC**
**Model City, NY**

**May 2012 - rev. 1**

**SLF 12 standpipe**

SLF 12 lift station

RMU-1, SLF-12 | tank sampl 120202028 | T160 AES 0 120210022 | 120215024 | 120216018CMW.xls, | T160 021512.xlsx | 120215035 | 120215034 | Old Landfill | Old Landfill Leachates_ 111116033

| Parameter | Units | Analytical Method | RMU-1 T-160 1/31/2012 | RMU-1 T-160 2/1/2012 | RMU-1 T-160 2/7/2012 | RMU-1 T-160 2/9/2012 | RMU-1 T-160 2/14/2012 | RMU-1 T-160 2/15/2012 | RMU-1 8/22/12 | L-54 2/14/2012 | T-150 2/14/2012 | T-150 2/14/2012 | T-150 7/23/2012 | Combined T-102 11/15/2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Samples Collected*** | | | | | | ***6*** | | | | ***1*** | ***1*** | | | ***1*** |
| ***Samples Required*** | | | | | | ***6*** | | | | ***3*** | ***3*** | | | ***24*** |
| **Conventional/General Water Quality** | | | | | | | | | | | | | | |
| Total Organic Carbon | mg/L | SM 5310C | | 167 | 263 | 262 | 277 | 290 | | 257 | 49.5 | | 66.6 | 315 |
| Total Suspended Solids | mg/L | SM 2540D | | 86.7 | 55 | 96 | 133 | 65 | | 72.0 | 10 | | 44 | 16.5 |
| Total Dissolved Solids | mg/L | SM 2540C | | 11900 | 17700 | 18600 | 22000 | 21300 | | 27200.00 | 1430 | | 4090 | 18000 |
| Total Petroleum Hydrocarbon | mg/L | E1664 | | 25.6 | 40 | 47.9 | 64.9 | 57.9 | | 12.5 | 13.4 | | <1 | 16.8 |
| Liquid Volume Processed | gpd | ---- | 28393 | 80254 | 6480 | 26374 | | | | | | | | |
| Sulfide | mg/L | | <0.200 | <0.200 | <1.00 | <1.00 | <0.200 | <0.200 | | 125 | <0.200 | <0.200 | | |
| **Metals** | | | | | | | | | | | | | | |
| Phenolic, Total | mg/L | 420.4, 420.1 | | 2.55 | 5.1 | 6.5 | 6.5 | | | 0.800 | 0.108 | | 0.031 | 6.79 |
| **Volatile Organic Compounds - Purgeables (10)** | | | | | | | | | | | | | | |
| Chloromethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Vinyl Chloride | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Bromomethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Chloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Trichlorofluoromethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Diethyl ether | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,1,2-Trichloro-1,2,2-trifluoroe | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Acetone | µg/L | 8260C | 4200 | 4440 | 7160 | 7380 | 8260 | 9040 | | <50.0 | 60.1 | 362 | | |
| 1,1-Dichloroethene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Methylene chloride | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | 2280 | | |
| Carbon disulfide | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| trans-1,2-Dichlorethene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,1-Dichloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Vinyl acetate | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 2-Butanone | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Ethyl acetate | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Chloroform | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,1,1-Trichloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Carbon tetrachloride | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,2-Dichloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Benzene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Trichloroethene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,2-Dichlropropane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Bromodichloromethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 2-Chloroethylvinyl ether | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 4-Methyl-2-pentanone | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| cis-1,3-Dichloropropene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Toluene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| trans-1,3-Dichloropropene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,1,2-Trichloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 2-Hexanone | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Tetrachloroethene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Dibromochloromethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Chlorobenzene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Ethylbenezene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Xylenes, total | µg/L | 8260C | <3000 | <3000 | <3000 | <3000 | <3000 | <3000 | | <150 | <60.0 | <150 | | |
| Styrene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| Bromoform | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,1,2,2-Tetrachloroethane | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,3-Dichlorobenzene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,4-Dichlorobenzene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| 1,2-Dichlorobenzene | µg/L | 8260C | <1000 | <1000 | <1000 | <1000 | <1000 | <1000 | | <50.0 | <20.0 | <50.0 | | |
| **Semi-Volatile Organic Compounds - Base Acid/Neutrals** | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 1,2-Dichlorobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 1,3-Dichlorobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 1,4-Dichlorobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2,4,5-Trichlorophenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2,4,6-Trichlorophenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2,4-Dichlorophenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2,4-Dimethylphenol | µg/L | 625 | | 71 | 140 | 110 | 120 | 110 | | <50 | <50 | | <5 | 140 |
| 2,4-Dinitrophenol | µg/L | 625 | | <250 | <500 | <500 | <500 | <500 | | <250 | <250 | | <25 | <500 |
| 2,4-Dinitrotoluene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2,6-Dinitrotoluene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2-Chloronaphthalene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2-Chlorophenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 2-Methylnaphthalene | µg/L | 625 | | | | | | | | | | | | |
| 2-Methylphenol | µg/L | 625 | | | | | | | | | | | | |
| 2-Nitrophenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 3,3´-Dichlorobenzidine | µg/L | 625 | | <100 | <200 | <200 | <200 | <200 | | <100 | <100 | | <10 | <200 |
| 4,6-Dinitro-2-methylphenol | µg/L | 625 | | <250 | <500 | <500 | <500 | <500 | | <250 | <250 | | <25 | <500 |
| 4-Bromophenyl phenyl ether | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 4-Chloro-3-methylphenol | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 4-Chlorophenyl phenyl ether | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| 4-Methylphenol | µg/L | 625 | | | | | | | | | | | | |
| 4-Nitrophenol | µg/L | 625 | | <250 | <500 | 500 | <500 | <500 | | <250 | <250 | | <25 | <500 |
| Acenaphthene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |

**Leachate Analytical Data - T-160**
**AWTS & FacPond Evaluation**

**CWM Chemical Services, LLC**
**Model City, NY**

**May 2012 - rev. 1**

**SLF 12 standpipe**

SLF 12 lift station

RMU-1, SLF-12 tank sampl 120202028 T160 AES 0 120210022 120215024 120216018CMW.xls, T160 021512.xlsx 120215035 120215034 Old Landfill Old Landfill Leachates_ 111116033

| Parameter | Units | Analytical Method | RMU-1 T-160 1/31/2012 | RMU-1 T-160 2/1/2012 | RMU-1 T-160 2/7/2012 | RMU-1 T-160 2/9/2012 | RMU-1 T-160 2/14/2012 | RMU-1 T-160 2/15/2012 | RMU-1 8/22/12 | L-54 2/14/2012 | T-150 2/14/2012 | T-150 2/14/2012 | T-150 7/23/2012 | Combined T-102 11/15/2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Samples Collected*** | | | | | | ***6*** | | | | ***1*** | ***1*** | | | ***1*** |
| ***Samples Required*** | | | | | | ***6*** | | | | ***3*** | ***3*** | | | ***24*** |
| Acenaphthylene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Anthracene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Azobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benz(a)anthracene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benzidine | µg/L | 625 | | <250 | <500 | <500 | <500 | <500 | | <250 | <250 | | <25 | <500 |
| Benzo(a)pyrene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benzo(b)fluoranthene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benzo(g,h,i)perylene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benzo(k)fluoranthene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Benzothiazole | µg/L | 625 | | | | | | | | | | | | |
| Bis(2-chloroethoxy)methane | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Bis(2-chloroethyl)ether | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Bis(2-chloroisopropyl)ether | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Bis(2-ethylhexyl)phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | 330 | | <5 | <100 |
| Butyl benzyl phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Carbazole | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Chrysene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Dibenz(a,h)anthracene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Dibenzofuran | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Diethyl phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Dimethyl phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Di-n-butyl phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Di-n-octyl phthalate | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Fluoranthene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Fluorene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Hexachlorobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Hexachlorobutadiene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Hexachlorocyclopentadiene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Hexachloroethane | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Hexamethylbenzene | µg/L | 625 | | | | | | | | | | | | |
| Indeno(1,2,3-cd)pyrene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Isophorone | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Naphthalene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| n-decane | µg/L | 625 | | | | | | | | | | | | |
| Nitrobenzene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| N-Nitrosodimethylamine | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| N-Nitrosodi-n-propylamine | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| N-Nitrosodiphenylamine | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| n-Octadecane | µg/L | 625 | | | | | | | | | | | | |
| Pentachlorophenol | µg/L | 625 | | <250 | <500 | <500 | <500 | <100 | | <250 | <250 | | <25 | <500 |
| Phenanthrene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Phenol | µg/L | 625 | | 630 | 1100 | 990 | 1200 | <100 | | <50 | <50 | | <5 | <100 |
| Pyrene | µg/L | 625 | | <50 | <100 | <100 | <100 | <100 | | <50 | <50 | | <5 | <100 |
| Pyridine | µg/L | 625 | | | | | | | | | | | | |
| **PCB Aroclor** | | | | | | | | | | | | | | |
| Aroclor 1016 | µg/L | 608 | | <1.3 | <5.2 | <0.26 | <0.074 | <0.349 | | <0.357 | <13.1 | | <16.8 | <3.25 |
| Aroclor 1221 | µg/L | 608 | | <1.3 | <5.2 | <0.26 | <0.074 | <0.349 | | <0.357 | <13.1 | | <16.8 | <3.25 |
| Aroclor 1232 | µg/L | 608 | | <1.3 | <5.2 | <0.26 | <0.074 | <0.349 | | <0.357 | <13.1 | | <16.8 | <3.25 |
| Aroclor 1242 | µg/L | 608 | | 3 | 29.6 | <0.26 | 2.04 | <0.349 | | <0.357 | 34.6 | | 226 | 5.32 |
| Aroclor 1248 | µg/L | 608 | | <1.3 | <5.2 | <0.26 | <0.074 | <0.349 | | <0.357 | <13.1 | | <16.8 | <3.25 |
| Aroclor 1254 | µg/L | 608 | | <1.3 | <5.2 | <0.26 | <0.074 | <0.349 | | <0.357 | 289 | | 92.5 | <3.25 |
| Aroclor 1260 | µg/L | 608 | | 1.67 | 112 | <0.26 | <0.074 | <0.349 | | <0.357 | 227 | | 69.7 | <3.25 |
| | | | | | | | | | | | | | | |
| Aroclor 1016 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1221 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1232 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1242 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1248 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1254 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1260 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1262 | µg/L | 8082A | | | | | | | | | | | | |
| Aroclor 1268 | µg/L | 8082A | | | | | | | | | | | | |
| **Chlorinated Pesticides** | | | | | | | | | | | | | | |
| 4,4´-DDD | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| 4,4´-DDE | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| 4,4´-DDT | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| Aldrin | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| alpha-BHC | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| alpha-Chlordane | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| beta-BHC | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Chlordane | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| delta-BHC | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Dieldrin | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| Endosulfan I | µg/L | 608 | | <0.2 | <4 | <0.2 | <0.057 | <0.054 | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Endosulfan II | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| Endosulfan sulfate | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |
| Endrin | µg/L | 608 | | <0.4 | <8 | <0.4 | <0.114 | <0.108 | | <0.110 | <20.2 | | <25.8 | <1.11 |

**Leachate Analytical Data - T-160**
**AWTS & FacPond Evaluation**

**CWM Chemical Services, LLC**
**Model City, NY**

**May 2012 - rev. 1**

RMU-1, SLF-12 tank sampl 120202028 T160 AES 0 120210022 120215024 120216018CMW.xls, T160 021512.xlsx 120215035 120215034 Old Landfill Old Landfill Leachates_ 111116033

**SLF 12 standpipe**

SLF 12 lift station

| Parameter | Units | Analytical Method | RMU-1 T-160 1/31/2012 | RMU-1 T-160 2/1/2012 | RMU-1 T-160 2/7/2012 | RMU-1 T-160 2/9/2012 | RMU-1 T-160 2/14/2012 | RMU-1 T-160 2/15/2012 | RMU-1 8/22/12 | L-54 2/14/2012 | T-150 2/14/2012 | T-150 2/14/2012 | T-150 7/23/2012 | Combined T-102 11/15/2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Samples Collected*** | | | | | | ***6*** | | | | ***1*** | ***1*** | | | ***1*** |
| ***Samples Required*** | | | | | | ***6*** | | | | ***3*** | ***3*** | | | ***24*** |
| Endrin aldehyde | µg/L | 608 | | <8 | <0.114 | <0.108 | | | | <0.110 | <20.2 | | <25.8 | <1.11 |
| Endrin Ketone | µg/L | 608 | | <8 | <0.108 | <0.108 | | | | <0.110 | <20.2 | | <25.8 | <1.11 |
| gamma-BHC | µg/L | 608 | | <4 | <0.054 | <0.054 | | | | <0.055 | <10.1 | | <12.9 | <0.56 |
| gamma-Chlordane | µg/L | 608 | | <4 | <0.054 | <0.054 | | | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Heptachlor | µg/L | 608 | | <4 | <0.054 | <0.054 | | | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Heptachlor epoxide | µg/L | 608 | | <4 | <0.054 | <0.054 | | | | <0.055 | <10.1 | | <12.9 | <0.56 |
| Methoxychlor | µg/L | 608 | | <40 | <0.538 | <0.538 | | | | <0.549 | <101 | | <129 | <5.56 |
| Toxaphene | µg/L | 608 | | <80 | <1.08 | <1.08 | | | | <1.10 | <202 | | <258 | <11.1 |
| **Other key considerations** | | | | | | | | | | | | | | |

Key:

# Attachment 5
# Estimated Emissions from Landfill Active Area

# *Chemical Waste Management, Model City, New York*

Waste Profile Report

| PROFILE NUMBER | | | max |
|---|---|---|---|
| TOTAL WEIGHT (tons) | | | 500000 |
| PARAMETER (Concentrations in PPM) | CAS | CLASS (Table 51.1 or 51.3) | |
| Non-Hazardous VOCs (Generic Oil) | N/A | N/A | |
| Non-Hazardous VOCs (Generic Fuel) | N/A | N/A | |
| 1,1,1-Trichloroethane (Methyl chloroform) | 71-55-6 | Class III | 1.147447 |
| 1,1,2-Trichloroethane (Cloroethene) | 79-00-5 | Class II | 0.011028 |
| 1,2,4-Trichlorobenzene (unsym-Trichlorobenzene) | 120-82-1 | Class II | 9.988952 |
| 1,2-Dibromo-3-chloropropane (DBCP) | 96-12-8 | Class II | |
| 1,2-Dibromoethane (Ethylene bromide, Ethylene dibromide) | 106-93-4 | Class I | |
| 1,2-Dichloroethane (Ethylene dichloride, EDC) | 107-06-2 | Class II | 0.028965 |
| 1,2-Dichloropropane (Propylene dichloride) | 78-87-5 | Class II | |
| 1,3-Dichloropropylene (1,3-dichloropropene, DCP) | 542-75-6 | Class II | |
| 1,4-Dichlorobenzene (p-Dichlorobenzene) | 106-46-7 | Class II | 0.351931 |
| 1,4-Dioxane (Diethylene dioxide, p-Dioxane) | 123-91-1 | Class II | |
| 2,3-Toluene diamine (MTD, Toluene-2,4-diamine) | 25376-45-8 | Class II | |
| 2,4,5-Trichlorophenol | 95-95-4 | Class III | |
| 2,4,6-Trichlorophenol (2,4,6-T) | 88-06-2 | Class II | |
| 2,4-Dinitrophenol | 51-28-5 | Class II | |
| 2,4-Dinitrotoluene (2,4-DNT) | 121-14-2 | Class II | |
| 2,6-Dinitrotoluene | 606-20-2 | Class II | |
| 2-Acetylaminofluorene (N-flouren-2-yl-acetamide) | 53-96-3 | Class II | |
| 4,4'-Methylene-bis(2-chloroaniline) (MOCA, MBOCA) | 101-14-4 | Class II | |
| 4-Nitrophenol (p-Nitrophenol) | 100-02-7 | Class III | |
| Acetonitrile (Cyanomethane, Methyl cyanide) | 75-05-8 | Class II | |
| Acetophenone | 98-86-2 | Class III | |
| Acrylamide (Acrylic amide) | 79-06-1 | Class II | |
| Acrylic acid (Acroleic acid, Propene acid) | 79-10-7 | Class III | |
| Acrylonitrile | 107-13-1 | Class I | 0.00031 |
| Allyl chloride (3-Chloropropene) | 107-05-1 | Class II | |
| Aniline (Aminobenzene), Phenylamine) | 62-53-3 | Class II | |
| Benzene (Benzol, Coal naphhtha) | 71-43-2 | Class I | 0.345517 |
| bis(2-Chloroethyl) ether (Dichloroethyl ether) | 111-44-4 | Class I | |
| bis (2-Ethylhexyl) phthalate (DEHP, Di-(2-ethylhexyl)phthalate | 117-81-7 | Class II | 7.332404 |
| Bromoform (Tribromomethane) | 75-25-2 | Class II | |
| Carbon disulfide (Carbon bisulfide) | 75-15-0 | Class II | 0.119793 |
| Carbon tetrachloride (Tetrachloromethane) | 56-23-5 | Class II | 0.00809 |
| Chlordane | 57-74-9 | Class II | 0.054264 |
| Chlorobenzene (Benzene chloride) | 108-90-7 | Class II | 6.765508 |
| Chloroethane (Ethyl chloride) | 75-00-3 | Class II | |
| Chloroform (Trichloromethane) | 67-66-3 | Class II | 0.039264 |
| Chloromethane (Methyl chloride) | 74-87-3 | Class II | |
| Cresol - mixed isomers | 1319-77-3 | Class III | 0.000942 |
| DDE (p,p'-dichlorodiphenyldichloroethylene) | 72-55-9 | Class II | |
| Dibutyl phthalate (DBP) | 84-74-2 | Class II | 6.012406 |
| Dichloromethane (Methylene chloride, DCM) | 75-09-2 | Class II | 0.715861 |
| Dimethyl phthalate (Phthalic acid methyl ester) | 131-11-3 | Class II | |
| Ethyl acrylate (Ethyl propenoate) | 140-88-5 | Class II | |
| Ethyl benzene (Phenylethane) | 100-41-4 | Class II | 3.475857 |
| Ethylene glycol | 107-21-1 | Class III | 0.268326 |

# *Chemical Waste Management, Model City, New York*

Waste Profile Report

| PROFILE NUMBER | | | max |
|---|---|---|---|
| TOTAL WEIGHT (tons) | | | 500000 |
| PARAMETER (Concentrations in PPM) | CAS | CLASS (Table 51.1 or 51.3) | |
| Ethylene oxide | 75-21-8 | Class I | |
| Ethylidene dichloride (1,1-dichloroethane) | 75-34-3 | ClassII | |
| Formaldehyde (methylene oxide) | 50-00-0 | Class I | |
| Glycol ethers | 109-86-4 | Class II | |
| Heptachlor (3-Chlorochlordene) | 76-44-8 | Class II | |
| Hexachloro-1,3-butadiene (Hexachlorobutadiene) | 87-68-3 | Class II | |
| Hexachlorobenzene (Perchlorobenzene) | 118-74-1 | Class II | |
| Hexachlorocyclopentadiene (HCCPD) | 77-47-4 | Class III | |
| Hexachloroethane (Perchloroethane) | 67-72-1 | Class II | |
| Methanol (Methyl alcohol) | 67-56-1 | Class III | |
| Methoxychlor (Methoxy DDT, DMDT, Dimethoxy-DDT) | 72-43-5 | Class II | |
| Methyl Bromide (Bromomethane) | 74-83-9 | Class III | |
| Methyl ethyl ketone (MEK) | 78-93-3 | Class III | 1.991377 |
| Methyl iodide (Iodomethane) | 74-88-4 | Class II | |
| Methyl isobutyl ketone (MIBK) | 108-10-1 | Class III | |
| Methyl methacrylate | 80-62-6 | Class III | |
| n-Butyl alcohol (n-Butanol) | 71-36-3 | Class III | |
| n-Hexane | 110-54-3 | Class III | |
| n-Nitrosodimethylamine (DMN, dimethylnitrosoamine) | 62-75-9 | Class I | |
| n-Nitrosomorpholine (4-Nitrosomorpholine) | 59-89-2 | Class II | |
| Naphthalene (and Methylnaphthalenes) | 91-20-3 | Class II | 5.263441 |
| Nitrobenzene (Nitrobenzol) | 98-95-3 | Class II | |
| Parathion (AATP, ethyl parathion) | 56-38-2 | Class II | |
| Pentachloronitrobenzene (Quintobenzene, PCNB) | 82-68-8 | Class II | |
| Pentachlorophenol (PCP) | 87-86-5 | Class II | |
| Phenol (Benzenol, Carbolic acid) | 108-95-2 | Class II | 0.000881 |
| Phthalic anhydride | 85-44-9 | Class III | |
| Polynuclear Aromatic Hydrocarbons (Generic PAHs) | 206-44-0 | Class II | 15.03722 |
| Propoxur (Baygon, 0-Isopropoxyphenyl methylcarbamate) | 114-26-01 | Class III | |
| Pyridine | 110-86-1 | Class III | 0.000717 |
| Styrene (Vinylbenzene) | 100-42-5 | Class II | |
| Tetrachloroethane (Acetylene tetrachloride) | 79-34-5 | Class II | |
| Tetrachloroethylene (Antisol 1, Carbon dichloride, Perchloroethylene) | 127-18-4 | Class II | 0.899999 |
| Toluene (Methylbenzene) | 108-88-3 | Class III | 13.55171 |
| Toluene-2,4-diisocyanate | 584-84-9 | Class II | |
| Toxaphene (Chlorinated camphene) | 8001-35-2 | Class II | |
| Trichloroethylene (Acetylene trichloride) | 79-01-6 | Class II | 0.602068 |
| Vinyl acetate | 108-05-4 | Class III | |
| Vinyl chloride (Chloroethene, Monochloride ethylene) | 75-01-4 | Class I | 0.010034 |
| Vinylidine Chloride (1,1-Dichloroethylene) | 75-35-4 | Class II | |
| Xylene (mixed isomers) | 1330-20-7 | Class II | 10.25792 |
| Biphenyl (1,1-Biphenyl, Xenene) | 95-52-4 | Class II | |
| Benzyl Chloride (Totyl chloride) | 100-44-7 | II | |
| 4,6-Dinitro-o-cresol | 534-52-1 | II | |
| Triethylamine | 121-44-8 | III | |
| Carbaryl | 63-25-2 | II | |
| o-Toluidine | 95-53-4 | II | |

# *Chemical Waste Management, Model City, New York*

Waste Profile Report

| PROFILE NUMBER | | | max |
|---|---|---|---|
| TOTAL WEIGHT (tons) | | | 500000 |
| PARAMETER (Concentrations in PPM) | CAS | CLASS (Table 51.1 or 51.3) | |
| Hydrazine | 302-01-2 | II | |
| Polychlorinated Biphenyls (PCB's) | 1336-36-3 | II | 600 |
| 2-Nitropropane | 79-46-9 | II | |
| Cumene (isopropyl benzene) | 98-82-8 | III | |
| Acenaphthene | 83-32-9 | Class II | |
| Acenaphthylene | 208-96-8 | Class II | |
| Acrolein | 107-02-8 | Class II | |
| Aldrin | 309-00-2 | Class II | |
| Anthracene | 120-12-7 | Class II | 1.603446 |
| Benz (a) anthracene | 56-55-3 | Class II | |
| Benzal Chloride 2 | 98-87-3 | Class II | |
| Benzo (b) flouranthene 4 | 205-66-2 | Class II | |
| Benzo (k) flouranthene 4 | 207-08-9 | Class II | |
| Benzo (a) pyrene | 50-32-8 | Class II | |
| BHC - Lindane | 58-89-9 | Class II | |
| Chlorobenzilate | 510-15-6 | Class II | |
| 2-Chloronaphthalene | 91-58-7 | Class II | |
| Chrysene | 218-01-9 | Class II | |
| Dibenz (a, h) anthracene | 53-70-3 | Class II | |
| Dieldrin | 60-57-1 | Class II | |
| Diphenyl amine 4 | 122-39-4 | Class 2 | |
| 1,2-Diphenylhydrazine | 122-66-7 | Class II | |
| Endrin | 72-20-8 | Class II | |
| Endrin aldehyde | 7421-93-4 | Class II | |
| Ethylene oxide | 75-21-8 | Class II | |
| Fluoranthene | 206-44-0 | Class II | |
| Fluorene | 86-737-7 | Class II | |
| Indeno (1,2,3-c,d) pyrene | 193-39-5 | Class II | |
| 3-Methylcholanthrene | 56-49-5 | Class II | |
| PCBs (Total) all isomers or Aroclors | 1336-36-3 | Class II | 0 |
| Penthachlorobenzene | 608-93-5 | Class II | |
| Phenathrene | 85-01-8 | Class II | 5.536544 |
| Pyrene | 129-00-0 | Class II | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | Class II | |
| Trichloroethene | 79-01-6 | Class II | |
| Tetrachloroethene | 127-18-4 | Class II | |
| 1,3 Butadiene (Biethylene) | 106-99-0 | Class II | |
| 2-Methylnapthalene | 91-57-6 | Class II | |
| 1-Methylnaphthalene | 90-12-0 | Class III | |
| Methyl Tert Butyl Ether (MTBE) | 1634-04-4 | Class III | |
| Acetaldehyde | 75-07-0 | Class II | |
| Diethanolamine | 111-42-2 | Class III | |
| Chloroprene | 126-99-8 | Class II | |
| Lindane | 58-89-9 | Class II | |
| Benzidine | 92-87-5 | Class I | |
| p-Phenylenediamine | 106-50-3 | Class III | |
| benzo(ghi)perylene | 191-24-2 | Class | 0.143108 |

# *Chemical Waste Management, Model City, New York*

Waste Profile Report

| PROFILE NUMBER | | | max |
|---|---|---|---|
| TOTAL WEIGHT (tons) | | | 500000 |
| PARAMETER<br>(Concentrations in PPM) | CAS | CLASS<br>(Table 51.1<br>or 51.3) | |
| 2,4-Dimethylphenol | 105-67-9 | Class | 0.004813 |
| p-phenylenediamine | 106-50-3 | Class | 0.011368 |
| Mercury | 7439-97-6 | Class | 0.025836 |
| 1,2,4-Trimethylbenzene | CAS No. | Class | 0.00127 |

**Chemical Waste Management**
**Model City, New York**

| *Open-Face Landfill Emissions Model Summary* | |
|---|---|
| Modeling Period Start Date: | 1/1/2017 |
| Modeling Period End Date: | 12/31/2017 |
| Total Days Modeled: | 365 |
| | |
| ***Chemical Name*** | ***Pounds Emitted*** |
| 1,1,1-Trichloroethane (Methyl chloroform) | 8.216498885 |
| 1,1,2-Trichloroethane (Cloroethene) | 0.035606138 |
| 1,2,4-Trichlorobenzene (unsym-Trichlorobenzene) | 1.697028002 |
| 1,2-Dichloroethane (Ethylene dichloride, EDC) | 0.193206616 |
| 1,4-Dichlorobenzene (p-Dichlorobenzene) | 0.234144225 |
| Acrylonitrile | 0.002676023 |
| Benzene (Benzol, Coal naphhtha) | 2.312277982 |
| bis (2-Ethylhexyl) phthalate (DEHP, Di-(2-ethylhexyl)phthalate | 0.001420455 |
| Carbon disulfide (Carbon bisulfide) | 1.708832379 |
| Carbon tetrachloride (Tetrachloromethane) | 0.055532325 |
| Chlordane | 4.28397E-05 |
| Chlorobenzene (Benzene chloride) | 14.51995183 |
| Chloroform (Trichloromethane) | 0.42223221 |
| Cresol - mixed isomers | 0.000314341 |
| Dibutyl phthalate (DBP) | 0.028918425 |
| Dichloromethane (Methylene chloride, DCM) | 11.00873087 |
| Ethyl benzene (Phenylethane) | 2.05 |
| Ethylene glycol | 0.072371793 |
| Methyl ethyl ketone (MEK) | 13.08894726 |
| Naphthalene (and Methylnaphthalenes) | 1.42 |
| Phenol (Benzenol, Carbolic acid) | 0.000340535 |
| Polynuclear Aromatic Hydrocarbons (Generic PAHs) | 1.10362345 |
| Pyridine | 0.002236351 |
| Tetrachloroethylene (Antisol 1, Carbon dichloride, Perchloroethylene) | 2.433861637 |
| Toluene (Methylbenzene) | 50.61797121 |
| Trichloroethylene (Acetylene trichloride) | 3.388373425 |
| Vinyl chloride (Chloroethene, Monochloride ethylene) | 0.389563857 |
| Xylene (mixed isomers) | 18.47339831 |
| Polychlorinated Biphenyls (PCB's) | 11.75189097 |
| Anthracene | 0.000760751 |
| Phenathrene | 2.057765208 |
| benzo(ghi)perylene | 4.69858E-07 |
| 2,4-Dimethylphenol | 0.008550833 |
| p-phenylenediamine | 0.000478541 |
| Mercury | 0.00037622 |
| 1,2,4-Trimethylbenzene | 0.001548605 |

| | |
|---|---|
| ***Total Emissions:*** | - |
| ***Total Emissions:*** | 147.30 |
| ***Total Emissions:*** | 147.30 |

| *Chemical Name* | *CAS No.* | *Class* | *Average Concentration* (ppm, by weight) | *Chemical Weight Fraction* (unitless) | *Effective Diffusivity* $D_e$ ($cm^2/s$) | *Partition Coefficient* $K_{eq}$ | *Rate Equation Validity Test* <0.25? | *Emission Rate Factor* $K_{dt}$ | *Fraction Emitted* $F_t$ | *Mass Avb'l for Emission* $M_o$ ($g/cm^2$) | *Total Mass Emitted* $E_{timeperiod}$ (Megagram | *Total Mass Emitted* $E_{timeperiod}$ (Pounds) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-Hazardous VOCs (Generic Oil) | N/A | N/A | 0.000E+00 | 0.000E+00 | 8.101E-05 | 6.193E-06 | YES!! | 1.167E-06 | 7.779E-04 | 0.000 | 0.00E+00 | - |
| Non-Hazardous VOCs (Generic Fuel) | N/A | N/A | 0.000E+00 | 0.000E+00 | 1.497E-04 | 5.630E-04 | YES!! | 1.961E-04 | 1.008E-02 | 0.000 | 0.00E+00 | - |
| 1,1,1-Trichloroethane (Methyl chloroform | 71-55-6 | Class III | 1.147E+00 | 1.659E-03 | 1.459E-04 | 1.822E-01 | YES!! | 6.186E-02 | 1.791E-01 | 0.000 | 3.73E-03 | 8.22 |
| 1,1,2-Trichloroethane (Cloroethene) | 79-00-5 | Class II | 1.103E-02 | 1.595E-05 | 1.459E-04 | 3.704E-02 | YES!! | 1.258E-02 | 8.074E-02 | 0.000 | 1.62E-05 | 0.04 |
| 1,2,4-Trichlorobenzene (unsym-Trichloro | 120-82-1 | Class II | 9.989E+00 | 1.444E-02 | 5.613E-05 | 2.666E-04 | YES!! | 3.482E-05 | 4.249E-03 | 0.003 | 7.70E-04 | 1.70 |
| 1,2-Dibromo-3-chloropropane (DBCP) | 96-12-8 | Class II | 0.000E+00 | 0.000E+00 | 3.966E-05 | 1.185E-03 | YES!! | 1.094E-04 | 7.530E-03 | 0.000 | 0.00E+00 | - |
| 1,2-Dibromoethane (Ethylene bromide, E | 106-93-4 | Class I | 0.000E+00 | 0.000E+00 | 5.370E-05 | 1.745E-02 | YES!! | 2.180E-03 | 3.362E-02 | 0.000 | 0.00E+00 | - |
| 1,2-Dichloroethane (Ethylene dichloride, | 107-06-2 | Class II | 2.897E-02 | 4.188E-05 | 1.946E-04 | 1.186E-01 | YES!! | 5.367E-02 | 1.668E-01 | 0.000 | 8.76E-05 | 0.19 |
| 1,2-Dichloropropane (Propylene dichlorid | 78-87-5 | Class II | 0.000E+00 | 0.000E+00 | 1.463E-04 | 5.926E-02 | YES!! | 2.017E-02 | 1.023E-01 | 0.000 | 0.00E+00 | - |
| 1,3-Dichloropropylene (1,3-dichloroprope | 542-75-6 | Class II | 0.000E+00 | 0.000E+00 | 1.171E-04 | 6.371E-02 | YES!! | 1.736E-02 | 9.486E-02 | 0.000 | 0.00E+00 | - |
| 1,4-Dichlorobenzene (p-Dichlorobenzene | 106-46-7 | Class II | 3.519E-01 | 5.089E-04 | 1.291E-04 | 1.778E-03 | YES!! | 5.340E-04 | 1.664E-02 | 0.000 | 1.06E-04 | 0.23 |
| 1,4-Dioxane (Diethylene dioxide, p-Dioxa | 123-91-1 | Class II | 0.000E+00 | 0.000E+00 | 4.284E-04 | 5.481E-02 | YES!! | 5.464E-02 | 1.683E-01 | 0.000 | 0.00E+00 | - |
| 2,3-Toluene diamine (MTD, Toluene-2,4- | 25376-45-8 | Class II | 0.000E+00 | 0.000E+00 | 1.065E-04 | 2.356E-03 | YES!! | 5.834E-04 | 1.739E-02 | 0.000 | 0.00E+00 | - |
| 2,4,5-Trichlorophenol | 95-95-4 | Class III | 0.000E+00 | 0.000E+00 | 5.444E-05 | 5.913E-05 | YES!! | 7.489E-06 | 1.970E-03 | 0.000 | 0.00E+00 | - |
| 2,4,6-Trichlorophenol (2,4,6-T) | 88-06-2 | Class II | 0.000E+00 | 0.000E+00 | 5.875E-05 | 1.082E-05 | YES!! | 1.478E-06 | 8.754E-04 | 0.000 | 0.00E+00 | - |
| 2,4-Dinitrophenol | 51-28-5 | Class II | 0.000E+00 | 0.000E+00 | 5.108E-05 | 2.074E-05 | YES!! | 2.465E-06 | 1.130E-03 | 0.000 | 0.00E+00 | - |
| 2,4-Dinitrotoluene (2,4-DNT) | 121-14-2 | Class II | 0.000E+00 | 0.000E+00 | 3.798E-04 | 7.555E-06 | YES!! | 6.676E-06 | 1.860E-03 | 0.000 | 0.00E+00 | - |
| 2,6-Dinitrotoluene | 606-20-2 | Class II | 0.000E+00 | 0.000E+00 | 6.118E-05 | 8.889E-03 | YES!! | 1.265E-03 | 2.561E-02 | 0.000 | 0.00E+00 | - |
| 2-Acetylaminofluorene (N-flouren-2-yl-ace | 53-96-3 | Class II | 0.000E+00 | 0.000E+00 | 4.965E-05 | 1.778E-05 | YES!! | 2.054E-06 | 1.032E-03 | 0.000 | 0.00E+00 | - |
| 4,4'-Methylene-bis(2-chloroaniline) (MOC | 101-14-4 | Class II | 0.000E+00 | 0.000E+00 | 3.723E-05 | 1.025E-07 | YES!! | 8.876E-09 | 6.783E-05 | 0.000 | 0.00E+00 | - |
| 4-Nitrophenol (p-Nitrophenol) | 100-02-7 | Class III | 0.000E+00 | 0.000E+00 | 8.045E-05 | 1.486E-07 | YES!! | 2.782E-08 | 1.201E-04 | 0.000 | 0.00E+00 | - |
| Acetonitrile (Cyanomethane, Methyl cyan | 75-05-8 | Class II | 0.000E+00 | 0.000E+00 | 2.395E-04 | 1.333E-01 | YES!! | 7.429E-02 | 1.962E-01 | 0.000 | 0.00E+00 | - |
| Acetophenone | 98-86-2 | Class III | 0.000E+00 | 0.000E+00 | 1.123E-04 | 4.400E-04 | YES!! | 1.149E-04 | 7.719E-03 | 0.000 | 0.00E+00 | - |
| Acrylamide (Acrylic amide) | 79-06-1 | Class II | 0.000E+00 | 0.000E+00 | 1.815E-04 | 1.778E-05 | YES!! | 7.507E-06 | 1.973E-03 | 0.000 | 0.00E+00 | - |
| Acrylic acid (Acroleic acid, Propene acid) | 79-10-7 | Class III | 0.000E+00 | 0.000E+00 | 1.834E-04 | 7.704E-03 | YES!! | 3.286E-03 | 4.128E-02 | 0.000 | 0.00E+00 | - |
| Acrylonitrile | 107-13-1 | Class I | 3.103E-04 | 4.487E-07 | 2.283E-04 | 1.689E-01 | YES!! | 8.969E-02 | 2.156E-01 | 0.000 | 1.21E-06 | 0.00 |
| Allyl chloride (3-Chloropropene) | 107-05-1 | Class II | 0.000E+00 | 0.000E+00 | 1.886E-04 | 5.348E-01 | YES!! | 2.347E-01 | 3.488E-01 | 0.000 | 0.00E+00 | - |
| Aniline (Aminobenzene), Phenylamine) | 62-53-3 | Class II | 0.000E+00 | 0.000E+00 | 1.310E-04 | 1.482E-03 | YES!! | 4.515E-04 | 1.530E-02 | 0.000 | 0.00E+00 | - |
| Benzene (Benzol, Coal naphhtha) | 71-43-2 | Class I | 3.455E-01 | 4.996E-04 | 1.646E-04 | 1.410E-01 | YES!! | 5.403E-02 | 1.674E-01 | 0.000 | 1.05E-03 | 2.31 |
| bis(2-Chloroethyl) ether (Dichloroethyl eth | 111-44-4 | Class I | 0.000E+00 | 0.000E+00 | 1.295E-04 | 2.074E-03 | YES!! | 6.248E-04 | 1.800E-02 | 0.000 | 0.00E+00 | - |
| bis (2-Ethylhexyl) phthalate (DEHP, Di-(2 | 117-81-7 | Class II | 7.332E+00 | 1.060E-02 | 6.567E-05 | 2.963E-10 | YES!! | 4.527E-11 | 4.845E-06 | 0.002 | 6.44E-07 | 0.00 |
| Bromoform (Tribromomethane) | 75-25-2 | Class II | 0.000E+00 | 0.000E+00 | 2.788E-05 | 8.296E-03 | YES!! | 5.381E-04 | 1.670E-02 | 0.000 | 0.00E+00 | - |
| Carbon disulfide (Carbon bisulfide) | 75-15-0 | Class II | 1.198E-01 | 1.732E-04 | 1.946E-04 | 5.423E-01 | YES!! | 2.455E-01 | 3.567E-01 | 0.000 | 7.75E-04 | 1.71 |
| Carbon tetrachloride (Tetrachloromethan | 56-23-5 | Class II | 8.090E-03 | 1.170E-05 | 1.459E-04 | 1.674E-01 | YES!! | 5.684E-02 | 1.717E-01 | 0.000 | 2.52E-05 | 0.06 |
| Chlordane | 57-74-9 | Class II | 5.426E-02 | 7.846E-05 | 2.208E-05 | 1.464E-08 | YES!! | 7.519E-10 | 1.974E-05 | 0.000 | 1.94E-08 | 0.00 |
| Chlorobenzene (Benzene chloride) | 108-90-7 | Class II | 6.766E+00 | 9.782E-03 | 1.366E-04 | 1.749E-02 | YES!! | 5.557E-03 | 5.367E-02 | 0.002 | 6.59E-03 | 14.52 |
| Chloroethane (Ethyl chloride) | 75-00-3 | Class II | 0.000E+00 | 0.000E+00 | 5.070E-04 | 1.778E+00 | NO!! | 2.097E+00 | 1.043E+00 | 0.000 | 0.00E+00 | - |
| Chloroform (Trichloromethane) | 67-66-3 | Class II | 3.926E-02 | 5.677E-05 | 1.946E-04 | 3.082E-01 | YES!! | 1.395E-01 | 2.689E-01 | 0.000 | 1.92E-04 | 0.42 |
| Chloromethane (Methyl chloride) | 74-87-3 | Class II | 0.000E+00 | 0.000E+00 | 2.357E-04 | 5.674E+00 | NO!! | 3.112E+00 | 1.270E+00 | 0.000 | 0.00E+00 | - |
| Cresol - mixed isomers | 1319-77-3 | Class III | 9.422E-04 | 1.362E-06 | 1.298E-04 | 4.445E-04 | YES!! | 1.343E-04 | 8.343E-03 | 0.000 | 1.43E-07 | 0.00 |
| DDE (p,p'-dichlorodiphenyldichloroethyler | 72-55-9 | Class II | 0.000E+00 | 0.000E+00 | 2.694E-05 | 1.013E-08 | YES!! | 6.352E-10 | 1.815E-05 | 0.000 | 0.00E+00 | - |
| Dibutyl phthalate (DBP) | 84-74-2 | Class II | 6.012E+00 | 8.693E-03 | 8.195E-05 | 1.464E-07 | YES!! | 2.791E-08 | 1.203E-04 | 0.002 | 1.31E-05 | 0.03 |
| Dichloromethane (Methylene chloride, DC | 75-09-2 | Class II | 7.159E-01 | 1.035E-03 | 1.890E-04 | 6.489E-01 | YES!! | 2.853E-01 | 3.846E-01 | 0.000 | 4.99E-03 | 11.01 |
| Dimethyl phthalate (Phthalic acid methyl | 131-11-3 | Class II | 0.000E+00 | 0.000E+00 | 1.063E-04 | 2.961E-07 | YES!! | 7.322E-08 | 1.948E-04 | 0.000 | 0.00E+00 | - |
| Ethyl acrylate (Ethyl propenoate) | 140-88-5 | Class II | 0.000E+00 | 0.000E+00 | 1.441E-04 | 5.926E-02 | YES!! | 1.986E-02 | 1.015E-01 | 0.000 | 0.00E+00 | - |
| Ethyl benzene (Phenylethane) | 100-41-4 | Class II | 3.476E+00 | 5.026E-03 | 1.403E-04 | 1.289E-03 | YES!! | 4.209E-04 | 1.477E-02 | 0.001 | 9.31E-04 | 2.05 |
| Ethylene glycol | 107-21-1 | Class III | 2.683E-01 | 3.880E-04 | 2.021E-04 | 1.867E-04 | YES!! | 8.776E-05 | 6.745E-03 | 0.000 | 3.28E-05 | 0.07 |
| Ethylene oxide | 75-21-8 | Class I | 0.000E+00 | 0.000E+00 | 1.946E-04 | 1.852E+00 | NO!! | 8.384E-01 | 6.593E-01 | 0.000 | 0.00E+00 | - |
| Ethylidene dichloride (1,1-dichloroethane | 75-34-3 | ClassII | 0.000E+00 | 0.000E+00 | 1.388E-04 | 8.758E-01 | YES!! | 2.829E-01 | 3.829E-01 | 0.000 | 0.00E+00 | - |

| *Chemical Name* | *CAS No.* | *Class* | *Average Concentration* (ppm, by weight) | *Chemical Weight Fraction* (unitless) | *Effective Diffusivity* $D_e$ ($cm^2/s$) | *Partition Coefficient* $K_{eq}$ | *Rate Equation Validity Test* <0.25? | *Emission Rate Factor* $K_{dt}$ | *Fraction Emitted* $F_t$ | *Mass Avb'l for Emission* $M_o$ ($g/cm^2$) | *Total Mass Emitted* $E_{timeperiod}$ (Megagram | *Total Mass Emitted* $E_{timeperiod}$ (Pounds) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Formaldehyde (methylene oxide) | 50-00-0 | Class I | 0.000E+00 | 0.000E+00 | 3.330E-04 | 5.185E+00 | NO!! | 4.018E+00 | 1.443E+00 | 0.000 | 0.00E+00 | - |
| Glycol ethers | 109-86-4 | Class II | 0.000E+00 | 0.000E+00 | 1.310E-04 | 5.096E-03 | YES!! | 1.553E-03 | 2.837E-02 | 0.000 | 0.00E+00 | - |
| Heptachlor (3-Chlorochlordene) | 76-44-8 | Class II | 0.000E+00 | 0.000E+00 | 2.095E-05 | 4.448E-07 | YES!! | 2.168E-08 | 1.060E-04 | 0.000 | 0.00E+00 | - |
| Hexachloro-1,3-butadiene (Hexachlorobu | 87-68-3 | Class II | 0.000E+00 | 0.000E+00 | 1.050E-04 | 2.222E-04 | YES!! | 5.427E-05 | 5.304E-03 | 0.000 | 0.00E+00 | - |
| Hexachlorobenzene (Perchlorobenzene) | 118-74-1 | Class II | 0.000E+00 | 0.000E+00 | 1.014E-04 | 7.112E-06 | YES!! | 1.678E-06 | 9.326E-04 | 0.000 | 0.00E+00 | - |
| Hexachlorocyclopentadiene (HCCPD) | 77-47-4 | Class III | 0.000E+00 | 0.000E+00 | 3.012E-05 | 1.200E-04 | YES!! | 8.412E-06 | 2.088E-03 | 0.000 | 0.00E+00 | - |
| Hexachloroethane (Perchloroethane) | 67-72-1 | Class II | 0.000E+00 | 0.000E+00 | 4.677E-06 | 9.630E-04 | YES!! | 1.048E-05 | 2.331E-03 | 0.000 | 0.00E+00 | - |
| Methanol (Methyl alcohol) | 67-56-1 | Class III | 0.000E+00 | 0.000E+00 | 2.806E-04 | 1.689E-01 | YES!! | 1.103E-01 | 2.391E-01 | 0.000 | 0.00E+00 | - |
| Methoxychlor (Methoxy DDT, DMDT, Dim | 72-43-5 | Class II | 0.000E+00 | 0.000E+00 | 2.919E-05 | 2.297E-07 | YES!! | 1.560E-08 | 8.992E-05 | 0.000 | 0.00E+00 | - |
| Methyl Bromide (Bromomethane) | 74-83-9 | Class III | 0.000E+00 | 0.000E+00 | 2.788E-05 | 2.356E+00 | YES!! | 1.528E-01 | 2.814E-01 | 0.000 | 0.00E+00 | - |
| Methyl ethyl ketone (MEK) | 78-93-3 | Class III | 1.991E+00 | 2.879E-03 | 1.512E-04 | 1.482E-01 | YES!! | 5.212E-02 | 1.644E-01 | 0.001 | 5.94E-03 | 13.09 |
| Methyl iodide (Iodomethane) | 74-88-4 | Class II | 0.000E+00 | 0.000E+00 | 7.297E-05 | 5.926E-01 | YES!! | 1.006E-01 | 2.284E-01 | 0.000 | 0.00E+00 | - |
| Methyl isobutyl ketone (MIBK) | 108-10-1 | Class III | 0.000E+00 | 0.000E+00 | 1.403E-04 | 2.326E-02 | YES!! | 7.594E-03 | 6.274E-02 | 0.000 | 0.00E+00 | - |
| Methyl methacrylate | 80-62-6 | Class III | 0.000E+00 | 0.000E+00 | 1.441E-04 | 5.334E-02 | YES!! | 1.788E-02 | 9.627E-02 | 0.000 | 0.00E+00 | - |
| n-Butyl alcohol (n-Butanol) | 71-36-3 | Class III | 0.000E+00 | 0.000E+00 | 1.497E-04 | 9.630E-03 | YES!! | 3.354E-03 | 4.169E-02 | 0.000 | 0.00E+00 | - |
| n-Hexane | 110-54-3 | Class III | 0.000E+00 | 0.000E+00 | 3.742E-04 | 2.222E-01 | YES!! | 1.935E-01 | 3.167E-01 | 0.000 | 0.00E+00 | - |
| n-Nitrosodimethylamine (DMN, dimethyln | 62-75-9 | Class I | 0.000E+00 | 0.000E+00 | 2.107E-04 | 1.186E-02 | YES!! | 5.811E-03 | 5.489E-02 | 0.000 | 0.00E+00 | - |
| n-Nitrosomorpholine (4-Nitrosomorpholin | 59-89-2 | Class II | 0.000E+00 | 0.000E+00 | 1.104E-04 | 1.474E-04 | YES!! | 3.785E-05 | 4.430E-03 | 0.000 | 0.00E+00 | - |
| Naphthalene (and Methylnaphthalenes) | 91-20-3 | Class II | 5.263E+00 | 7.610E-03 | 1.104E-04 | 3.407E-04 | YES!! | 8.750E-05 | 6.735E-03 | 0.001 | 6.43E-04 | 1.42 |
| Nitrobenzene (Nitrobenzol) | 98-95-3 | Class II | 0.000E+00 | 0.000E+00 | 1.422E-04 | 4.445E-04 | YES!! | 1.470E-04 | 8.731E-03 | 0.000 | 0.00E+00 | - |
| Parathion (AATP, ethyl parathion) | 56-38-2 | Class II | 0.000E+00 | 0.000E+00 | 3.181E-05 | 5.630E-08 | YES!! | 4.166E-09 | 4.647E-05 | 0.000 | 0.00E+00 | - |
| Pentachloronitrobenzene (Quintobenzene | 82-68-8 | Class II | 0.000E+00 | 0.000E+00 | 2.975E-05 | 1.464E-07 | YES!! | 1.013E-08 | 7.247E-05 | 0.000 | 0.00E+00 | - |
| Pentachlorophenol (PCP) | 87-86-5 | Class II | 0.000E+00 | 0.000E+00 | 1.048E-04 | 7.408E-06 | YES!! | 1.806E-06 | 9.675E-04 | 0.000 | 0.00E+00 | - |
| Phenol (Benzenol, Carbolic acid) | 108-95-2 | Class II | 8.808E-04 | 1.273E-06 | 1.534E-04 | 5.052E-04 | YES!! | 1.803E-04 | 9.669E-03 | 0.000 | 1.54E-07 | 0.00 |
| Phthalic anhydride | 85-44-9 | Class III | 0.000E+00 | 0.000E+00 | 1.328E-04 | 2.223E-06 | YES!! | 6.869E-07 | 5.967E-04 | 0.000 | 0.00E+00 | - |
| Polynuclear Aromatic Hydrocarbons (Ger | 206-44-0 | Class II | 1.504E+01 | 2.174E-02 | 8.213E-05 | 3.400E-05 | YES!! | 6.498E-06 | 1.835E-03 | 0.004 | 5.01E-04 | 1.10 |
| Propoxur (Baygon, 0-Isopropoxyphenyl m | 114-26-01 | Class III | 0.000E+00 | 0.000E+00 | 5.108E-05 | 2.548E-05 | YES!! | 3.028E-06 | 1.253E-03 | 0.000 | 0.00E+00 | - |
| Pyridine | 110-86-1 | Class III | 7.169E-04 | 1.037E-06 | 1.703E-04 | 2.964E-02 | YES!! | 1.174E-02 | 7.801E-02 | 0.000 | 1.01E-06 | 0.00 |
| Styrene (Vinylbenzene) | 100-42-5 | Class II | 0.000E+00 | 0.000E+00 | 1.328E-04 | 1.082E-02 | YES!! | 3.343E-03 | 4.163E-02 | 0.000 | 0.00E+00 | - |
| Tetrachloroethane (Acetylene tetrachlorid | 79-34-5 | Class II | 0.000E+00 | 0.000E+00 | 1.328E-04 | 9.631E-03 | YES!! | 2.976E-03 | 3.928E-02 | 0.000 | 0.00E+00 | - |
| Tetrachloroethylene (Antisol 1, Carbon di | 127-18-4 | Class II | 9.000E-01 | 1.301E-03 | 1.347E-04 | 2.815E-02 | YES!! | 8.822E-03 | 6.763E-02 | 0.000 | 1.10E-03 | 2.43 |
| Toluene (Methylbenzene) | 108-88-3 | Class III | 1.355E+01 | 1.959E-02 | 1.628E-04 | 4.444E-02 | YES!! | 1.683E-02 | 9.341E-02 | 0.004 | 2.30E-02 | 50.62 |
| Toluene-2,4-diisocyanate | 584-84-9 | Class II | 0.000E+00 | 0.000E+00 | 1.141E-04 | 1.185E-04 | YES!! | 3.147E-05 | 4.039E-03 | 0.000 | 0.00E+00 | - |
| Toxaphene (Chlorinated camphene) | 8001-35-2 | Class II | 0.000E+00 | 0.000E+00 | 2.170E-05 | 4.444E-04 | YES!! | 2.244E-05 | 3.411E-03 | 0.000 | 0.00E+00 | - |
| Trichloroethylene (Acetylene trichloride) | 79-01-6 | Class II | 6.021E-01 | 8.705E-04 | 1.478E-04 | 1.111E-01 | YES!! | 3.821E-02 | 1.407E-01 | 0.000 | 1.54E-03 | 3.39 |
| Vinyl acetate | 108-05-4 | Class III | 0.000E+00 | 0.000E+00 | 1.590E-04 | 1.704E-01 | YES!! | 6.304E-02 | 1.808E-01 | 0.000 | 0.00E+00 | - |
| Vinyl chloride (Chloroethene, Monochlorid | 75-01-4 | Class I | 1.003E-02 | 1.451E-05 | 1.983E-04 | 3.941E+00 | NO!! | 1.818E+00 | 9.709E-01 | 0.000 | 1.77E-04 | 0.39 |
| Vinylidine Chloride (1,1-Dichloroethylene) | 75-35-4 | Class II | 0.000E+00 | 0.000E+00 | 1.684E-04 | 9.334E-01 | YES!! | 3.657E-01 | 4.354E-01 | 0.000 | 0.00E+00 | - |
| Xylene (mixed isomers) | 1330-20-7 | Class II | 1.026E+01 | 1.483E-02 | 1.336E-04 | 1.259E-02 | YES!! | 3.912E-03 | 4.504E-02 | 0.003 | 8.38E-03 | 18.47 |
| Biphenyl (1,1-Biphenyl, Xenene) | 95-52-4 | Class II | 0.000E+00 | 0.000E+00 | 7.559E-05 | 1.481E-03 | YES!! | 2.604E-04 | 1.162E-02 | 0.000 | 0.00E+00 | - |
| Benzyl Chloride (Totyl chloride) | 100-44-7 | II | 0.000E+00 | 0.000E+00 | 1.403E-04 | 1.793E-03 | YES!! | 5.852E-04 | 1.742E-02 | 0.000 | 0.00E+00 | - |
| 4,6-Dinitro-o-cresol | 534-52-1 | II | 0.000E+00 | 0.000E+00 | 5.482E-05 | 2.667E-05 | YES!! | 3.402E-06 | 1.328E-03 | 0.000 | 0.00E+00 | - |
| Triethylamine | 121-44-8 | III | 0.000E+00 | 0.000E+00 | 7.989E-05 | 1.482E-05 | YES!! | 2.754E-06 | 1.195E-03 | 0.000 | 0.00E+00 | - |
| Carbaryl | 63-25-2 | II | 0.000E+00 | 0.000E+00 | 5.201E-05 | 5.923E-08 | YES!! | 7.167E-09 | 6.095E-05 | 0.000 | 0.00E+00 | - |
| o-Toluidine | 95-53-4 | II | 0.000E+00 | 0.000E+00 | 1.336E-04 | 3.581E-04 | YES!! | 1.113E-04 | 7.595E-03 | 0.000 | 0.00E+00 | - |
| Hydrazine | 302-01-2 | II | 0.000E+00 | 0.000E+00 | 7.791E-04 | 2.134E-02 | YES!! | 3.868E-02 | 1.416E-01 | 0.000 | 0.00E+00 | - |
| Polychlorinated Biphenyls (PCB's) | 1336-36-3 | II | 6.000E+02 | 8.675E-01 | 3.274E-05 | 6.075E-06 | YES!! | 4.628E-07 | 4.898E-04 | 0.158 | 5.33E-03 | 11.75 |
| 2-Nitropropane | 79-46-9 | II | 0.000E+00 | 0.000E+00 | 1.727E-04 | 1.504E-01 | YES!! | 6.044E-02 | 1.770E-01 | 0.000 | 0.00E+00 | - |
| Cumene (isopropyl benzene) | 98-82-8 | III | 0.000E+00 | 0.000E+00 | 1.216E-04 | 6.817E-03 | YES!! | 1.929E-03 | 3.162E-02 | 0.000 | 0.00E+00 | - |

| *Chemical Name* | *CAS No.* | *Class* | *Average Concentration* (ppm, by weight) | *Chemical Weight Fraction* (unitless) | *Effective Diffusivity* $D_e$ ($cm^2/s$) | *Partition Coefficient* $K_{eq}$ | *Rate Equation Validity Test* <0.25? | *Emission Rate Factor* $K_{dt}$ | *Fraction Emitted* $F_t$ | *Mass Avb'l for Emission* $M_o$ ($g/cm^2$) | *Total Mass Emitted* $E_{timeperiod}$ (Megagran | *Total Mass Emitted* $E_{timeperiod}$ (Pounds) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acenaphthene | 83-32-9 | Class II | 0.000E+00 | 0.000E+00 | 7.877E-05 | 7.409E-06 | YES!! | 1.358E-06 | 8.390E-04 | 0.000 | 0.00E+00 | - |
| Acenaphthylene | 208-96-8 | Class II | 0.000E+00 | 0.000E+00 | 8.019E-05 | 3.400E-05 | YES!! | 6.344E-06 | 1.813E-03 | 0.000 | 0.00E+00 | - |
| Acrolein | 107-02-8 | Class II | 0.000E+00 | 0.000E+00 | 1.964E-04 | 3.616E-01 | YES!! | 1.652E-01 | 2.927E-01 | 0.000 | 0.00E+00 | - |
| Aldrin | 309-00-2 | Class II | 0.000E+00 | 0.000E+00 | 2.470E-05 | 8.891E-09 | YES!! | 5.108E-10 | 1.627E-05 | 0.000 | 0.00E+00 | - |
| Anthracene | 120-12-7 | Class II | 1.603E+00 | 2.318E-03 | 6.062E-05 | 1.925E-09 | YES!! | 2.716E-10 | 1.186E-05 | 0.000 | 3.45E-07 | 0.00 |
| Benz (a) anthracene | 56-55-3 | Class II | 0.000E+00 | 0.000E+00 | 9.542E-05 | 2.961E-10 | YES!! | 6.574E-11 | 5.838E-06 | 0.000 | 0.00E+00 | - |
| Benzal Chloride 2 | 98-87-3 | Class II | 0.000E+00 | 0.000E+00 | 1.403E-04 | 1.793E-03 | YES!! | 5.852E-04 | 1.742E-02 | 0.000 | 0.00E+00 | - |
| Benzo (b) flouranthene 4 | 205-66-2 | Class II | 0.000E+00 | 0.000E+00 | 4.228E-05 | 7.409E-10 | YES!! | 7.289E-11 | 6.147E-06 | 0.000 | 0.00E+00 | - |
| Benzo (k) flouranthene 4 | 207-08-9 | Class II | 0.000E+00 | 0.000E+00 | 4.228E-05 | 1.419E-13 | YES!! | 1.396E-14 | 8.506E-08 | 0.000 | 0.00E+00 | - |
| Benzo (a) pyrene | 50-32-8 | Class II | 0.000E+00 | 0.000E+00 | 8.045E-05 | 8.411E-07 | YES!! | 1.574E-07 | 2.857E-04 | 0.000 | 0.00E+00 | - |
| BHC - Lindane | 58-89-9 | Class II | 0.000E+00 | 0.000E+00 | 3.031E-05 | 4.581E-05 | YES!! | 3.230E-06 | 1.294E-03 | 0.000 | 0.00E+00 | - |
| Chlorobenzilate | 510-15-6 | Class II | 0.000E+00 | 0.000E+00 | 3.143E-05 | 3.952E-12 | YES!! | 2.890E-13 | 3.871E-07 | 0.000 | 0.00E+00 | - |
| 2-Chloronaphthalene | 91-58-7 | Class II | 0.000E+00 | 0.000E+00 | 6.492E-05 | 2.519E-05 | YES!! | 3.805E-06 | 1.404E-03 | 0.000 | 0.00E+00 | - |
| Chrysene | 218-01-9 | Class II | 0.000E+00 | 0.000E+00 | 4.640E-05 | 8.535E-13 | YES!! | 9.214E-14 | 2.185E-07 | 0.000 | 0.00E+00 | - |
| Dibenz (a, h) anthracene | 53-70-3 | Class II | 0.000E+00 | 0.000E+00 | 9.355E-05 | 1.486E-13 | YES!! | 3.235E-14 | 1.295E-07 | 0.000 | 0.00E+00 | - |
| Dieldrin | 60-57-1 | Class II | 0.000E+00 | 0.000E+00 | 2.339E-05 | 2.961E-10 | YES!! | 1.611E-11 | 2.890E-06 | 0.000 | 0.00E+00 | - |
| Diphenyl amine 4 | 122-39-4 | Class 2 | 0.000E+00 | 0.000E+00 | 5.613E-05 | 1.482E-03 | YES!! | 1.935E-04 | 1.002E-02 | 0.000 | 0.00E+00 | - |
| 1,2-Diphenylhydrazine | 122-66-7 | Class II | 0.000E+00 | 0.000E+00 | 5.931E-05 | 3.705E-08 | YES!! | 5.112E-09 | 5.148E-05 | 0.000 | 0.00E+00 | - |
| Endrin | 72-20-8 | Class II | 0.000E+00 | 0.000E+00 | 2.339E-05 | 2.961E-10 | YES!! | 1.611E-11 | 2.890E-06 | 0.000 | 0.00E+00 | - |
| Endrin aldehyde | 7421-93-4 | Class II | 0.000E+00 | 0.000E+00 | 5.613E-05 | 1.482E-01 | YES!! | 1.935E-02 | 1.002E-01 | 0.000 | 0.00E+00 | - |
| Ethylene oxide | 75-21-8 | Class II | 0.000E+00 | 0.000E+00 | 1.946E-04 | 1.852E+00 | NO!! | 8.385E-01 | 6.593E-01 | 0.000 | 0.00E+00 | - |
| Fluoranthene | 206-44-0 | Class II | 0.000E+00 | 0.000E+00 | 5.650E-05 | 2.622E-05 | YES!! | 3.447E-06 | 1.337E-03 | 0.000 | 0.00E+00 | - |
| Fluorene | 86-737-7 | Class II | 0.000E+00 | 0.000E+00 | 9.355E-05 | 4.740E-07 | YES!! | 1.032E-07 | 2.313E-04 | 0.000 | 0.00E+00 | - |
| Indeno (1,2,3-c,d) pyrene | 193-39-5 | Class II | 0.000E+00 | 0.000E+00 | 3.555E-05 | 1.486E-12 | YES!! | 1.229E-13 | 2.524E-07 | 0.000 | 0.00E+00 | - |
| 3-Methylcholanthrene | 56-49-5 | Class II | 0.000E+00 | 0.000E+00 | 3.910E-05 | 1.125E-06 | YES!! | 1.023E-07 | 2.303E-04 | 0.000 | 0.00E+00 | - |
| PCBs (Total) all isomers or Aroclors | 1336-36-3 | Class II | 0.000E+00 | 0.000E+00 | 3.274E-05 | 6.080E-06 | YES!! | 4.632E-07 | 4.900E-04 | 0.000 | 0.00E+00 | - |
| Penthachlorobenzene | 608-93-5 | Class II | 0.000E+00 | 0.000E+00 | 1.066E-04 | 6.812E-06 | YES!! | 1.690E-06 | 9.361E-04 | 0.000 | 0.00E+00 | - |
| Phenathrene | 85-01-8 | Class II | 5.537E+00 | 8.005E-03 | 9.355E-05 | 7.657E-04 | YES!! | 1.666E-04 | 9.295E-03 | 0.001 | 9.33E-04 | 2.06 |
| Pyrene | 129-00-0 | Class II | 0.000E+00 | 0.000E+00 | 9.355E-05 | 2.815E-06 | YES!! | 6.127E-07 | 5.636E-04 | 0.000 | 0.00E+00 | - |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | Class II | 0.000E+00 | 0.000E+00 | 1.328E-04 | 9.627E-03 | YES!! | 2.975E-03 | 3.927E-02 | 0.000 | 0.00E+00 | - |
| Trichloroethene | 79-01-6 | Class II | 0.000E+00 | 0.000E+00 | 1.459E-04 | 3.705E-02 | YES!! | 1.258E-02 | 8.075E-02 | 0.000 | 0.00E+00 | - |
| Tetrachloroethene | 127-18-4 | Class II | 0.000E+00 | 0.000E+00 | 1.347E-04 | 2.815E-02 | YES!! | 8.822E-03 | 6.763E-02 | 0.000 | 0.00E+00 | - |
| 1,3 Butadiene (Biethylene) | 106-99-0 | Class II | 0.000E+00 | 0.000E+00 | 4.659E-04 | 3.108E+00 | NO!! | 3.368E+00 | 1.321E+00 | 0.000 | 0.00E+00 | - |
| 2-Methylnapthalene | 91-57-6 | Class II | 0.000E+00 | 0.000E+00 | 8.981E-05 | 1.003E-04 | YES!! | 2.097E-05 | 3.297E-03 | 0.000 | 0.00E+00 | - |
| 1-Methylnaphthalene | 90-12-0 | Class III | 0.000E+00 | 0.000E+00 | 8.981E-05 | 7.983E-05 | YES!! | 1.668E-05 | 2.941E-03 | 0.000 | 0.00E+00 | - |
| Methyl Tert Butyl Ether (MTBE) | 1634-04-4 | Class III | 0.000E+00 | 0.000E+00 | 1.916E-04 | 2.849E-01 | YES!! | 1.270E-01 | 2.566E-01 | 0.000 | 0.00E+00 | - |
| Acetaldehyde | 75-07-0 | Class II | 0.000E+00 | 0.000E+00 | 2.320E-04 | 1.289E+00 | NO!! | 6.958E-01 | 6.006E-01 | 0.000 | 0.00E+00 | - |
| Diethanolamine | 111-42-2 | Class III | 0.000E+00 | 0.000E+00 | 1.317E-04 | 8.095E-07 | YES!! | 2.481E-07 | 3.586E-04 | 0.000 | 0.00E+00 | - |
| Chloroprene | 126-99-8 | Class II | 0.000E+00 | 0.000E+00 | 1.946E-04 | 4.042E-01 | YES!! | 1.830E-01 | 3.080E-01 | 0.000 | 0.00E+00 | - |
| Lindane | 58-89-9 | Class II | 0.000E+00 | 0.000E+00 | 3.031E-05 | 4.583E-05 | YES!! | 3.232E-06 | 1.294E-03 | 0.000 | 0.00E+00 | - |
| Benzidine | 92-87-5 | Class I | 0.000E+00 | 0.000E+00 | 6.361E-05 | 4.504E-07 | YES!! | 6.666E-08 | 1.859E-04 | 0.000 | 0.00E+00 | - |
| p-Phenylenediamine | 106-50-3 | Class III | 0.000E+00 | 0.000E+00 | 1.338E-04 | 6.869E-06 | YES!! | 2.138E-06 | 1.053E-03 | 0.000 | 0.00E+00 | - |
| benzo(ghi)perylene | 191-24-2 | Class | 1.431E-01 | 2.069E-04 | 3.761E-05 | 1.486E-13 | YES!! | 1.300E-14 | 8.211E-08 | 0.000 | 2.13E-10 | 0.00 |
| 2,4-Dimethylphenol | 105-67-9 | Class | 4.813E-03 | 6.960E-06 | 1.093E-04 | 1.498E-02 | YES!! | 3.807E-03 | 4.442E-02 | 0.000 | 3.88E-06 | 0.01 |
| p-phenylenediamine | 106-50-3 | Class | 1.137E-02 | 1.644E-05 | 1.338E-04 | 6.869E-06 | YES!! | 2.138E-06 | 1.053E-03 | 0.000 | 2.17E-07 | 0.00 |
| Mercury | 7439-97-6 | Class | 2.584E-02 | 3.736E-05 | 5.744E-05 | 1.914E-06 | YES!! | 2.558E-07 | 3.642E-04 | 0.000 | 1.71E-07 | 0.00 |
| 1,2,4-Trimethylbenzene | CAS No. | Class | 1.270E-03 | 1.836E-06 | 1.141E-04 | 6.756E-03 | YES!! | 1.794E-03 | 3.049E-02 | 0.000 | 7.02E-07 | 0.00 |

## Chemical Properties and Data

| ***Chemical Name*** | ***CAS No.*** | ***Class*** | ***Air Diffusivity*** ($cm^2$/sec) | ***Density*** ($g/cm^3$) | ***Molecular Weight*** | ***Vapor Pressure*** (Atm) |
|---|---|---|---|---|---|---|
| Non-Hazardous VOCs (Generic Oil) | N/A | N/A | 0.0433 | 0.940 | 190.00 | 5.500E-06 |
| Non-Hazardous VOCs (Generic Fuel) | N/A | N/A | 0.0800 | 0.900 | 147.00 | 5.000E-04 |
| 1,1,1-Trichloroethane (Methyl chloroform) | 71-55-6 | Class III | 0.0780 | 1.330 | 133.40 | 1.618E-01 |
| 1,1,2-Trichloroethane (Cloroethene) | 79-00-5 | Class II | 0.0780 | 1.300 | 133.40 | 3.289E-02 |
| 1,2,4-Trichlorobenzene (unsym-Trichlorobenzene) | 120-82-1 | Class II | 0.0300 | 1.410 | 181.50 | 2.368E-04 |
| 1,2-Dibromo-3-chloropropane (DBCP) | 96-12-8 | Class II | 0.0212 | 1.410 | 236.36 | 1.053E-03 |
| 1,2-Dibromoethane (Ethylene bromide, Ethylene dibromide) | 106-93-4 | Class I | 0.0287 | 1.410 | 187.88 | 1.550E-02 |
| 1,2-Dichloroethane (Ethylene dichloride, EDC) | 107-06-2 | Class II | 0.1040 | 1.260 | 98.96 | 1.053E-01 |
| 1,2-Dichloropropane (Propylene dichloride) | 78-87-5 | Class II | 0.0782 | 1.156 | 112.99 | 5.263E-02 |
| 1,3-Dichloropropylene (1,3-dichloropropene, DCP) | 542-75-6 | Class II | 0.0626 | 1.200 | 110.97 | 5.658E-02 |
| 1,4-Dichlorobenzene (p-Dichlorobenzene) | 106-46-7 | Class II | 0.0690 | 1.290 | 147.00 | 1.579E-03 |
| 1,4-Dioxane (Diethylene dioxide, p-Dioxane) | 123-91-1 | Class II | 0.2290 | 1.030 | 88.20 | 4.868E-02 |
| 2,3-Toluene diamine (MTD, Toluene-2,4-diamine) | 25376-45-8 | Class II | 0.0569 | 1.110 | 122.17 | 2.092E-03 |
| 2,4,5-Trichlorophenol | 95-95-4 | Class III | 0.0291 | 1.180 | 197.45 | 5.251E-05 |
| 2,4,6-Trichlorophenol (2,4,6-T) | 88-06-2 | Class II | 0.0314 | 1.000 | 197.46 | 9.605E-06 |
| 2,4-Dinitrophenol | 51-28-5 | Class II | 0.0273 | 1.680 | 184.00 | 1.842E-05 |
| 2,4-Dinitrotoluene (2,4-DNT) | 121-14-2 | Class II | 0.2030 | 1.310 | 182.14 | 6.710E-06 |
| 2,6-Dinitrotoluene | 606-20-2 | Class II | 0.0327 | 1.150 | 182.14 | 7.894E-03 |
| 2-Acetylaminofluorene (N-flouren-2-yl-acetamide) | 53-96-3 | Class II | 0.0265 | 1.020 | 223.27 | 1.579E-05 |
| 4,4'-Methylene-bis(2-chloroaniline) (MOCA, MBOCA) | 101-14-4 | Class II | 0.0199 | 1.150 | 267.15 | 9.100E-08 |
| 4-Nitrophenol (p-Nitrophenol) | 100-02-7 | Class III | 0.0430 | 1.400 | 139.11 | 1.320E-07 |
| Acetonitrile (Cyanomethane, Methyl cyanide) | 75-05-8 | Class II | 0.1280 | 0.780 | 41.03 | 1.184E-01 |
| Acetophenone | 98-86-2 | Class III | 0.0600 | 1.030 | 120.16 | 3.908E-04 |
| Acrylamide (Acrylic amide) | 79-06-1 | Class II | 0.0970 | 1.120 | 71.09 | 1.579E-05 |
| Acrylic acid (Acroleic acid, Propene acid) | 79-10-7 | Class III | 0.0980 | 0.970 | 72.07 | 6.842E-03 |
| Acrylonitrile | 107-13-1 | Class I | 0.1220 | 0.810 | 53.10 | 1.500E-01 |
| Allyl chloride (3-Chloropropene) | 107-05-1 | Class II | 0.1008 | 1.410 | 75.60 | 4.750E-01 |
| Aniline (Aminobenzene), Phenylamine) | 62-53-3 | Class II | 0.0700 | 1.020 | 93.10 | 1.316E-03 |
| Benzene (Benzol, Coal naphhtha) | 71-43-2 | Class I | 0.0880 | 0.870 | 78.10 | 1.253E-01 |
| bis(2-Chloroethyl) ether (Dichloroethyl ether) | 111-44-4 | Class I | 0.0692 | 1.220 | 143.00 | 1.842E-03 |
| bis (2-Ethylhexyl) phthalate (DEHP, Di-(2-ethylhexyl)phthalate | 117-81-7 | Class II | 0.0351 | 1.000 | 390.56 | 2.632E-10 |
| Bromoform (Tribromomethane) | 75-25-2 | Class II | 0.0149 | 2.890 | 252.77 | 7.368E-03 |
| Carbon disulfide (Carbon bisulfide) | 75-15-0 | Class II | 0.1040 | 1.260 | 76.10 | 4.816E-01 |
| Carbon tetrachloride (Tetrachloromethane) | 56-23-5 | Class II | 0.0780 | 1.590 | 153.80 | 1.487E-01 |
| Chlordane | 57-74-9 | Class II | 0.0118 | 1.110 | 409.80 | 1.300E-08 |
| Chlorobenzene (Benzene chloride) | 108-90-7 | Class II | 0.0730 | 1.110 | 112.60 | 1.553E-02 |
| Chloroethane (Ethyl chloride) | 75-00-3 | Class II | 0.2710 | 1.410 | 64.51 | 1.579E+00 |
| Chloroform (Trichloromethane) | 67-66-3 | Class II | 0.1040 | 1.490 | 119.38 | 2.737E-01 |

## Chemical Properties and Data

| ***Chemical Name*** | ***CAS No.*** | ***Class*** | ***Air Diffusivity*** ($cm^2$/sec) | ***Density*** ($g/cm^3$) | ***Molecular Weight*** | ***Vapor Pressure*** (Atm) |
|---|---|---|---|---|---|---|
| Chloromethane (Methyl chloride) | 74-87-3 | Class II | 0.1260 | 0.950 | 50.49 | 5.039E+00 |
| Cresol - mixed isomers | 1319-77-3 | Class III | 0.0694 | 1.030 | 108.10 | 3.947E-04 |
| DDE (p,p'-dichlorodiphenyldichloroethylene) | 72-55-9 | Class II | 0.0144 | 1.410 | 318.03 | 9.000E-09 |
| Dibutyl phthalate (DBP) | 84-74-2 | Class II | 0.0438 | 1.043 | 278.30 | 1.300E-07 |
| Dichloromethane (Methylene chloride, DCM) | 75-09-2 | Class II | 0.1010 | 1.340 | 85.00 | 5.763E-01 |
| Dimethyl phthalate (Phthalic acid methyl ester) | 131-11-3 | Class II | 0.0568 | 1.190 | 194.20 | 2.630E-07 |
| Ethyl acrylate (Ethyl propenoate) | 140-88-5 | Class II | 0.0770 | 0.920 | 100.00 | 5.263E-02 |
| Ethyl benzene (Phenylethane) | 100-41-4 | Class II | 0.0750 | 0.870 | 106.20 | 1.145E-03 |
| Ethylene glycol | 107-21-1 | Class III | 0.1080 | 1.110 | 62.08 | 1.658E-04 |
| Ethylene oxide | 75-21-8 | Class I | 0.1040 | 0.870 | 44.00 | 1.645E+00 |
| Ethylidene dichloride (1,1-dichloroethane) | 75-34-3 | ClassII | 0.0742 | 1.170 | 98.96 | 7.778E-01 |
| Formaldehyde (methylene oxide) | 50-00-0 | Class I | 0.1780 | 0.970 | 30.00 | 4.605E+00 |
| Glycol ethers | 109-86-4 | Class II | 0.0700 | 0.978 | 134.14 | 4.526E-03 |
| Heptachlor (3-Chlorochlordene) | 76-44-8 | Class II | 0.0112 | 1.570 | 373.35 | 3.950E-07 |
| Hexachloro-1,3-butadiene (Hexachlorobutadiene) | 87-68-3 | Class II | 0.0561 | 1.670 | 260.80 | 1.974E-04 |
| Hexachlorobenzene (Perchlorobenzene) | 118-74-1 | Class II | 0.0542 | 2.040 | 284.80 | 6.316E-06 |
| Hexachlorocyclopentadiene (HCCPD) | 77-47-4 | Class III | 0.0161 | 1.700 | 272.77 | 1.066E-04 |
| Hexachloroethane (Perchloroethane) | 67-72-1 | Class II | 0.0025 | 2.090 | 237.00 | 8.553E-04 |
| Methanol (Methyl alcohol) | 67-56-1 | Class III | 0.1500 | 0.790 | 32.00 | 1.500E-01 |
| Methoxychlor (Methoxy DDT, DMDT, Dimethoxy-DDT) | 72-43-5 | Class II | 0.0156 | 0.970 | 345.65 | 2.040E-07 |
| Methyl Bromide (Bromomethane) | 74-83-9 | Class III | 0.0149 | 1.410 | 94.95 | 2.092E+00 |
| Methyl ethyl ketone (MEK) | 78-93-3 | Class III | 0.0808 | 1.150 | 72.10 | 1.316E-01 |
| Methyl iodide (Iodomethane) | 74-88-4 | Class II | 0.0390 | 1.650 | 141.94 | 5.263E-01 |
| Methyl isobutyl ketone (MIBK) | 108-10-1 | Class III | 0.0750 | 0.800 | 100.20 | 2.066E-02 |
| Methyl methacrylate | 80-62-6 | Class III | 0.0770 | 0.950 | 100.10 | 4.737E-02 |
| n-Butyl alcohol (n-Butanol) | 71-36-3 | Class III | 0.0800 | 0.810 | 74.14 | 8.553E-03 |
| n-Hexane | 110-54-3 | Class III | 0.2000 | 0.660 | 86.20 | 1.974E-01 |
| n-Nitrosodimethylamine (DMN, dimethylnitrosoamine) | 62-75-9 | Class I | 0.1126 | 1.150 | 74.08 | 1.053E-02 |
| n-Nitrosomorpholine (4-Nitrosomorpholine) | 59-89-2 | Class II | 0.0590 | 1.150 | 116.14 | 1.309E-04 |
| Naphthalene (and Methylnaphthalenes) | 91-20-3 | Class II | 0.0590 | 1.140 | 128.20 | 3.026E-04 |
| Nitrobenzene (Nitrobenzol) | 98-95-3 | Class II | 0.0760 | 1.200 | 123.10 | 3.947E-04 |
| Parathion (AATP, ethyl parathion) | 56-38-2 | Class II | 0.0170 | 1.260 | 291.30 | 5.000E-08 |
| Pentachloronitrobenzene (Quintobenzene, PCNB) | 82-68-8 | Class II | 0.0159 | 1.410 | 295.36 | 1.300E-07 |
| Pentachlorophenol (PCP) | 87-86-5 | Class II | 0.0560 | 1.980 | 266.40 | 6.579E-06 |
| Phenol (Benzenol, Carbolic acid) | 108-95-2 | Class II | 0.0820 | 1.070 | 94.10 | 4.487E-04 |
| Phthalic anhydride | 85-44-9 | Class III | 0.0710 | 1.330 | 148.10 | 1.974E-06 |
| Polynuclear Aromatic Hydrocarbons (Generic PAHs) | 206-44-0 | Class II | 0.0439 | 1.020 | 147.00 | 3.020E-05 |
| Propoxur (Baygon, 0-Isopropoxyphenyl methylcarbamate) | 114-26-01 | Class III | 0.0273 | 1.150 | 209.24 | 2.263E-05 |

## Chemical Properties and Data

| ***Chemical Name*** | ***CAS No.*** | ***Class*** | ***Air Diffusivity*** ($cm^2/sec$) | ***Density*** ($g/cm^3$) | ***Molecular Weight*** | ***Vapor Pressure*** (Atm) |
|---|---|---|---|---|---|---|
| Pyridine | 110-86-1 | Class III | 0.0910 | 0.980 | 79.10 | 2.632E-02 |
| Styrene (Vinylbenzene) | 100-42-5 | Class II | 0.0710 | 0.900 | 104.20 | 9.605E-03 |
| Tetrachloroethane (Acetylene tetrachloride) | 79-34-5 | Class II | 0.0710 | 1.590 | 168.00 | 8.553E-03 |
| Tetrachloroethylene (Antisol 1, Carbon dichloride, Perchloroethylene) | 127-18-4 | Class II | 0.0720 | 1.624 | 165.83 | 2.500E-02 |
| Toluene (Methylbenzene) | 108-88-3 | Class III | 0.0870 | 0.870 | 92.40 | 3.947E-02 |
| Toluene-2,4-diisocyanate | 584-84-9 | Class II | 0.0610 | 1.200 | 174.16 | 1.053E-04 |
| Toxaphene (Chlorinated camphene) | 8001-35-2 | Class II | 0.0116 | 1.110 | 414.00 | 3.947E-04 |
| Trichloroethylene (Acetylene trichloride) | 79-01-6 | Class II | 0.0790 | 1.400 | 131.40 | 9.868E-02 |
| Vinyl acetate | 108-05-4 | Class III | 0.0850 | 0.930 | 86.09 | 1.513E-01 |
| Vinyl chloride (Chloroethene, Monochloride ethylene) | 75-01-4 | Class I | 0.1060 | 0.910 | 62.60 | 3.500E+00 |
| Vinylidine Chloride (1,1-Dichloroethylene) | 75-35-4 | Class II | 0.0900 | 1.213 | 96.94 | 8.289E-01 |
| Xylene (mixed isomers) | 1330-20-7 | Class II | 0.0714 | 0.880 | 106.16 | 1.118E-02 |
| Biphenyl (1,1-Biphenyl, Xenene) | 95-52-4 | Class II | 0.0404 | 1.180 | 154.20 | 1.315E-03 |
| Benzyl Chloride (Totyl chloride) | 100-44-7 | II | 0.0750 | 1.100 | 126.60 | 1.592E-03 |
| 4,6-Dinitro-o-cresol | 534-52-1 | II | 0.0293 | 1.150 | 198.00 | 2.369E-05 |
| Triethylamine | 121-44-8 | III | 0.0427 | 1.150 | 149.19 | 1.316E-05 |
| Carbaryl | 63-25-2 | II | 0.0278 | 1.232 | 201.22 | 5.260E-08 |
| o-Toluidine | 95-53-4 | II | 0.0714 | 0.989 | 107.17 | 3.180E-04 |
| Hydrazine | 302-01-2 | II | 0.4164 | 1.008 | 32.06 | 1.895E-02 |
| Polychlorinated Biphenyls (PCB's) | 1336-36-3 | II | 0.0175 | 1.190 | 292.00 | 5.396E-06 |
| 2-Nitropropane | 79-46-9 | II | 0.0923 | 0.988 | 89.09 | 1.336E-01 |
| Cumene (isopropyl benzene) | 98-82-8 | III | 0.0650 | 0.860 | 120.20 | 6.054E-03 |
| Acenaphthene | 83-32-9 | Class II | 0.0421 | 1.070 | 154.21 | 6.580E-06 |
| Acenaphthylene | 208-96-8 | Class II | 0.0429 | 1.020 | 152.21 | 3.020E-05 |
| Acrolein | 107-02-8 | Class II | 0.1050 | 0.840 | 56.10 | 3.211E-01 |
| Aldrin | 309-00-2 | Class II | 0.0132 | 1.180 | 364.93 | 7.896E-09 |
| Anthracene | 120-12-7 | Class II | 0.0324 | 1.250 | 178.23 | 1.710E-09 |
| Benz (a) anthracene | 56-55-3 | Class II | 0.0510 | 1.110 | 228.30 | 2.630E-10 |
| Benzal Chloride 2 | 98-87-3 | Class II | 0.0750 | 1.100 | 126.60 | 1.592E-03 |
| Benzo (b) flouranthene 4 | 205-66-2 | Class II | 0.0226 | 1.020 | 252.32 | 6.580E-10 |
| Benzo (k) flouranthene 4 | 207-08-9 | Class II | 0.0226 | 1.020 | 252.32 | 1.260E-13 |
| Benzo (a) pyrene | 50-32-8 | Class II | 0.0430 | 1.110 | 252.30 | 7.470E-07 |
| BHC - Lindane | 58-89-9 | Class II | 0.0162 | 1.410 | 290.85 | 4.068E-05 |
| Chlorobenzilate | 510-15-6 | Class II | 0.0168 | 0.970 | 325.20 | 3.510E-12 |
| 2-Chloronaphthalene | 91-58-7 | Class II | 0.0347 | 1.410 | 162.62 | 2.237E-05 |
| Chrysene | 218-01-9 | Class II | 0.0248 | 1.110 | 228.20 | 7.580E-13 |
| Dibenz (a, h) anthracene | 53-70-3 | Class II | 0.0500 | 1.282 | 278.35 | 1.320E-13 |
| Dieldrin | 60-57-1 | Class II | 0.0125 | 1.180 | 380.93 | 2.630E-10 |

## Chemical Properties and Data

| ***Chemical Name*** | ***CAS No.*** | ***Class*** | ***Air Diffusivity*** ($cm^2$/sec) | ***Density*** ($g/cm^3$) | ***Molecular Weight*** | ***Vapor Pressure*** (Atm) |
|---|---|---|---|---|---|---|
| Diphenyl amine 4 | 122-39-4 | Class 2 | 0.0300 | 1.160 | 169.24 | 1.316E-03 |
| 1,2-Diphenylhydrazine | 122-66-7 | Class II | 0.0317 | 1.190 | 184.23 | 3.290E-08 |
| Endrin | 72-20-8 | Class II | 0.0125 | 1.800 | 380.93 | 2.630E-10 |
| Endrin aldehyde | 7421-93-4 | Class II | 0.0300 | 1.790 | 382.93 | 1.316E-01 |
| Ethylene oxide | 75-21-8 | Class II | 0.1040 | 0.870 | 44.00 | 1.645E+00 |
| Fluoranthene | 206-44-0 | Class II | 0.0302 | 1.020 | 202.00 | 2.329E-05 |
| Fluorene | 86-737-7 | Class II | 0.0500 | 1.203 | 166.32 | 4.210E-07 |
| Indeno (1,2,3-c,d) pyrene | 193-39-5 | Class II | 0.0190 | 1.150 | 276.34 | 1.320E-12 |
| 3-Methylcholanthrene | 56-49-5 | Class II | 0.0209 | 1.020 | 268.36 | 9.988E-07 |
| PCBs (Total) all isomers or Aroclors | 1336-36-3 | Class II | 0.0175 | 1.190 | 292.00 | 5.400E-06 |
| Penthachlorobenzene | 608-93-5 | Class II | 0.0570 | 1.610 | 250.34 | 6.050E-06 |
| Phenathrene | 85-01-8 | Class II | 0.0500 | 0.980 | 178.23 | 6.800E-04 |
| Pyrene | 129-00-0 | Class II | 0.0500 | 1.271 | 202.25 | 2.500E-06 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | Class II | 0.0710 | 1.590 | 168.00 | 8.550E-03 |
| Trichloroethene | 79-01-6 | Class II | 0.0780 | 1.300 | 133.40 | 3.290E-02 |
| Tetrachloroethene | 127-18-4 | Class II | 0.0720 | 1.624 | 165.83 | 2.500E-02 |
| 1,3 Butadiene (Biethylene) | 106-99-0 | Class II | 0.2490 | 0.760 | 54.09 | 2.760E+00 |
| 2-Methylnapthalene | 91-57-6 | Class II | 0.0480 | 1.020 | 142.19 | 8.912E-05 |
| 1-Methylnaphthalene | 90-12-0 | Class III | 0.0480 | 1.020 | 142.19 | 7.090E-05 |
| Methyl Tert Butyl Ether (MTBE) | 1634-04-4 | Class III | 0.1024 | 0.970 | 83.10 | 2.530E-01 |
| Acetaldehyde | 75-07-0 | Class II | 0.1240 | 0.788 | 45.06 | 1.145E+00 |
| Diethanolamine | 111-42-2 | Class III | 0.0704 | 1.088 | 105.14 | 7.189E-07 |
| Chloroprene | 126-99-8 | Class II | 0.1040 | 0.958 | 88.50 | 3.590E-01 |
| Lindane | 58-89-9 | Class II | 0.0162 | 1.410 | 290.85 | 4.070E-05 |
| Benzidine | 92-87-5 | Class I | 0.0340 | 1.250 | 184.24 | 4.000E-07 |
| p-Phenylenediamine | 106-50-3 | Class III | 0.0715 | 1.140 | 108.14 | 6.100E-06 |

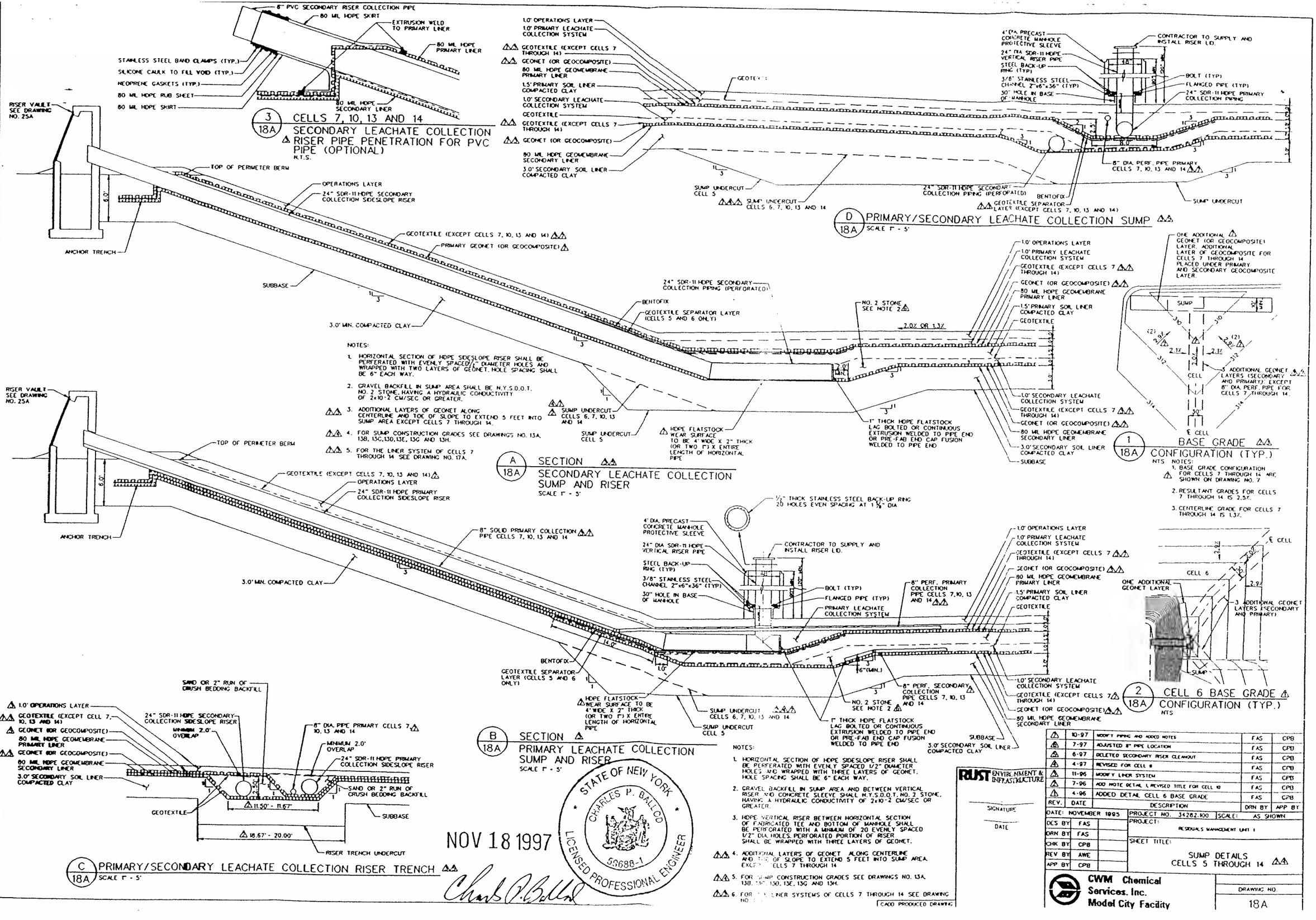
# Landfill Data for Emissions Calculations

| *Open Fill Area* | *Average Fill Depth* | *Air Porosity* | *Total Porosity* | *Landfill Density* | *Landfill Temp.* |
|---|---|---|---|---|---|
| (Acres) | (Feet) | (unitless) | (unitless) | ($lb/ft^3$) | (°C) |
| 1.7 | 6.0 | 0.100 | 0.500 | 90.0 | 25 |

| *Time Period Modeled* | |
|---|---|
| Start Date | 1/1/2017 |
| End Date | ######## |
| Total Days | 365 |

| *Calculated Landfill Data* | |
|---|---|
| ***Total Organic Loading, L*** *($g/cm^3$)* | 0.00100 |
| ***Average Organic Molecular Weight*** | 274.7 |

# Attachment 6
# Select Drawings of RMU-2 Landfill


8" PVC SECONDARY RISER COLLECTION PIPE
80 MIL HDPE SKIRT
EXTRUSION WELD TO PRIMARY LINER
80 MIL HDPE PRIMARY LINER
STAINLESS STEEL BAND CLAMPS (TYP.)
SILICONE CAULK TO FILL VOID (TYP.)
NEOPRENE GASKETS (TYP.)
80 MIL HDPE RUB SHEET
80 MIL HDPE SKIRT
80 MIL HDPE SECONDARY LINER
3 / 18A CELLS 7, 10, 13 AND 14 SECONDARY LEACHATE COLLECTION RISER PIPE PENETRATION FOR PVC PIPE (OPTIONAL) N.T.S.
RISER VAULT SEE DRAWING NO. 25A
TOP OF PERIMETER BERM
6.0'
OPERATIONS LAYER
24" SDR-11 HDPE SECONDARY COLLECTION SIDESLOPE RISER
ANCHOR TRENCH
GEOTEXTILE (EXCEPT CELLS 7, 10, 13 AND 14) △△
PRIMARY GEONET (OR GEOCOMPOSITE) △
SUBBASE
3.0' MIN. COMPACTED CLAY
1L/3
1.0' OPERATIONS LAYER
1.0' PRIMARY LEACHATE COLLECTION SYSTEM
GEOTEXTILE (EXCEPT CELLS 7 THROUGH 14) △△
GEONET (OR GEOCOMPOSITE) △△
80 MIL HDPE GEOMEMBRANE PRIMARY LINER
1.5' PRIMARY SOIL LINER COMPACTED CLAY
1.0' SECONDARY LEACHATE COLLECTION SYSTEM
GEOTEXTILE
GEOTEXTILE (EXCEPT CELLS 7 THROUGH 14) △△
GEONET (OR GEOCOMPOSITE) △△
80 MIL HDPE GEOMEMBRANE SECONDARY LINER
3.0' SECONDARY SOIL LINER COMPACTED CLAY
SUMP UNDERCUT CELL 5
SUMP UNDERCUT CELLS 6, 7, 10, 13 AND 14 △△△
24" SDR-11 HDPE SECONDARY COLLECTION PIPING (PERFORATED)
BENTOFIX
GEOTEXTILE SEPARATOR LAYER (CELLS 5 AND 6 ONLY)
△△△ GEOTEXTILE SEPARATOR LAYER (EXCEPT CELLS 7, 10, 13 AND 14)
8" DIA. PERF. PIPE PRIMARY CELLS 7, 10, 13 AND 14 △△
4' DIA. PRECAST CONCRETE MANHOLE PROTECTIVE SLEEVE
24" DIA SDR-11 HDPE VERTICAL RISER PIPE
STEEL BACK-UP RING (TYP)
3/8" STAINLESS STEEL CHANNEL 2"x6"x36" (TYP)
30" HOLE IN BASE OF MANHOLE
CONTRACTOR TO SUPPLY AND INSTALL RISER LID.
BOLT (TYP)
FLANGED PIPE (TYP)
24" SDR-11 HDPE PRIMARY COLLECTION PIPING
D / 18A PRIMARY/SECONDARY LEACHATE COLLECTION SUMP △△ SCALE 1" = 5'
NO. 2 STONE SEE NOTE 2 △
2.0% OR 1.3%
HDPE FLATSTOCK WEAR SURFACE TO BE 4" WIDE X 2" THICK (OR TWO 1") X ENTIRE LENGTH OF HORIZONTAL PIPE
1" THICK HDPE FLATSTOCK LAG BOLTED OR CONTINUOUS EXTRUSION WELDED TO PIPE END OR PRE-FAB END CAP FUSION WELDED TO PIPE END
NOTES:
1. HORIZONTAL SECTION OF HDPE SIDESLOPE RISER SHALL BE PERFERATED WITH EVENLY SPACED 1/2" DIAMETER HOLES AND WRAPPED WITH TWO LAYERS OF GEONET. HOLE SPACING SHALL BE 6" EACH WAY.
2. GRAVEL BACKFILL IN SUMP AREA SHALL BE N.Y.S.D.O.T. NO. 2 STONE, HAVING A HYDRAULIC CONDUCTIVITY OF 2x10-2 CM/SEC OR GREATER.
△△ 3. ADDITIONAL LAYERS OF GEONET ALONG CENTERLINE AND TOE OF SLOPE TO EXTEND 5 FEET INTO SUMP AREA EXCEPT CELLS 7 THROUGH 14.
△△△ 4. FOR SUMP CONSTRUCTION GRADES SEE DRAWINGS NO. 13A, 13B, 13C, 13D, 13E, 13G AND 13H.
△△ 5. FOR THE LINER SYSTEM OF CELLS 7 THROUGH 14 SEE DRAWING NO. 17A.
A / 18A SECTION △△ SECONDARY LEACHATE COLLECTION SUMP AND RISER SCALE 1" = 5'
ONE ADDITIONAL △ GEONET (OR GEOCOMPOSITE) LAYER. ADDITIONAL LAYER OF GEOCOMPOSITE FOR CELLS 7 THROUGH 14 PLACED UNDER PRIMARY AND SECONDARY GEOCOMPOSITE LAYER.
SUMP
CELL
5 ADDITIONAL GEONET △△ LAYERS (SECONDARY AND PRIMARY) EXCEPT 8" DIA. PERF. PIPE FOR CELLS 7 THROUGH 14.
℄ CELL
1 / 18A BASE GRADE △△ CONFIGURATION (TYP.)
NTS NOTES:
1. BASE GRADE CONFIGURATION FOR CELLS 7 THROUGH 14 ARE △ SHOWN ON DRAWING NO. 7
2. RESULTANT GRADES FOR CELLS 7 THROUGH 14 IS 2.5%.
3. CENTERLINE GRADE FOR CELLS 7 THROUGH 14 IS 1.3%.
RISER VAULT SEE DRAWING NO. 25A
TOP OF PERIMETER BERM
6.0'
GEOTEXTILE (EXCEPT CELLS 7, 10, 13 AND 14) △
OPERATIONS LAYER
24" SDR-11 HDPE PRIMARY COLLECTION SIDESLOPE RISER
ANCHOR TRENCH
8" SOLID PRIMARY COLLECTION PIPE CELLS 7, 10, 13 AND 14 △△
3.0' MIN. COMPACTED CLAY
1L/3
BENTOFIX
GEOTEXTILE SEPARATOR LAYER (CELLS 5 AND 6 ONLY)
HDPE FLATSTOCK WEAR SURFACE TO BE 4" WIDE X 2" THICK (OR TWO 1") X ENTIRE LENGTH OF HORIZONTAL PIPE
SUMP UNDERCUT CELLS 6, 7, 10, 13 AND 14 △△△
SUMP UNDERCUT CELL 5
NO. 2 STONE SEE NOTE 2 △
1" THICK HDPE FLATSTOCK LAG BOLTED OR CONTINUOUS EXTRUSION WELDED TO PIPE END OR PRE-FAB END CAP FUSION WELDED TO PIPE END
8" PERF. SECONDARY COLLECTION PIPE CELLS 7, 10, 13 AND 14 △△
1/2" THICK STAINLESS STEEL BACK-UP RING 20 HOLES EVEN SPACING AT 1 7/8" DIA
4' DIA. PRECAST CONCRETE MANHOLE PROTECTIVE SLEEVE
24" DIA SDR-11 HDPE VERTICAL RISER PIPE
STEEL BACK-UP RING (TYP)
3/8" STAINLESS STEEL CHANNEL 2"x6"x36" (TYP)
30" HOLE IN BASE OF MANHOLE
CONTRACTOR TO SUPPLY AND INSTALL RISER LID.
BOLT (TYP)
FLANGED PIPE (TYP)
PRIMARY LEACHATE COLLECTION SYSTEM
1.0' OPERATIONS LAYER
1.0' PRIMARY LEACHATE COLLECTION SYSTEM
GEOTEXTILE (EXCEPT CELLS 7 THROUGH 14) △△
GEONET (OR GEOCOMPOSITE) △△
80 MIL HDPE GEOMEMBRANE PRIMARY LINER
1.5' PRIMARY SOIL LINER COMPACTED CLAY
GEOTEXTILE
1.0' SECONDARY LEACHATE COLLECTION SYSTEM
GEOTEXTILE (EXCEPT CELLS 7 THROUGH 14) △
GEONET (OR GEOCOMPOSITE) △△
80 MIL HDPE GEOMEMBRANE SECONDARY LINER
3.0' SECONDARY SOIL LINER COMPACTED CLAY
SUBBASE
NOTES:
1. HORIZONTAL SECTION OF HDPE SIDESLOPE RISER SHALL BE PERFERATED WITH EVENLY SPACED 1/2" DIAMETER HOLES AND WRAPPED WITH THREE LAYERS OF GEONET. HOLE SPACING SHALL BE 6" EACH WAY.
2. GRAVEL BACKFILL IN SUMP AREA AND BETWEEN VERTICAL RISER AND CONCRETE SLEEVE SHALL N.Y.S.D.O.T. NO. 2 STONE, HAVING A HYDRAULIC CONDUCTIVITY OF 2x10-2 CM/SEC OR GREATER.
3. HDPE VERTICAL RISER BETWEEN HORIZONTAL SECTION OF FABRICATED TEE AND BOTTOM OF MANHOLE SHALL BE PERFORATED WITH A MINIMUM OF 20 EVENLY SPACED 1/2" DIA. HOLES. PERFORATED PORTION OF RISER SHALL BE WRAPPED WITH THREE LAYERS OF GEONET.
△△ 4. ADDITIONAL LAYERS OF GEONET ALONG CENTERLINE AND TOE OF SLOPE TO EXTEND 5 FEET INTO SUMP AREA EXCEPT CELLS 7 THROUGH 14
△△ 5. FOR SUMP CONSTRUCTION GRADES SEE DRAWINGS NO. 13A, 13B, 13C, 13D, 13E, 13G AND 13H.
△△ 6. FOR THE LINER SYSTEMS OF CELLS 7 THROUGH 14 SEE DRAWING NO. 17A.
B / 18A SECTION △ PRIMARY LEACHATE COLLECTION SUMP AND RISER SCALE 1" = 5'
CELL 6
ONE ADDITIONAL GEONET LAYER
3 ADDITIONAL GEONET LAYERS (SECONDARY AND PRIMARY)
SUMP
2 / 18A CELL 6 BASE GRADE △ CONFIGURATION (TYP.) NTS
SAND OR 2" RUN OF CRUSH BEDDING BACKFILL
1.0' OPERATIONS LAYER
GEOTEXTILE (EXCEPT CELL 7, 10, 13 AND 14) △△
GEONET (OR GEOCOMPOSITE) △
80 MIL HDPE GEOMEMBRANE PRIMARY LINER
GEONET (OR GEOCOMPOSITE) △△
80 MIL HDPE GEOMEMBRANE SECONDARY LINER
3.0' SECONDARY SOIL LINER COMPACTED CLAY
24" SDR-11 HDPE SECONDARY COLLECTION SIDESLOPE RISER
MINIMUM 2.0' OVERLAP
8" DIA. PIPE PRIMARY CELLS 7, 10, 13 AND 14 △
MINIMUM 2.0' OVERLAP
24" SDR-11 HDPE PRIMARY COLLECTION SIDESLOPE RISER
SAND OR 2" RUN OF CRUSH BEDDING BACKFILL
GEOTEXTILE
11.50' - 11.67' △
18.67' - 20.00' △
SUBBASE
RISER TRENCH UNDERCUT
C / 18A PRIMARY/SECONDARY LEACHATE COLLECTION RISER TRENCH △△ SCALE 1" = 5'
STATE OF NEW YORK
CHARLES P. BALLOD
LICENSED PROFESSIONAL ENGINEER
59688-1
NOV 18 1997
CADD PRODUCED DRAWING
RUST ENVIRONMENT & INFRASTRUCTURE
SIGNATURE
DATE
△ 10-97 MODIFY PIPING AND ADDED NOTES FAS CPB
△ 7-97 ADJUSTED 8" PIPE LOCATION FAS CPB
△ 6-97 DELETED SECONDARY RISER CLEANOUT FAS CPB
△ 4-97 REVISED FOR CELL 8 FAS CPB
△ 11-96 MODIFY LINER SYSTEM FAS CPB
△ 7-96 ADD NOTE DETAIL 1, REVISED TITLE FOR CELL 10 FAS CPB
△ 4-96 ADDED DETAIL CELL 6 BASE GRADE FAS CPB
REV. DATE DESCRIPTION DRN BY APP BY
DATE: NOVEMBER 1995
PROJECT NO. 34282.100
SCALE: AS SHOWN
DES BY FAS
DRN BY FAS
CHK BY CPB
REV BY AWE
APP BY CPB
PROJECT: RESIDUALS MANAGEMENT UNIT 1
SHEET TITLE: SUMP DETAILS CELLS 5 THROUGH 14 △△
CWM Chemical Services, Inc. Model City Facility
DRAWING NO. 18A

**ENCLOSURE NO. 3**
**PROPOSED REVISED FUGITIVE DUST CONTROL PLAN**

Addition of RMU-2
(includes document showing tracked changes)

Date: April 2001 (Revised: March 2016)

**APPENDIX D-10**
**FUGITIVE DUST CONTROL PLAN**

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Date: April 2001 (Revised: March 2016)

# FUGITIVE DUST CONTROL PLAN

As a hazardous waste management facility, the possibility exists that potentially contaminated dust could be released to the atmosphere. 6 NYCRR 373-2.14(c)(9) specifies that if a landfill contains any particulate matter which may be subject to wind dispersal, the owner or operator must cover or otherwise manage the landfill to control wind dispersal. Controls, such as wetting, must be applied to dusty waste streams when they are disposed of in the landfill to prevent particulate emissions. Vehicles exiting the landfill are cleaned of any gross contamination at the exit of the landfill. In order to control any potentially contaminated dust that may accumulate on the roads outside the landfill which are used by waste hauling vehicles, road maintenance is performed.

In addition to the control of potentially contaminated dust from waste management activities, CWM employs best management practices to reduce the amount of soil-type particulate dust. The practices are employed during construction, site and stockpile maintenance and the maintenance of roadways which are used by non-waste hauling vehicles.

## I. Control of Potentially Contaminated Dust

### A. Landfill Operations

1. Waste stream evaluation.

    a) Waste streams are evaluated for dusting potential during the approval process. Recommendations for dust control, including wetting, containerization, stabilization treatment, etc. will be included on the disposal decision for any wastes identified with dusting potential.

    b) Recommendations for dust control will be considered by the On-Site DEC Monitors during their review and approval of the landfill waste stream. DEC comments will be incorporated into the management approach as appropriate.

    c) Upon receipt of the first shipment of any new waste, the sampler will inspect the load and consider its potential for dusting. The disposal decision may be updated if necessary.

    d) A dusty load for direct landfill disposal will be flagged for special handling by the landfill personnel and the control method prescribed on the Waste Tracking Form.

2. Waste Disposal

    a) If the prescribed method for dust control is wetting, an operator with a water canon may wet the load in the container in the landfill. If required, an operator may use a backhoe to mix the water and the material in the container prior to dumping to ensure proper wetting of the waste. Additional water may be sprayed during the unloading or after waste placement.

b) Any excess or free liquid resulting from the operations contemplated by the activity above shall be treated as liquid from a precipitation event and shall not be deemed to constitute the disposal of free liquids or bulk waste containing free liquids. This interpretation is in keeping with USEPA policy contained in a statutory interpretative guidance document issued in April, 1986.

c) If a dusty waste load not previous identified as having a dusting potential is noted by the landfill personnel, the lab will be notified and the disposal decision amended as needed to specify controls.

d) If the specified dust controls are unsuccessful during a trial load, CWM shall cease disposal of additional loads and revise the dust control procedure.

e) In addition, a trash fence is employed to prevent wind blown debris from escaping the landfill. On a routine basis, all plastic and paper debris escaping the boundaries of the waste management area will be collected.

f) Additional water may be applied to the landfill operating area to control dust. DEC approved cover material such as ConCover may be used to provide dust control of the waste placed in the landfill.

g) All exposed waste is covered at the end of each day of operation using a DEC approved cover material.

NOTE: The procedures specified above in sections 1. a)-c) and 2. c)-d) must be included in this and any future versions of CWM's Fugitive Dust Control Plan according to a Memorandum of Understanding (89-151) between CWM and NYSDEC.

B. Roadways Used By Waste Hauling Vehicles

1. Potential Contamination Control

a) Vehicles or any other equipment which have entered the landfill facility where it has come into direct contact with waste, shall be inspected for gross contamination prior to leaving the landfill area.

b) Any gross contamination identified on the wheels or equipment will be physically removed before leaving the area to prevent contamination of on-site roads.

c) Despite the efforts described above, the potential exists that contaminated dust may be present on the roadways outside the landfill. These roadways will be cleaned and maintained. A sweeper or other road cleaning equipment may be employed to minimize dust accumulation on these roads. Water trucks may also be employed to wet the road surfaces and to minimize air borne dust. Note: If truck washing is performed at the landfill exit, the potential for contaminated dust on the roadway will be eliminated.

d) In addition, the site traffic control plan has generally limited these roadways to waste hauling vehicles. A low speed limit has been posted and speed bumps are employed to minimize dust generation.

## II. Control of General Particulate Dust

### A. Construction Projects

Dust management procedures for new site and landfill construction projects are addressed in the related permit applications where appropriate. A Stormwater Pollution Prevention Plan has been developed for construction projects affecting areas of at least one acre to control soil erosion and contain sediments.

### B. Erosion

Vegetative cover is maintained using on-site and contracted services. This includes the application of clay, top soil, fertilizer, hydroseeding and hand seeding. Some berm areas may also be covered with stone or gravel. The use of gabion mats and especially Miramet geotextile fabric has reduced erosion and enhanced vegetative growth.

### C. Other Site Roads

Roadways other than those used by waste hauling vehicles will be cleaned and maintained as good housekeeping dictates. In general, the paved roads will be swept as needed, weather permitting. These roads may be wetted down as needed to provide general dust management, adequate visibility and nuisance control.

## III. Air Monitoring - Fugitive Dust Emissions

CWM has an Ambient Air Monitoring Program. This program determines the impact, if any, of the hazardous waste activities and other site activities on the surrounding air quality at the Model City facility. This Ambient Air Monitoring Program has been approved by NYSDEC.

A. During RMU-2 Landfill Operations

PM-10 Monitoring

A detailed discussion of the PM-10 monitoring network relative to dust emissions is presented in the PM-10 Air Monitoring Program QA/QC Manual, initially approved by NYSDEC (H. Sandonato to J. Pizzuto, 9/26/90), with subsequent revisions. This monitoring program demonstrates CWM's compliance with the national primary and secondary 24 hour ambient air quality standard for particulate matter (PM-10) of 150 micrograms/cubic meter, 24 hour average concentration.

The results of the PM-10 monitoring shall be treated as PM-2.5 and compared to the national primary and secondary 24 hour ambient air quality standard for particulate matter (PM-2.5) of 35 micrograms/cubic meter, 24 hour average concentration. Alternatively, the Permittee may perform a short-term monitoring program using temporary PM-2.5 units co-located at PM-10 monitoring network locations to establish the fraction of the PM-10 results that are PM-2.5.

The fugitive dust control measures discussed in this plan have consistently resulted in particulate matter levels below the ambient air quality standards. If this monitoring network begins to show levels above the standards, CWM will investigate the cause and revise the Fugitive Dust Control Plan, if necessary.

B. Monitoring During Construction

PM-10 Monitoring

In addition to the perimeter network monitoring, the Permittee shall perform continuous real-time PM-10 monitoring proximate to the landfill construction in accordance with the Residuals Management Unit No. 2 (RMU-2) Air Monitoring Plan (RAMP) for Landfill Construction as required by Attachment N of this Permit. Response Levels and Response Actions shall be specified in the RAMP.

**APPENDIX D-10**
**FUGITIVE DUST CONTROL PLAN**

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Date: April 2001 (Revised: March 2016)

# FUGITIVE DUST CONTROL PLAN

As a hazardous waste management facility, the possibility exists that potentially contaminated dust could be released to the atmosphere. 6 NYCRR 373-2.14(c)(9) specifies that if a landfill contains any particulate matter which may be subject to wind dispersal, the owner or operator must cover or otherwise manage the landfill to control wind dispersal. Controls, such as wetting, must be applied to dusty waste streams when they are disposed of in the landfill to prevent particulate emissions. Vehicles exiting the landfill are cleaned of any gross contamination at the exit of the landfill. In order to control any potentially contaminated dust that may accumulate on the roads outside the landfill which are used by waste hauling vehicles, road maintenance is performed.

In addition to the control of potentially contaminated dust from waste management activities, CWM employs best management practices to reduce the amount of soil-type particulate dust. The practices are employed during construction, site and stockpile maintenance and the maintenance of roadways which are used by non-waste hauling vehicles.

## I. Control of Potentially Contaminated Dust

### A. Landfill Operations

1. Waste stream evaluation.

   a) Waste streams are evaluated for dusting potential during the approval process. Recommendations for dust control, including wetting, containerization, stabilization treatment, etc. will be included on the disposal decision for any wastes identified with dusting potential.

   b) Recommendations for dust control will be considered by the On-Site DEC Monitors during their review and approval of the landfill waste stream. DEC comments will be incorporated into the management approach as appropriate.

   c) Upon receipt of the first shipment of any new waste, the sampler will inspect the load and consider its potential for dusting. The disposal decision may be updated if necessary.

   d) A dusty load for direct landfill disposal will be flagged for special handling by the landfill personnel and the control method prescribed on the Waste Tracking Form.

2. Waste Disposal

   a) If the prescribed method for dust control is wetting, an operator with a water canon may wet the load in the container in the landfill. If required, an operator may use a backhoe to mix the water and the material in the container prior to dumping to ensure proper wetting of the waste. Additional water may be sprayed during the unloading or after waste placement.

b) Any excess or free liquid resulting from the operations contemplated by the activity above shall be treated as liquid from a precipitation event and shall not be deemed to constitute the disposal of free liquids or bulk waste containing free liquids. This interpretation is in keeping with USEPA policy contained in a statutory interpretative guidance document issued in April, 1986.

c) If a dusty waste load not previous identified as having a dusting potential is noted by the landfill personnel, the lab will be notified and the disposal decision amended as needed to specify controls.

d) If the specified dust controls are unsuccessful during a trial load, CWM shall cease disposal of additional loads and revise the dust control procedure.

e) In addition, a trash fence is employed to prevent wind blown debris from escaping the landfill. On a routine basis, all plastic and paper debris escaping the boundaries of the waste management area will be collected.

f) Additional water may be applied to the landfill operating area to control dust. DEC approved cover material such as ConCover may be used to provide dust control of the waste placed in the landfill.

g) All exposed waste is covered at the end of each day of operation using a DEC approved cover material.

NOTE: The procedures specified above in sections 1. a)-c) and 2. c)-d) must be included in this and any future versions of CWM's Fugitive Dust Control Plan according to a Memorandum of Understanding (89-151) between CWM and NYSDEC.

B. Roadways Used By Waste Hauling Vehicles

1. Potential Contamination Control

a) Vehicles or any other equipment which have entered the landfill facility where it has come into direct contact with waste, shall be inspected for gross contamination prior to leaving the landfill area.

b) Any gross contamination identified on the wheels or equipment will be physically removed before leaving the area to prevent contamination of on-site roads.

c) Despite the efforts described above, the potential exists that contaminated dust may be present on the roadways outside the landfill. These roadways will be cleaned and maintained. A sweeper or other road cleaning equipment may be employed to minimize dust accumulation on these roads. Water trucks may also be employed to wet the road surfaces and to minimize air borne dust. Note: If truck washing is performed at the landfill exit, the potential for contaminated dust on the roadway will be eliminated.

d) In addition, the site traffic control plan has generally limited these roadways to waste hauling vehicles. A low speed limit has been posted and speed bumps are employed to minimize dust generation.

## II. Control of General Particulate Dust

### A. Construction Projects

Dust management procedures for new site and landfill construction projects are addressed in the related permit applications where appropriate. A Stormwater Pollution Prevention Plan has been developed for construction projects affecting areas of at least ~~5 acres~~one acre to control soil erosion and contain sediments.

### B. Erosion

Vegetative cover is maintained using on-site and contracted services. This includes the application of clay, top soil, fertilizer, hydroseeding and hand seeding. Some berm areas may also be covered with stone or gravel. The use of gabion mats and especially Miramet geotextile fabric has reduced erosion and enhanced vegetative growth.

### C. Other Site Roads

Roadways other than those used by waste hauling vehicles will be cleaned and maintained as good housekeeping dictates. In general, the paved roads will be swept as needed, weather permitting. These roads may be wetted down as needed to provide general dust management, adequate visibility and nuisance control.

## III. Air Monitoring - Fugitive Dust Emissions

CWM has an Ambient Air Monitoring Program. This program determines the impact, if any, of the hazardous waste activities and other site activities on the surrounding air quality at the Model City facility. This Ambient Air Monitoring Program has been approved by NYSDEC.

A. During RMU-2 Landfill Operations

PM-10 Monitoring

A detailed discussion of the PM-10 monitoring network relative to dust emissions is presented in the PM-10 ~~monitoring system~~Air Monitoring Program QA/QC ~~manual previously~~Manual, initially approved by NYSDEC (H. Sandonato to J. Pizzuto, 9/26/90~~).~~.), with subsequent revisions. This monitoring program demonstrates CWM's compliance with the national primary and secondary 24 hour ambient air quality standard for particulate matter (PM-10) of 150 micrograms/cubic meter, 24 hour average concentration. ~~The level of the national primary and secondary annual standards for particulate matter is 50 micrograms/cubic meter, annual arithmetic mean.~~

The results of the PM-10 monitoring shall be treated as PM-2.5 and compared to the national primary and secondary 24 hour ambient air quality standard for particulate matter (PM-2.5) of 35 micrograms/cubic meter, 24 hour average concentration. Alternatively, the Permittee may perform a short-term monitoring program using temporary PM-2.5 units co-located at PM-10 monitoring network locations to establish the fraction of the PM-10 results that are PM-2.5.

The fugitive dust control measures discussed in this plan have consistently resulted in particulate matter levels below the ambient air quality standards. If this monitoring network begins to show levels above the standards, CWM will investigate the cause and revise the Fugitive Dust Control Plan, if necessary.

B. Monitoring During Construction

PM-10 Monitoring

In addition to the perimeter network monitoring, the Permittee shall perform continuous real-time PM-10 monitoring proximate to the landfill construction in accordance with the Residuals Management Unit No. 2 (RMU-2) Air Monitoring Plan (RAMP) for Landfill Construction as required by Attachment N of this Permit. Response Levels and Response Actions shall be specified in the RAMP.

**ENCLOSURE NO. 4**
**PROPOSED REVISED AIR & METEOROLOGICAL MONITORING PLAN**

Addition of RMU-2
(includes document showing tracked changes)

# Air & Meteorological Monitoring Plan

Monitoring Network

A NYSDEC-approved ambient air and meteorological monitoring network shall be operated and maintained at the CWM Model City facility. This program shall consist of a minimum of six (6) monitoring sites established at NYSDEC-approved locations and equipped with sampling devices and other equipment as necessary for ambient air quality and one (1) meteorological monitoring station. Additional monitoring will be required during landfill construction activities.

Air Quality Monitoring During Construction

Air samples shall be obtained from the NYSDEC-approved monitoring network and analyzed for PM-10 in accordance with Methods published by the USEPA. CWM will sample for PM-10 once every six calendar days.

The Permittee shall prepare and submit to the NYSDEC for approval a Residuals Management Unit No. 2 (RMU-2) Air Monitoring Plan (RAMP) for Landfill Construction prior to initiating landfill construction activities at the facility. The Permittee shall use Appendix 1A and 1B of DER-10 as a guide to prepare the RAMP. Additional proximate air monitoring for Volatile Organic Compounds (VOCs), dust and Polychlorinated biphenyls (PCBs), shall be performed during landfill construction in accordance with the RAMP.

Response Levels and Response Actions shall be specified in the RAMP.

At a minimum, the Permittee shall perform continuous real-time PM-10 monitoring proximate to the landfill construction. Additionally, the Permittee shall perform VOC and/or PCB monitoring in accordance with the RAMP for Landfill Construction proximate to the excavation of in-situ soil with known VOC and/or PCB, contamination (corrective action areas). The RAMP will specify action levels for PM-10 and PCBs.

Additional requirements for VOC monitoring during excavations for RMU-2 are included in the RMU-2 Soil Excavation Monitoring and Management Plan (SEMMP), which includes an RMU-2 Corrective Action Plan.

Air Quality Monitoring During RMU-2 Operations

Air samples shall be obtained from the monitoring network and analyzed for PM-10 in accordance with Methods published by the USEPA during the operational life of RMU-2. CWM will sample for PM-10 once every six calendar days.

The results of the PM-10 monitoring shall be treated as PM-2.5 and compared to the national primary and secondary 24 hour ambient air quality standard for particulate matter (PM-2.5) of 35 micrograms/cubic meter, 24 hour average concentration. Alternatively, the Permittee may perform a short-term monitoring program using temporary PM-2.5 units co-located at PM-10 monitoring

network locations to establish the fraction of the PM-10 results that are PM-2.5.

Commencing with the start of waste disposal operations in RMU-2, additional monitoring network air sampling and analysis for VOCs, PCBs, and metals shall be performed in accordance with the RAMP. The majority of the bulk waste placed in the landfill is remedial waste (contaminated soil & debris). RCRA hazardous waste must meet the Land Disposal Restriction (LDR) standards (total constituents in mg/kg or ppm) prior to placement in the landfill. Metals contaminated wastes (e.g. remedial soil, sand blast grit, wastewater treatment sludge) may require treatment by stabilization with CKD to meet the LDR standards (mg/l or ppm by TCLP) prior to landfill disposal. VOCs will be monitored at network locations in accordance with the RAMP. During initial operations, PCB monitoring will be performed to verify that levels at the network locations are not above the action level. A PCB factor will be developed for use in routine monitoring in accordance with the RAMP. Also, during initial operations, metals analysis will be performed on samples collected at the network locations. Metals factors will be developed for use in routine monitoring in accordance with the RAMP.

Meteorological Monitoring

Temperature, wind speed and wind direction shall be continuously measured at CWM's on-site meteorological station and recorded. CWM shall also measure and record the date, or dates, duration (in hours) and amount (in inches) of all precipitation events at the facility's meteorological station. Other parameters shall also be measured if deemed necessary by the NYSDEC.

Quality Assurance / Quality Control (QA/QC)

The ambient air and meteorological monitoring network shall be maintained and all sampling and analysis shall be performed in accordance with the November 2000 and any subsequently Department approved revisions of the CWM Meteorological Monitoring Network - Quality Assurance Project Plan, which is incorporated by reference into this Permit by **Condition B** in **Schedule 1 of Module I** of this Permit, and in accordance with the May 2005 and any subsequently Department approved revisions of the PM-10 Air Monitoring Program QA/QC Manual and approved RAMP . CWM shall compensate the NYSDEC for the costs incurred in the oversight and validation of the network QA/QC that are reported to CWM. Compensation procedures shall be the same as those specified by **Condition E** in **Schedule 1 of Module I** of this Permit for the environmental monitors.

Reporting of Monitoring Data

A monthly report of air monitoring data collected during each calendar month shall be submitted to the Region 9 Air and Solid & Hazardous Materials Engineers within ninety (90) days from the end of each calendar month or in accordance with an alternative Department approved submission schedule. Meteorological monitoring data shall be made available upon request.

**Air & Meteorological Monitoring Plan**

Monitoring Network

A NYSDEC-approved ambient air and meteorological monitoring network shall be operated and maintained at the CWM Model City facility. This program shall consist of a minimum of six (6) monitoring sites established at NYSDEC-approved locations and equipped with sampling devices and other equipment as necessary for ambient air quality and one (1) meteorological monitoring station. Additional monitoring will be required during landfill construction activities.

Air Quality Monitoring During Construction

Air samples shall be obtained from the NYSDEC-approved monitoring network and analyzed for PM-10 in accordance with Methods published by the USEPA. CWM will sample for PM-10 once every six calendar days.

The Permittee shall prepare and submit to the NYSDEC for approval a Residuals Management Unit No. 2 (RMU-2) Air Monitoring Plan (RAMP) for Landfill Construction prior to initiating landfill construction activities at the facility. The Permittee shall use Appendix 1A and 1B of DER-10 as a guide to prepare the RAMP. Additional proximate air ~~sampling and analysis~~monitoring for Volatile Organic Compounds (VOCs~~)~~), dust and~~/or~~ Polychlorinated ~~biphenals~~biphenyls (PCBs~~)~~), shall be performed ~~if deemed necessary~~during landfill construction in accordance with the RAMP.

Response Levels and Response Actions shall be specified in the RAMP.

At a minimum, the Permittee shall perform continuous real-time PM-10 monitoring proximate to the landfill construction. Additionally, the Permittee shall perform VOC and/or PCB monitoring in accordance with the RAMP for Landfill Construction proximate to the excavation of in-situ soil with known VOC and/or PCB, contamination (corrective action areas). The RAMP will specify action levels for PM-10 and PCBs.

Additional requirements for VOC monitoring during excavations for RMU-2 are included in the RMU-2 Soil Excavation Monitoring and Management Plan (SEMMP), which includes an RMU-2 Corrective Action Plan.

Air Quality Monitoring During RMU-2 Operations

Air samples shall be obtained from the monitoring network and analyzed for PM-10 in accordance with Methods published by the ~~NYSDEC.~~USEPA during the operational life of RMU-2. CWM will sample for PM-10 once every six calendar days.

The results of the PM-10 monitoring shall be treated as PM-2.5 and compared to the national primary and secondary 24 hour ambient air quality standard for particulate matter (PM-2.5) of 35 micrograms/cubic meter, 24 hour average concentration. Alternatively, the Permittee may perform

a short-term monitoring program using temporary PM-2.5 units co-located at PM-10 monitoring network locations to establish the fraction of the PM-10 results that are PM-2.5.

Commencing with the start of waste disposal operations in RMU-2, additional monitoring network air sampling and analysis for VOCs, PCBs, and metals shall be performed in accordance with the RAMP. The majority of the bulk waste placed in the landfill is remedial waste (contaminated soil & debris). RCRA hazardous waste must meet the Land Disposal Restriction (LDR) standards (total constituents in mg/kg or ppm) prior to placement in the landfill. Metals contaminated wastes (e.g. remedial soil, sand blast grit, wastewater treatment sludge) may require treatment by stabilization with CKD to meet the LDR standards (mg/l or ppm by TCLP) prior to landfill disposal. VOCs will be monitored at network locations in accordance with the RAMP. During initial operations, PCB monitoring will be performed to verify that levels at the network locations are not above the action level. A PCB factor will be developed for use in routine monitoring in accordance with the RAMP. Also, during initial operations, metals analysis will be performed on samples collected at the network locations. Metals factors will be developed for use in routine monitoring in accordance with the RAMP.

Meteorological Monitoring

Temperature, wind speed and wind direction shall be continuously measured at ~~CWM=s~~CWM's on-site meteorological station and recorded. CWM shall also measure and record the date, or dates, duration (in hours) and amount (in inches) of all precipitation events at the ~~facility=s~~facility's meteorological station. Other parameters shall also be measured if deemed necessary by the NYSDEC.

Quality Assurance / Quality Control (QA/QC)

The ambient air and meteorological monitoring network shall be maintained and all sampling and analysis shall be performed in accordance with the November 2000 and any subsequently Department approved revisions of the ~~A~~CWM Meteorological Monitoring Network - Quality Assurance Project Plan~~@,~~ which is incorporated by reference into this Permit by **Condition B** in **Schedule 1 of Module I** of this Permit, and in accordance with the May 2005 and any subsequently Department approved revisions of the ~~A~~PM-10 Air Monitoring Program QA/QC Manual~~@.~~ and approved RAMP . CWM shall compensate the NYSDEC for the costs incurred in the oversight and validation of the network QA/QC that are reported to CWM. Compensation procedures shall be the same as those specified by **Condition E** in **Schedule 1 of Module I** of this Permit for the environmental monitors.

Reporting of Monitoring Data

A monthly report of air monitoring data collected during each calendar month shall be submitted to the Region 9 Air and Solid & Hazardous Materials Engineers within ninety (90) days from the end of each calendar month or in accordance with an alternative Department approved submission schedule. Meteorological monitoring data shall be made available upon request.

**ENCLOSURE NO. 5**
**OUTLINE OF PROPOSED RMU-2 AIR MONITORING PROGRAM FOR CONSTRUCTION AND OPERATIONS**

- This outline shall be used as a basis for the preparation of the RMU-2 Air Monitoring Plan (RAMP)

March 16, 2016

**PROPOSED AIR MONITORING PROGRAM**
**RESIDUALS MANAGEMENT UNIT NO. 2**
**CWM CHEMICAL SERVICES, LLC**
**MODEL CITY, NEW YORK**

| | Current Operations | | | | RMU-2 Construction (1) | | | | RMU-2 Operations (1) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Monitoring | Type | Location | Frequency | Monitoring | Type | Location | Frequency | Monitoring | Type | Location | Frequency |
| Dust | PM-10 | Hi-vol | Network | 1/6 days | PM-10 (2) | Hi-vol | Network | 1/6 days | PM-10 (2) | Hi-vol | Network | 1/6 days |
| | | | | | PM-10<br>DER-10<br>(RAMP) | Hand-Held DataRAM™ pDR-1000AN or equivalent | Proximate | Continuous during construction activities | | | | |
| VOCs | SEMMP | Hand-Held MiniRAE 3000 or equivalent | Proximate | Continuous during excavation activities | DER-10<br>(RAMP) | Hand-Held MiniRAE 3000 or equivalent | Proximate | Continuous during excavation activities (VOC Contaminated Areas Only) | Method 325A—VOCs from Fugitive and Area Sources (8) | Passive Sorbent | Network | Continuous (2 week sample) |
| | | | | | RMU-2 (SEMMP) | Hand-Held MiniRAE 3000 or equivalent | At soil placement area (berm or stockpile) | Continuous during excavation activities | | | | |
| PCBs (routine) | - | - | - | - | PM-10 with application of a surrogate for PCBs (3) | Hand-Held DataRAM™ pDR-1000AN or equivalent (for dust) | Proximate | Continuous during construction activities (PCB Contaminated Areas Only) | PM-10 with application of a surrogate for PCBs (4) | Hi-vol | Network | 1/6 days |
| PCBs (confirmation, first month PCBs landfilled in RMU-2 ) | - | - | - | - | - | - | - | - | PCB by ASTM D 4861 | Filter /PUF | Network | 1/6 days |
| Metals (routine) | - | - | - | - | PM-10<br>(5) | Hand-Held DataRAM™ pDR-1000AN or equivalent (for dust) | Proximate | Continuous during construction activities | PM-10 with application of a surrogate for metals (6) | Hi-vol | Network | 1/6 days |
| Metals (confirmation, first month lead and other toxic metals landfilled in RMU-2) | - | - | - | - | - | - | - | - | analyze PM-10 filter for metals (7) | Hi-vol | Network | 1/6 days |

Notes:
(1) = Methods and procedures for monitoring for dust, VOCs, PCBs, and metals during construction and operations for RMU-2 will be established in the RMU-2 Air Monitoring Plan (RAMP) to be submitted to the NYSDEC and approved prior to construction.
(2) = CWM may utilize a short-term program with portable PM-2.5 units co-located at various PM-10 monitoring locations to establish what percentage of PM-10 particulates are PM-2.5. Methods and frequency will be established in the RAMP.
(3) = During excavation of areas with PCB contamination, the PCB concentration in the soil will be used to develop a PCB factor to be applied to the PM-10 values as a surrogate for PCB analyses.
A PCB action level of 110 ng/m3 will be included in the RAMP (reference: Hudson River community monitoring program).
(4) = Initial RMU-2 operations: during the first month that bulk PCB contaminated soil/waste is landfilled, PCB sampling will be performed at network locations using PUF samplers. Results will be compared to the PCB action level.
Upwind/downwind results will be compared. PCB PUF results will be used to develop PCB factor for application to PM-10 values as a surrogate for routine PCB analysis.
(5) = No lead or toxic metals contamination expected in areas of RMU-2 cell construction. Lead and other toxic metals will be present in hazardous waste landfilled in RMU-2. Metals analysis to be performed during RMU-2 operations.
(6) = Initial RMU-2 operations: during the first month that bulk lead or other toxic metals contaminated waste is landfilled, metals analysis will be performed on the PM-10 filters collected at the network locations.
Upwind/downwind results will be compared. The values in Air Guide 1 will be reviewed. Metals results will be used to develop lead/metals factors for application to PM-10 values as a surrogate for routine metals analysis.
(7) Total metals analysis for lead and other toxic metals will be performed on PM-10 filters collected at network locations.
Lead and other RCRA toxic metals must be stabilized with CKD to meet the Land Disposal Restrictions standards prior to landfill disposal.
(8) = CWM may petition the NYSDEC for approval of discontinuing the VOC monitoring one-year after the initiation of the program(s)
- = Not Required
Proximate = Monitoring located near construction activities in accordance with DER-10 or RMU-2 Air Monitoring Plan (RAMP)
SEMMP = Generic or Project-Specific Soil Excavation Monitoring and Management Plan in accordance with Condition D of Exhibit B of the 6 NYCRR Part 373 Permit.