HAWTHORN PARK RECYCLING & DISPOSAL FACILITY
HARRIS COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2185A

PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT 5
GROUNDWATER MONITORING PLAN

Prepared for:

USA Waste of Texas Landfills, Inc.
24275 Katy Freeway, Suite 450
Katy, Texas 77494

Prepared by:

Biggs & Mathews Environmental, Inc.
Firm Registration No. 50222

2/9/2021

February 2021

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1700 Robert Road, Suite 100 ♦ Mansfield, Texas 76063 ♦ 817-563-1144

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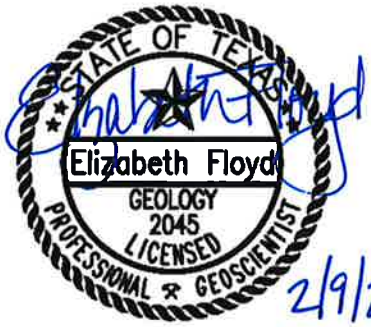

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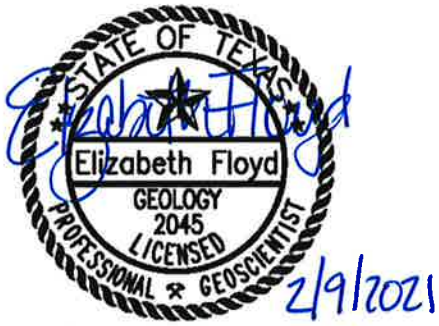
CONTENTS



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TABLES

Page

GROUNDWATER MONITORING SYSTEM DESIGN CERTIFICATION

General Site Information

Site: Hawthorn Park Recycling & Disposal Facility

Site Location: Harris County, Texas

MSW Permit No.: 2185A

Qualified Groundwater Scientist Statement

I, Elizabeth Floyd, am a licensed professional geoscientist in the State of Texas and a qualified groundwater scientist as defined in §330.3. I have reviewed the groundwater monitoring system and supporting data contained herein. In my professional opinion, the groundwater monitoring system is in compliance with the groundwater monitoring requirements specified in 30 TAC §330.401 through §330.421. This system has been designed for specific application to the Hawthorn Park Recycling & Disposal Facility (Permit No. MSW-2185A). The only warranty made by me in connection with this document is that I have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of my profession, practicing in the same or similar locality. No other warranty, expressed or implied, is intended.

Biggs & Mathews Environmental, Inc.
Firm Registration No. 50222

Firm/Address: Biggs and Mathews Environmental, Inc.
1700 Robert Road, Suite 100
Mansfield, Texas 76063

Signature: Elizabeth Floyd

Elizabeth Floyd, P.G. No. 2045 – Texas

Date: 2/9/2021

1 SITE HYDROGEOLOGY

1.1 Hydrogeological Units

The site hydrygeologic units were initially identified in the previous studies, including the 1990 McBride-Ratcliff and Associates (MRA) study for Sanifill of Texas, Inc. The site hydrogeology is composed of two discrete groundwater flow systems.

Groundwater flow is primarily contained within the more permeable sand beds of Layer II, the uppermost aquifer. Underlying the uppermost aquifer is an aquitard composed of clay and silty clay and it is considered the lower confining unit (Layer III). Underlying the lower confining unit is a lower transmissive layer consisting of primarily fine sand and varying amounts of silt (Layer IV).

Figures III-4C-1 through III-4C-4 of Appendix III-4C depict the relationship between the various hydrogeologic zones and the excavation depths of the facility sectors. A discussion of each hydrogeologic unit follows.

Historical cross sections from previous characterizations are presented in Appendix III-4I of Part III, Attachment 4 – Geology Report.

1.1.1 Uppermost Aquifer – Layer II

Groundwater flow is primarily contained within the sand beds of Layer II and under natural conditions generally flows to the southeast. The geometric mean of the hydraulic conductivity for Layer II is 1.97×10^{-2} cm/sec (Table III-4-7). Groundwater velocity is estimated to be approximately 306 feet/year in this layer.

1.1.2 Lower Confining Unit – Layer III

Layer III is considered the lower confining unit to the uppermost aquifer, Layer II. Layer III is continuous and correlatable across the site. Where Layer III was completely penetrated, it is 40 to 50 feet thick. Layer III consists primarily of clays, sandy clays, and silty clays and is primarily a zone of low permeability with some internal transmissive zones present.

1.2 Groundwater Flow Direction and Rate

1.2.1 Groundwater Flow Direction

Prior to 2016, depressurization activities were ongoing on the north side of the landfill, in the vicinity of MW-9, and all landfill monitoring wells were considered to be upgradient. At this time, depressurization activities are ongoing in the southern portion of the landfill, in the vicinity of MW-18; however, a portion of the depressurization system was reported to

be non-operational during the December 2019 sampling event and general groundwater flow in the uppermost aquifer was observed to the northeast.

1.2.2 Groundwater Flow Rate

Travel times across the site were estimated using the formula:

$$v = (k * i) / n_e$$

Where: v = travel velocity
k = hydraulic conductivity of the aquifer
i = hydraulic gradient
n_e = effective porosity

The estimated flow velocity for the uppermost aquifer at the site is 306 ft/year. Layer II piezomieter hydraulic conductivity values were used for calculation and are shown in Table III-4-7. The groundwater flow velocity calculation is included in Appendix III-4E, page III-4E-20.

2 SUBTITLE D GROUNDWATER MONITORING SYSTEM

The existing Hawthorn Park RDF has a Subtitle D groundwater monitoring system that has been certified by a qualified groundwater scientist in accordance with 30 TAC §330.401 through §330.421. The site initiated Subtitle D monitoring in 1993. The groundwater monitoring system has a total of 16 monitoring wells (MW-6 through MW-21) that are currently installed. All monitoring wells are currently considered upgradient due to an inward gradient previously present at the site. Monitoring well details are presented in Table III-4-6 of Attachment III-4. Groundwater monitoring is performed in accordance with the facility's Groundwater Sampling and Analysis Plan (GWSAP) and 30 TAC §330 Subchapter J. All of these wells are installed in the uppermost aquifer (Layer II) at the site. The boring logs, Monitoring Well Data Sheets (MWDS), and state forms for all wells can be found in Appendix III-4B as III-4B-240 through III-4B-288.

2.1 Design Criteria

In accordance with 30 TAC §330.403(a) and (e), a groundwater monitoring system must be installed that consists of a sufficient number of monitoring wells installed at appropriate locations and depths to yield representative samples from the uppermost aquifer. The design of the system shall be based on site-specific technical information that includes a thorough characterization of aquifer thickness, groundwater flow rate, groundwater flow direction, including seasonal and temporal fluctuations in flow, effect of site construction and operations on groundwater flow direction and rates, and thickness, stratigraphy, lithology and hydraulic characteristics of saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials of the uppermost aquifer, and materials of the lower confining unit of the uppermost aquifer.

The groundwater monitoring system for the Hawthorn Park RDF was designed and is operated in accordance with those rules and was certified by a qualified groundwater scientist.

The modifications to the Hawthorn Park RDF groundwater monitoring system are also designed in accordance with the required elements of the stated regulations.

In order to achieve a groundwater monitoring system design to comply with 30 TAC §330.403, the following criteria listed in Table III-5-1 were followed. The table lists the location of the appropriate section where the required information is located in this report.

Table III-5-1
Hawthorn Park Recycling & Disposal Facility
Groundwater Monitoring System Design Criteria

Criterion	Location of Information in this Report
Identify and Characterize the Uppermost Aquifer	Section 1.1 – Hydrogeologic Units
Establish Groundwater Flow Direction and Rate	Section 1.1 – Hydrogeologic Units Section 1.2 – Groundwater Flow Direction and Rate
Evaluate Potential Impacts of Operational Attributes of the Facility on Groundwater Flow	Section 2.1.1 – Relationship of Excavation Bottom to Uppermost Aquifer
Determine Impacts of Critical Receptors	Section 2.1.2 – Critical Receptors
Determine the Appropriate Locations and Screened Intervals of Groundwater Monitoring Wells	Section 2.5 – Monitoring Well Design and Construction

2.1.1 Relationship of Excavation Bottom to Uppermost Aquifer

There are three separate excavations at the Hawthorn Park RDF facility. The western excavation is bottomed in Layer III. Layer III is a laterally continuous clay composed of primarily clays, sandy clays, and silty clays. This is a zone of low permeability; due to the sand and silt content present within this layer; internal transmissive zones are present. The center excavation is designed to be bottomed primarily in Layer I, with a small portion of the southern portion of the central excavation bottomed in Layer II. Layer II is composed of fine sands and silts. The eastern excavation is in Layer I. Layer I consists primarily of clays, sandy clays, and silty clays.

Figures III-4C-2 through III-4C-5 of Appendix III-4C depict the relationship between the various hydrogeologic zones and the excavation depths of each of the excavations at the facility.

2.1.2 Critical Receptors

Critical receptors to groundwater flow downgradient of a landfill could include public drinking water supply wells, individual drinking water or livestock wells, and surface water bodies used for drinking water supply. There are at least 240 individual wells within a one-mile radius of the site. These wells are screened in the Chicot Aquifer. See Attachment III-4, Section III-4-3.2 – Wells Within One Mile for more detailed information regarding water wells. The nearest surface water body is the unnamed tributary of Cole Creek to the north and an unnamed tributary of the Brickhouse Gully to the southeast.

2.2 Contaminant Pathway Analysis

The natural flow of shallow groundwater in Layer II (the uppermost aquifer), within the subsurface has been altered by temporary dewatering activities causing an inward gradient at times and flow toward the north-northeast and east when depressurization activities are not in operation. Shallow groundwater in the vicinity of the landfill naturally flows generally toward the southeast.

Groundwater will resume normal flow toward the southeast once dewatering activities have ceased. After construction of the landfill is completed, water levels are expected to resume to pre-dewatering activities and resume flow toward the southeast. Groundwater in the Layer II sands is confined at its lower limit by the Layer III clay. The thickness and laterally continuous nature of this clay unit significantly limit the downward migration of groundwater in the Layer II sand.

After construction and depressurization activities have stopped and groundwater resumes natural state conditions, Layer II will be a preferential pathway for a potential release. This is addressed in the design of the groundwater monitoring system.

2.3 Monitoring Well Locations

The uppermost aquifer beneath the Hawthorn Park RDF has been identified as Layer II. Layer II is composed of fine sand and silts.

The proposed groundwater monitoring system will consist of a total of 16 monitoring wells. Fourteen monitoring wells will be considered downgradient: MW-6, MW-7, MW-8, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16, MW-17R, MW-21, MW-22, and MW-23. Two monitoring wells (MW-19 and 20) will be considered upgradient. Two of the above downgradient monitoring wells (MW-22 and MW-23) will be installed after permit approval. Three monitoring wells (MW-9, MW-17, and MW-18) will be plugged and abandoned to allow for expansion. Monitoring well MW-17 will be relocated to southern perimeter of the center block as MW-17R. Monitoring wells MW-17R, MW-22, and MW-23 will be installed within 60 days after final approval of the permit. All monitoring well locations are shown on Figure III-5A-1 in Appendix III-5A.

All parts of the groundwater monitoring system shall be operated and maintained so that they perform at least to design specifications through the life of the groundwater monitoring program.

The owner or operator shall promptly notify TCEQ and Harris County Pollution Control Services Department, in writing of changes in facility construction or operation or changes in adjacent property that affect or are likely to affect the direction and rate of groundwater flow and the potential for detecting groundwater contamination from a solid waste management unit and that may require the installation of additional monitoring wells or sampling points. Such additional wells or sampling points require a modification of the Site Development Plan.

2.4 Sampling and Analysis Procedures

Appendix III-5B – Groundwater Sampling and Analysis Plan contains the general requirements, sampling procedures and methods, and statistical analysis information required in 30 TAC §330.405(a)-(f). A copy of the approved plan will be placed in the site operating record.

2.5 Monitoring Well Design and Construction

All monitoring well design and construction will be done in accordance with §330.421. As such, a licensed Texas driller will install monitoring wells in accordance with the regulations. Wells will be drilled by a method that will not introduce contaminants into the borehole or casing. A licensed professional geoscientist or engineer who is familiar with the geology of the area will supervise monitoring well installation and development and will provide a log of the boring. Equivalent alternatives to TCEQ requirements may be used if prior written approval is obtained from the TCEQ Executive Director. Monitoring well construction details including screen intervals, well locations and elevations, filter pack and bentonite seal elevations, and surface completion are shown in Appendix III-5A on Figure III-5A-2. Monitoring well construction will be completed in accordance with §§330.63, 330.403, and 330.421.

If any fluid is required in the drilling of monitoring wells, clean, treated city water shall be used and a chemical analysis provided to the TCEQ Executive Director. No glue or solvents will be used in monitoring well construction.

After installation, monitoring wells will be developed to remove drilling artifacts and open the water-bearing zone for maximum flow until all water used or affected during drilling activities is removed and field measurements of pH, specific conductance, and temperature are stabilized.

A registered professional land surveyor will survey the well location and elevation. The point of the elevation datum will be permanently marked on the well casing.

Within 60 days of completion of a monitoring well or any other part of a monitoring system, an installation report will be submitted to TCEQ. The report will include construction and installation details for each well on forms available from TCEQ, a site map drawn to scale showing the location of all monitoring wells and the relevant point(s) of compliance, well elevations to the nearest 0.01 foot above msl (with year of datum shown), latitude and longitude or landfill grid location of each well, copies of detailed geologic logs including soil sample data, and copies of driller's reports and a description of well development procedures. The licensed driller should be familiar with the forms required by other agencies; a copy of those forms must also be submitted to TCEQ.

Damaged monitoring wells that are no longer usable will be reported to the TCEQ Executive Director for a determination whether to replace or repair the well. In accordance with 30 TAC §305.70, if a compromised well requires replacement a permit modification request will be submitted within 45 days of the discovery.

Plugging and abandonment of monitoring wells will be performed in accordance with 16 TAC §76.702 and §76.1004. No abandonment will be performed without prior written authorization.

All parts of the groundwater monitoring system will be operated and maintained so that they perform to design specifications throughout the life of the groundwater monitoring program.

The facility must notify the TCEQ Executive Director if changes in site construction or operation or changes in adjacent property affect or are likely to affect the direction and rate of groundwater flow and the potential for detecting groundwater contamination from the facility.

When monitoring wells are installed in unusual conditions, all aspects must be approved in writing by the TCEQ Executive Director.

3 GROUNDWATER QUALITY

3.1 Groundwater Monitoring Analytical Data

The historic groundwater chemistry results are tabulated in Appendix III-4F of Attachment III-4.

3.2 Plume of Contamination

In accordance with 30 TAC §330.63(f)(2), it is concluded that no plume of contamination has been identified as of the December 2019 groundwater sampling event.

3.3 Groundwater Quality

Groundwater quality has been monitored at the site as a part of a permitted monitoring network since the early 1990s. Groundwater conditions in the vicinity of the facility are currently monitored by sixteen (16) groundwater monitoring wells (MW-6 through MW-21) screened in the uppermost aquifer (Layer II).

Subtitle D background sampling was conducted for the site monitoring wells in accordance with the facility Groundwater Sampling and Analysis Plan (GWSAP) in 1996. The initial detection monitoring event for the site was conducted in December 1997. Currently the groundwater monitoring system is monitored for the parameters listed in Table 5B-1 of the approved GWSAP (Appendix III-5B). Historical analytical data for the facility monitoring wells is provided in Appendix III-4F – Historical Groundwater Analytical Data.

The only Appendix I metal detections were arsenic, barium, cadmium, chromium, copper, selenium, and zinc, all detected during the background establishment period in 1996 and one cadmium detection in 2014 (See Appendix III-4F of Attachment III-4). As shown in Table III-5-2, arsenic is the only parameter detected exceeding a maximum contaminant level (MCL).

Table III-5-2
Hawthorn Park Recycling & Disposal Facility
Historical Appendix I MCL Exceedances

Sample Date	Well	Constituent	Result (µg/L)	MCL (µg/L)
9/24/1996	MW-12	Arsenic	56	50
12/6/1996	MW-14	Arsenic	51	50

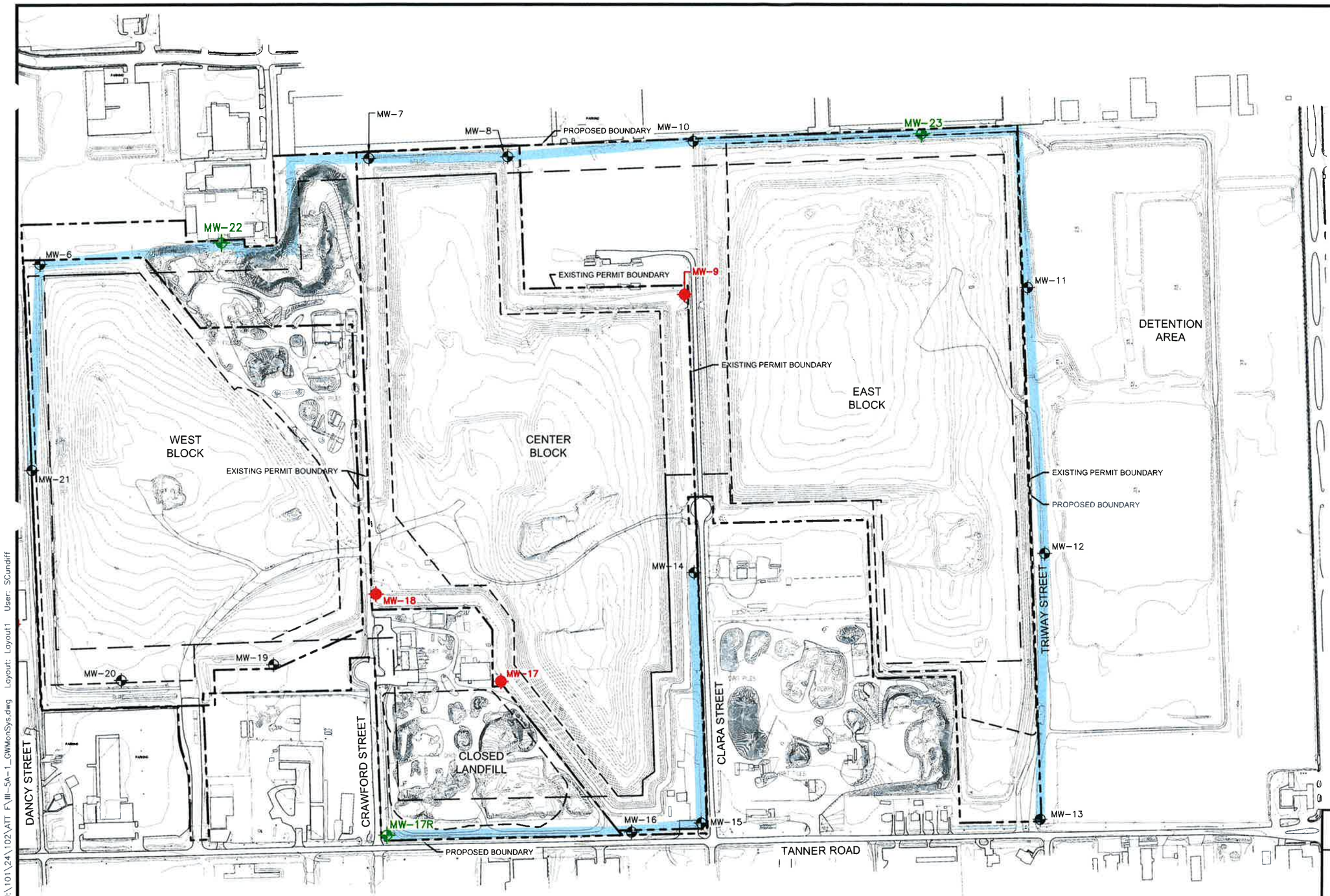
Note: The MCL for Arsenic was lowered from 50 µg/L to 10 µg/L in 2001

In response to an increase in Total Organic Carbon (TOC) concentrations above the TCEQ informal trigger level of 10 mg/L at MW-14, MW-18, and MW-19, TCEQ requested that these three monitoring wells be sampled for the 40 CFR Part 258, Appendix I Volatile Organic Compounds (VOCs) during the May 2000 groundwater sampling event and then again in February 2002 at MW-14. As shown in Appendix III-4F, no VOCs were detected during the 2000 and 2002 events. As described in correspondence with TCEQ on August 26, 2000, an increase in TOC concentration in groundwater is most often a result of groundwater having been influenced by surface water or surface conditions. Historically, some variability has occurred in the average TOC concentrations across the site and has exceeded the TCEQ informal trigger level of 10 mg/L at MW-6, MW-14, MW-16, MW-18, MW-19, MW-20, and MW-21. TOC readings are nonspecific and do not distinguish between naturally occurring and man-made organic compounds. Therefore, TOC is not a direct indicator of a subsurface release from a landfill unit.

In addition to variability in TOC at MW-14, increases in chloride, iron, specific conductance, and TDS were noted beginning in 2012. The increases observed at MW-14 are believed to be from an off-site source due to depressurization activities and supported by a landfill gas speciation investigation performed by USA Waste at gas probe GP-11, located approximately 360 feet south (upgradient) of MW-14, in 2009.

Some variability in chloride, manganese, and total dissolved solids has also been observed in multiple monitoring wells locations across the site. It is believed that these fluctuations in concentration are due to natural temporal variability as well as the result of site construction and excavation related depressurization, causing drawdown.

HAWTHORN PARK RECYCLING & DISPOSAL FACILITY
APPENDIX III-5A



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SCALE IN FEET

LEGEND

- CURRENT PERMIT BOUNDARY
- PROPOSED PERMIT BOUNDARY
- CURRENT LIMIT OF WASTE
- PROPOSED LIMIT OF WASTE
- MW-15 MONITOR WELL LOCATION
- MW-9 MONITOR WELL TO BE PLUGGED
- MW-23 MONITOR WELL TO BE INSTALLED
- POINT OF COMPLIANCE

NOTE:

1. EXISTING TOPOGRAPHIC MAP AND BORING LOCATIONS PROVIDED BY GOLDER ASSOCIATES.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
LICENSED
PROFESSIONAL GEOSCIENTIST

Elizabeth Floyd

2/9/2021

GROUNDWATER MONITORING SYSTEM

USA WASTE OF TEXAS LANDFILLS, INC.
HAWTHORN PARK LANDFILL
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144

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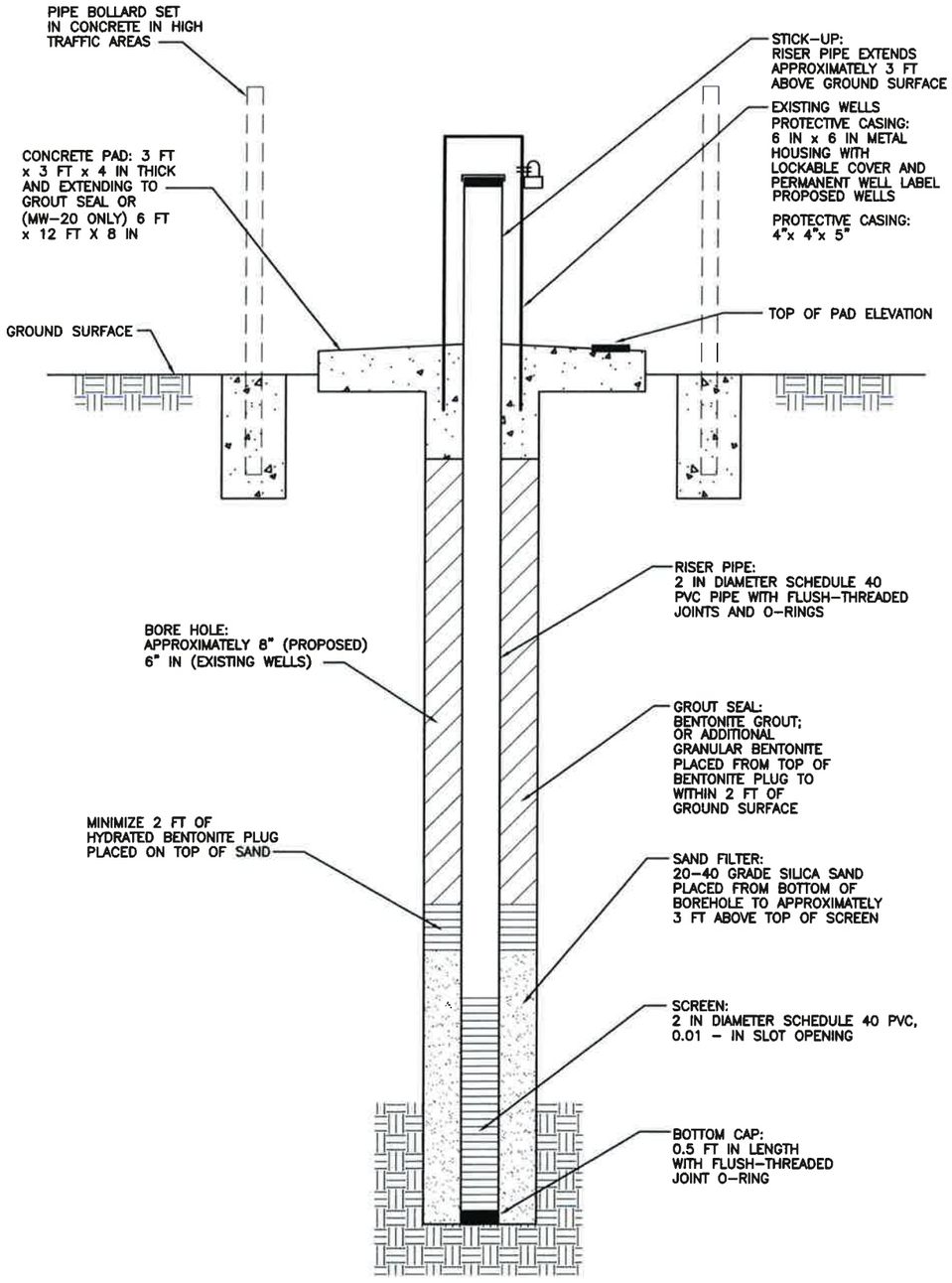

Well Name	Location Northing	Location Easting	Total Depth (feet)	Surface Elevation	Casing Top Elevation (ft msl)	Filter Pack Elevation (ft msl)	Screen Elevation (ft msl)	Top of Bentonite (ft msl)
MW-6	751676	3089869	58.50	104.50	107.80	64.50 to 41.50	56.50 to 46.50	67.60
MW-7	752099	3091197	68.00	102.40	105.34	82.40 to 34.40	46.40 to 36.40	86.40
MW-8	752106	3091756	64.00	102.20	105.29	78.20 to 38.20	49.20 to 39.20	80.20
MW-9	751552	3092479	55.00	105.20	108.45	62.20 to 50.20	60.20 to 55.20	66.20
MW-10	752168	3092511	60.00	102.20	105.20	63.20 to 42.20	61.20 to 51.20	66.20
MW-11	751582	3093876	54.00	102.60	105.51	59.60 to 48.60	57.60 to 52.60	61.10
MW-12	750508	3093951	55.00	102.40	105.10	88.40 to 47.40	62.40 to 52.40	92.10
MW-13	749432	3093938	57.00	102.10	105.14	88.10 to 45.10	62.10 to 52.10	91.10
MW-14	750428	3092521	60.00	103.50	106.43	57.50 to 43.50	55.50 to 45.50	60.40
MW-15	749415	3092553	70.00	104.00	106.76	71.00 to 34.00	51.00 to 41.00	74.00
MW-16	749378	3092270	65.00	103.40	106.26	85.70 to 38.10	53.10 to 43.10	88.10
MW-19	750056	3090816	63.00	106.10	109.07	64.10 to 43.10	58.10 to 48.10	67.10
MW-20	749994	3090199	63.00	107.80	110.69	67.80 to 44.80	59.80 to 49.80	70.80
MW-21	750845	3089837	70.00	104.50	107.94	78.50 to 34.50	49.50 to 39.50	82.20
Proposed Monitoring Wells								
MW-17R	749365	3091277	65.00	103.50	106.00	51.50 to 39.00	48.50 to 38.50	53.50
MW-22	751693	3090725	63.00	106.00	108.50	67.00 to 54.50	65.00 to 55.00	69.00
MW-23	752199	3093440	57.00	100.00	102.50	64.00 to 50.50	61.00 to 51.00	66.00

* ACTUAL VALUES WILL BE DETERMINED AT THE TIME OF INSTALLATION.

MONITORING WELL CONSTRUCTION WILL BE IN ACCORDANCE WITH 30 TAC § 330.231 AND 30 TAC § 330.242.

NOTES:

1. WELL TO BE DRILLED BY TEXAS LICENSED DRILLER.
2. INSTALLATION AND WELL DEVELOPMENT TO BE SUPERVISED BY QUALIFIED GEOLOGIST OR ENGINEER.
3. FLUIDS INTRODUCED INTO BOREHOLE MUST BE TREATED CITY WATER.
4. STEAMCLEAN PROCEDURES SHOULD BE USED FOR ALL EQUIPMENT SUCH AS TREMIE PIPES OR DRILL PIPE THAT ENTERS BOREHOLES.
5. WELL DEVELOPMENT SHOULD CONTINUE UNTIL pH, SPECIFIC CONDUCTANCE AND TEMPERATURE HAVE STABILIZED.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
LICENSED
PROFESSIONAL GEOSCIENTIST
2/9/2021

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

MONITORING WELL DETAIL

USA WASTE OF TEXAS LANDFILLS, INC.
HAWTHORN PARK LANDFILL
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144

DSN.	EAS	DATE : 01/2021	FIGURE III-5A-2
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HAWTHORN PARK RECYCLING & DISPOSAL FACILITY
APPENDIX III-5B
GROUNDWATER SAMPLING AND ANALYSIS PLAN

HAWTHORN PARK RECYCLING & DISPOSAL FACILITY
HARRIS COUNTY, TEXAS
TCEQ PERMIT NO. MSW-2185A

PERMIT AMENDMENT APPLICATION

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ATTACHMENT 5B
GROUNDWATER SAMPLING AND ANALYSIS PLAN (GWSAP)

Prepared for

USA Waste of Texas Landfill, Inc.
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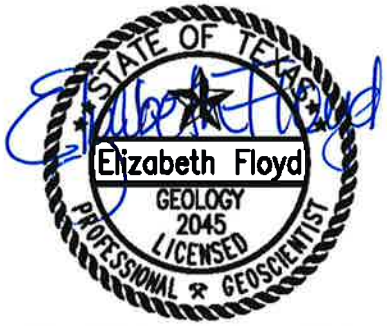

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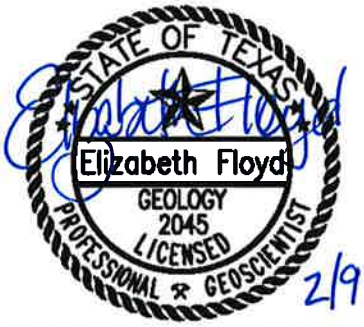

2/9/2021

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Firm Registration No. 50222

CONTENTS

TABLES

ATTACHMENTS

1 INTRODUCTION TO DETECTION MONITORING

This document details the groundwater sampling and analysis plan (the "GWSAP") for the Hawthorn Park Recycling & Disposal Facility (RDF) located in Harris County, Texas. The Hawthorn Park RDF is a Type IV municipal solid waste (MSW) landfill facility owned and operated by USA Waste of Texas Landfills, Inc. (USA Waste) under Texas Commission on Environmental Quality (TCEQ) Permit No. MSW-2185A.

This GWSAP presents proposed requirements for monitoring groundwater quality in the vicinity of the site. The elements of this sampling program are in compliance with the TCEQ rules for Groundwater Monitoring and Corrective Action (30 Texas Administrative Code (TAC) §330.401-§330.421). This GWSAP serves as a guidance document for personnel performing site monitoring during the active life of the facility and during closure and post-closure periods.

Detection monitoring involves the effective use of monitoring parameters and locations to detect a potential release from a facility. As part of the Detection Monitoring Program, a background monitoring period is established to evaluate the groundwater chemistry that has not been affected by the landfill. Groundwater data that are collected following the background period are then compared to the background data to evaluate changes in water quality. This GWSAP describes the detection monitoring background and compliance monitoring frequencies for each monitoring point, sampling procedures, laboratory analysis, and data evaluation and reporting requirements.

2 SAMPLE ANALYSES

2.1 Background Groundwater Sampling

Background groundwater sampling has been completed for the existing monitoring system at this facility. If new or replacement monitoring wells are incorporated into the groundwater monitoring system then background groundwater sampling will be initiated. A minimum of four (4) background groundwater samples from the new (or replacement) monitoring well(s) will be obtained within a period of 12 months after completion of the monitoring well(s). Background levels shall be established from samples collected from each new (or replacement) well at least once during each of the four calendar quarters: January-March, April-June, July-September, and October-December. Samples from any monitoring well shall not be collected for at least 45 days following collection of a previous sample, unless a replacement sample is necessary. Background analyses will be performed for the parameters listed below (metals are total phase):

Arsenic	Barium	Cadmium	Chromium
Copper	Calcium	Iron	Lead
Magnesium	Manganese	Mercury	Potassium
Selenium	Silver	Sodium	Zinc
Chloride	Fluoride	Alkalinity (CaCO3)	Bicarbonate
Hardness (CaC03)	Nitrate	Sulfate	Anion-Cation Balance
pH (field and lab)	Specific Conductance (field and lab)	Total Dissolved Solids (Non-purgeable Organic Compounds) (4 Replicates)	Total Organic Carbon

2.2 Monitoring Frequency and Parameters

Upon completion of the background sampling events, the groundwater monitoring wells will be sampled on an annual basis. This sampling schedule will continue throughout the site operation and post-closure.

Monitoring wells at the site are to be sampled and analyzed for the parameters listed in Table 5B-1. This list of parameters is consistent with the requirements of 30 TAC §330.417.

3 SAMPLING PLAN

This section describes the procedures followed prior to and during sample collection to ensure representative samples are collected from the Site.

Proper sampling procedures are the most important aspect in an effective monitoring program. Sampling activities at the Site will be completed by personnel trained in proper sampling protocol, discussed below.

3.1 Procedures Prior and Subsequent to Groundwater Sample Collection

This section details the proposed methodologies to be utilized for purging, sample handling, maintaining sample point integrity, and obtaining field measurements.

Upon arrival at the well location, the condition of the well and its surroundings will be visually inspected for signs of damage. Information on the well condition to be recorded includes the well identification sign, locking cap and lock, well cement footing, casing surface and seal, and evidence of any surface contamination.

Prior to sampling, the depth to groundwater should be measured from the top of the well casing and recorded on the Field Information Form (FIF), or equivalent (Attachment A). The water level measuring device should be decontaminated between wells. Water level depths are to be measured and recorded on the FIF to the nearest hundredth (0.01) of a foot.

3.2 Groundwater Sample Collection

The Hawthorn Park RDF has dedicated sampling devices in each monitoring well. With the exception of the water level measurement device, there is very little chance of cross-contamination from the field instruments. Therefore, sequence of sample collection is irrelevant. However, wells known to be contaminated will be sampled after those believed to be uncontaminated.

The monitoring well will be purged a minimum of three casing volumes of water until the temperature, conductivity and pH have stabilized. Temperature, conductivity, pH, and turbidity measurements will be recorded on the FIF, or equivalent. The measuring equipment is to be properly calibrated, following the manufacturer's procedures, immediately prior to commencement of the sampling event. Purge water will be containerized and held until the analytical results for samples of that water are known. If the analyses indicate the water is contaminated (a COC is present above background), then the water must be managed as contaminated water; if no COCs are present above background, then the water may be discharged onto the surface. As an alternative to containerizing and holding purge water until analytical results are known, the purge water may be managed immediately upon generation as contaminated water, and disposed of accordingly.

Proper decontamination of all non-dedicated field measuring equipment should be performed between each sample point. Care should be taken during purging and sampling to avoid the introduction of contaminants into the well. Appropriate gloves should be used during all purging and sampling procedures and changed after each well to avoid cross-contamination.

Water samples collected in the field will be placed into laboratory-cleaned bottles of the appropriate size and construction for the chemical parameters to be analyzed. A list of chemical parameters and recommended types and sizes of sample containers are shown in Table 5B-2. Samples will not be filtered either in the field or prior to laboratory analysis.

Under normal conditions (i.e., a well that recovers relatively quickly and to 90 % of the initial static water elevation), the sample bottles must be filled in the order of decreasing volatilization sensitivity. Generally, that will be in the following order, as applicable:

- Total organic carbon (TOC) (Non-purgeable organic compounds);
- Total metals; and
- Other inorganic parameters.

When filling the sample bottles for TOC, water should flow slowly from the discharge tube of the pump into each sample vial, until a positive meniscus is formed over the top of the container. After the cap has been placed on the vial and tightened, the vial should be checked for air bubbles by turning it upside down and tapping on it. If an air bubble is seen rising to the bottom of the vial, the process outlined above should be repeated. Air bubbles can be eliminated by removing the cap, topping off the vial with water to a positive meniscus, and resealing. If no air bubbles are seen in each vial, the process is complete.

Laboratory-supplied bottles will be filled from the discharge tube of the sample pump. A physical description of the sample will be recorded, including the sample color, odor, clarity, foaming, and any other physical characteristics. If the field values obtained are not within the expected ranges, the Environmental Protection Manager or designee will be notified immediately, as it may be necessary to resample. The initial sample will not be discarded. Additional samples may be requested by the Environmental Protection Manager or designee to ascertain the cause of the erratic field measurements.

If the well becomes dry prior to completion of the sampling event, the sampling team will return to the well no more than 72 hours later. Upon return, the sampling team will measure the depth of water in the well and calculate the volume of water present in the well casing. If this volume is sufficient, the team will complete the sampling. If the volume of water in the well casing is not sufficient, the team will not complete sampling and will send the samples already taken to the laboratory. Whether or not the sampling team is able to complete the sampling, all occurrences and conditions will be recorded.

Field activities must be thoroughly documented in the FIF and/or Chain-of-Custody (COC) Form. Below is an outline of the information to be documented during field activities (if applicable).

- Project name and number
- Date and time of all activities
- Weather conditions
- Sampling personnel

- Initial equipment decontamination remarks
- Well location (identification number)
- Well description, including casing size
- Description of well condition
- Initial water level measurement with point of reference (top of casing) and time of measurement
- Well volume calculations
- Initial pH, temperature, turbidity, and conductivity measurements
- Presence and thicknesses of immiscible layers (if applicable)
- Time starting and ending well evacuation, volume purged, and method of removal
- Sampling equipment and remarks
- Sample time and date
- Description of groundwater sample
- Quality control remarks
- Samples collected (number of bottles)
- Analysis to be performed
- Preservatives added
- Mode of sample transport

3.3 Preservation and Shipment

Samples will be preserved immediately after sample collection. These sample containers may have preservatives included in the sample bottle that are usually provided by the laboratory. When being filled, the bottles should not be allowed to overflow since this will reduce the effectiveness of the preservation.

Following sample collection, samples will be immediately placed in insulated containers chilled to about 4°C, and "locked" with a security seal. The sampler will record sample designations on COC forms. The forms will be reviewed to ensure completeness, and all paperwork will be placed in a plastic bag, sealed, and placed inside the container.

The filled, sealed shipping containers will be sent to the laboratory via overnight courier or hand delivered. All overnight courier arrivals are scheduled for next day delivery.

To comply with packaging regulations and to take practical measures to prevent damage to expensive samples, the sampling personnel will follow packaging and shipping instructions supplied by the certified testing laboratory. Typically, the following packaging procedures are recommended:

1. Use hard, durable ice chests and shipping containers. Inspect for visible damage and do not use damaged ice chests.

2. Seal drain openings with tape.

3. Individually wrap sample containers, giving special attention to glass or fragile containers.

4. Use frozen self-contained "blue ice" (or similar cold packs) or ice to cool the samples in the chests.

5. Shipping containers must be secured using laboratory-supplied security locks or strong tape such as duct tape or fiber tape.

6. Tamper-proof seal(s) must be applied to the closed shipping container to ensure that no unauthorized access to the chest has occurred during shipment.

7. Firmly and visibly attach the necessary shipping labels, indicating any special instructions, such as "notify on arrival".

Samples will be appropriately labeled and will be transported by an overnight carrier directly to the analytical facility.

3.4 Chain of Custody Record

To help maintain the integrity of the samples, strict COC procedures will be utilized. These procedures ensure that the handling and transport of the samples will be recorded from the time the sample bottles leave the laboratory until the issuance of the analytical laboratory results.

In order to maintain the COC, the samples will be either in sight of the assigned custodian, locked in a tamper-proof location, or sealed with a tamper-proof seal. A record of sample bottle possession and any transfers of samples must be maintained and documented on the COC form.

The COC form will be signed with each date and time that the container's seal is broken. When the shipment container is initially opened for inspection of its contents, the seal number (if any) will be noted. The signature of the responsible party, time, and date will also be recorded each time the sample container is transferred to the custody of another person (other than the overnight courier) and immediately before sealing the container for transport to the laboratory. Upon receipt of the sample container by the laboratory, the seal will be broken, and the condition of the samples, temperature, date, and time are recorded on the COC form by the log-in personnel receiving the sample shipment.

3.5 Laboratory Sample Receiving

A laboratory custodian will be assigned to receive the samples. Upon receipt of a sample, the custodian inspects the condition of the sample and the sample seal, reconciles the information on the sample label against that on the COC form, assigns the laboratory number, logs in the sample in the laboratory log book, and stores the sample in a secured sample storage room or cabinet until assigned to an analyst for analysis. Any discrepancies will be resolved before the sample is assigned for analysis.

4 QUALITY ASSURANCE AND QUALITY CONTROL

4.1 Field Program Quality Assurance/Quality Control Procedures

Trip blanks, equipment blanks, field blanks, field forms, and the COC forms provide QA/QC measures for the monitoring program. The QA/QC samples are discussed below.

4.1.1 Trip Blanks

Since volatile organic compounds (VOCs) are not required to be sampled at the Site, trip blanks are not required. However, if VOCs are required to be sampled, one trip blank should be included with each cooler containing VOC sample vials. The trip blank will be analyzed for VOCs. Trip blanks will consist of 40 mL vials filled with distilled or deionized (DI) water and will be provided by the analytical laboratory. One trip blank set will be placed in each cooler that is used to ship samples requiring VOC analyses. The trip blank shall only be opened by laboratory personnel (the vial must not be opened at any time during the sampling event).

4.1.2 Field Blanks

Field blanks are prepared in the field (at the sampling site) using laboratory-supplied bottles and DI or laboratory reagent-quality water. Field blank water for VOC samples, which is the same type of water as that used to prepare trip blanks, can be supplied by the laboratory. All other field blank water is supplied by the sampling team. The field blank is prepared by pouring the deionized water into the sample bottles at the location of one of the wells in the sampling program. The well at which the field blank is collected is recorded on the FIF. The purpose of the field blank is to detect any potential contamination that might be introduced into the groundwater samples through the air. If a field blank is collected, it is handled and shipped in the same manner as the rest of the samples.

For dedicated or disposable equipment requiring no filtration, the DI or laboratory reagent-quality water is exposed to the air and is transferred to the field blank bottles, and the proper preservative is added as required.

Field blank results will be reported in the laboratory results as separate samples, using the designations FB-(well #) as their sample point designation.

4.1.3 Equipment Blanks

Since sampling equipment consists of dedicated pumps, an equipment blank sample is not necessary at this site. However, in the event that non-dedicated equipment is used, an equipment blank should be collected that day. Equipment blanks will be prepared by collecting DI water that has passed through the decontaminated, non-dedicated sampling equipment into the appropriate sampling containers. Equipment blanks will be analyzed for the appropriate analytes as for the well sampled.

4.1.4 Chain-of-Custody Forms

The quality control of sample integrity including field operations and laboratory operations (i.e., chemical laboratory analysis) will be administered by the field sampling personnel. An example of a typical COC form is provided in Attachment B (actual forms may vary). The specific information that is required for documentation is both listed on the form and described in Sections 3.3, Preservation and Shipment, and 3.4, Chain-of-Custody Record. Copies of the COC forms will be filed in the Site Operating Record (SOR) after the laboratory has returned the form with the analytical results. The forms will be used to help generate the groundwater monitoring report for the site. Copies of all applicable COC forms will be included in the monitoring report.

4.2 Laboratory Quality Assurance/Quality Control

Hawthorn Park RDF has historically utilized a NELAC (National Environmental Laboratory Accreditation Council) certified laboratory for analysis of groundwater samples and will continue to use a NELAC certified laboratory for future groundwater analyses. Laboratory data analyses and/or a Texas Risk Reduction Program (TRRP) Laboratory Review Checklist will be performed and submitted. NELAC standards require that laboratories have an established quality system that includes a comprehensive laboratory quality manual (LQM) and an authorized quality assurance officer. A copy of the LQM will be maintained in the Hawthorn Park RDF SOR for use in data evaluation.

The laboratory calibrates equipment and instrumentation according to the laboratory's LQM and referenced methodologies. Quality control including matrix spikes, matrix spike duplicates or sample duplicates, laboratory control samples, method blanks, and surrogates are analyzed along with field groundwater samples and field QC samples also in accordance with LQM and method requirements. The laboratory evaluates and reports this information in a report with laboratory case narrative (LCN), with qualifiers and narrative detail where appropriate such that Hawthorn Park RDF may ensure that all sample collection, preparation and analyses, and data management activities have been conducted. The laboratory report (including the LCN) will report the number of samples, sampling parameters, and sample matrix, the name of the laboratory (including subcontract labs) involved in the analysis, an explanation of each failed precision and accuracy measurement determined to be outside the laboratory and/or method control limits and whether such a quality control excursion represents a positive or negative bias and the limitations these excursions have on data quality. Additionally, exceedance of sample holding times and identification of matrix interferences shall be identified in the LCN. Any dilutions implemented due to sample matrix interference will be done to the smallest dilution possible to bring the sample into control for analysis.

In addition to the exceptions listed above, the LCN report for all problems and anomalies observed will be included in the laboratory report for each sampling event. The LCN will report, at a minimum, the following information:

1. The exact number of samples, testing parameters and sample matrix.

2. The name of the laboratory involved in the analysis. If more than one laboratory is used, all laboratories shall be identified in the LCN.

3. The test objective regarding samples.

4. Each failed precision and accuracy measurement determined to be outside of the laboratory and/or method control limits.

5. The effect of the failed precision and accuracy measurements on the results induces a positive or negative bias.

6. Identification and explanation of problems associated with the sample results, along with the limitations these problems have on data usability.

7. A statement on the estimated uncertainty of analytical results of the samples when appropriate and/or when requested.

8. A statement of compliance and/or noncompliance with the requirements and specifications. Exceedance of holding times and identification of matrix interferences must be identified. Dilutions shall be identified and if dilutions are necessary, they must be done to the smallest dilution possible to effectively minimize matrix interferences and bring the sample into control for analysis.

9. Identification of any and all applicable QA/QC samples that will require special attention by the reviewer.

10. A statement on the quality control of the analytical method of the permit and the analytical recoveries information shall be provided when appropriate and/or when requested.

The analytical laboratory report for each sampling event will document the results and methods for each sample and analyte along with the quantification limit. The report will also include a copy of the COC and an understandable correlation between the COC and the sample results reported to the TCEQ. The analytical laboratory report will be submitted either electronically or in hard copy upon TCEQ request.

The Hawthorn Park RDF shall ensure that a data reviewer consider the project data quality objectives as appropriate to determine if the results meet the project needs with respect to completeness, representativeness, and accuracy. Prior to submittal of the data to the TCEQ, all analytical data will be examined to ensure that the data quality objectives are considered and met and that the results representing the samples are accurate and complete. The data will be reviewed, including the laboratory quality control results, the relative percent difference (RPD) of the monitor well results and its duplicate analysis (DUP) as a measure of accuracy. The data review will include a statement assessing data usability by a certified groundwater scientist with respect to the project data quality objectives (primarily a statistical evaluation of the groundwater analytical data) and, when necessary, provide comment to further explain or supplement the quality control data on the laboratory report. If the facility determines that the analytical data may be utilized, any and all problems and corrective action that the laboratory identified during the analysis will be included in the report submitted to the TCEQ.

A record of laboratory sample receipt, storage and analysis procedures will be kept for each sample received. A summary of this record will be part of the laboratory analysis report. A copy of the NELAC-Certified LQM is maintained as part of the facility's SOR. If at any time the Site changes analytical laboratories, the new laboratory's LQM will be submitted by the laboratory and the site SOR updated.

Although the QA/QC procedures for use at this facility apply predominantly to groundwater analytical data, it is possible that soil sample analytical results may be reported in the future. If the data is from soils and/or sediment samples, it will be reported on a dry weight basis with the percent solids and the percent moisture reported so that any back calculations of the wet analysis may be performed.

4.3 Analytical Methodologies

Table 5B-3 presents the analytical methodologies to be used by the laboratory for the parameters required in the monitoring program. Analytical methods are approved by the U.S. Environmental Protection Agency (EPA) and are fully described in the laboratory method and standard operating procedure documents.

4.4 Laboratory Data Record Keeping

Analytical data are maintained by the laboratory. The laboratory ensures that, at each stage of a process where a permanent data record is required, security measures are in place to guarantee the integrity of the data. Standard operating procedures are in place for computer security, computer data storage, and back-up.

5 DATA EVALUATION, REPORTING AND RECORDKEEPING

5.1 Data Evaluation Methods

5.1.1 Initial QA/QC Checks

The contract laboratory will qualitatively evaluate the analytical data by examining the internal quality control data. Examples of relevant quality control data include measures of accuracy (percent recovery), precision (relative percent difference, RPD), and sample contamination (blank determinations). A more complete description is contained in the laboratory QA/QC program procedures.

Precision and accuracy targets shown in the table below represent TCEQ guidance as of the date of this document. Should TCEQ guidance change, the targets will be adjusted accordingly. The specification limits below are intended to be applied only to the approved constituent list for the Hawthorn Park RDF.

The practical quantitation limit (PQL) is defined as the lowest concentration reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions and is considered equivalent to the limit of quantitation (LOQ) in the most recent NELAC Standard (www.nemc.us/epa12/2003standards.html). The PQL is method, instrument, and analyte specific and may be updated as more data becomes available. To help ensure these practices will be observed the following information is provided:

- The PQL will be at or below the groundwater protection standard established for each analyte in accordance with 30 TAC §330.409(h) unless approved otherwise by the TCEQ.

- The PQL will be determined as the concentration that corresponds to the following precision and accuracy criteria:

QC Specification Limits for the PQL and Lower Limit of Quantitation Check Samples

Constituent/Chemical of Concern	Precision (% RSD)	Accuracy (% Recovery)
Metals	10	70-130
Volatiles	20	50-150
Semi-Volatiles	30	50-150

- The precision and accuracy of the PQL initially will be determined from the PQLs reported over the course of a minimum of eight groundwater monitoring events. The results obtained from these events will be used to demonstrate that the PQLs meet the specified precision and accuracy limits. The PQL may be updated as more data become available.

- The PQL will be supported by analysis of a PQL check sample, consisting of a laboratory reagent grade sample matrix spiked with constituents/chemicals of

concern at concentrations equal to or less than the PQL. At a minimum, a PQL check sample will be performed quarterly during the calendar year to demonstrate that the PQL continues to meet the specified limits for precision and accuracy.

- Analytical results for data below the limit of detection ("non-detect" results) must be reported as less than the established PQL that meets the specified precision and accuracy requirements.

- If a PQL cannot be established according to the specified precision and accuracy limits, the owner or operator will ensure that the laboratory provides sufficient documentation to justify the alternate precision and accuracy limits. This information will be reported to the TCEQ and will be evaluated on a case-by-case basis.

5.1.2 Detection Monitoring Data Evaluation

Once the background database has been developed, the database will be examined for outliers, anomalies, and trends that might confound evaluation methodologies. Outliers and anomalies are inconsistently large or small values that can occur due to sampling errors, laboratory errors, transcription errors, or by chance. Significant trends indicate a source of systemic error, or an actual contamination occurrence, that must be evaluated and corrected before the detection monitoring program can be implemented. The inclusion of such values in the historical database could cause misinterpretation of the data set, which could result in a high false positive (i.e., an indication of a release when none exists) and/or false negative (i.e., falsely concluding there is no release in the presence of an actual release) conclusions.

Once the background database is established, evidence of a release will be evaluated relative to the background database for those wells that have at least four measurements for a given constituent. For parameter concentrations that appear anomalously high, or a result at or near the U.S. EPA maximum contaminant level (MCL) for the constituent, the TCEQ will be notified in the annual report that is required to be submitted within 60 days of the annual groundwater monitoring event. Should the background concentrations of a constituent with an MCL exhibit results that are naturally above the MCL, a risk-based concentration will be used for evaluation of that constituent and described in the annual report. If an anomalous result is not verified, it will be removed from the database. Any detected systematic trend or verified outliers in the background database will be evaluated and reported to the TCEQ in the annual report. If the source of the anomaly is not from the landfill, a report discussing an alternate source will be submitted to the TCEQ.

In accordance with 30 TAC §330.417(b)(6), the TCEQ may require additional sampling, analyses of additional constituents, installation of additional monitoring wells or other sampling points, and/or other hydrogeological investigations if the facility appears to be contaminating the uppermost aquifer.

5.2 Data Recordkeeping Requirements

The Hawthorn Park RDF will maintain copies of water quality monitoring data collected in accordance with this plan in the facility operating record.

5.3 Reporting Requirements

In accordance with 30 TAC §330.417, not later than 60 days after each sampling event, the owner or operator shall determine whether the landfill has released contaminants to the uppermost aquifer.

The TCEQ may require additional sampling, analyses of additional constituents, installation of additional monitoring wells or other sampling points, and/or other hydrogeological investigations if the facility appears to be contaminating the uppermost aquifer.

If the owner or operator finds the facility to have contaminated or be contaminating the uppermost aquifer, the TCEQ may order corrective action appropriate to protect human health and the environment up to and including that in §§330.411, 330.413, and 330.415 of this title (relating to Assessment of Corrective Measures; Selection of Remedy; and Implementation of the Corrective Action Program).

5.4 Annual Reports

The owner or operator shall provide an annual detection monitoring report within 60 days after the facility's annual groundwater monitoring event that includes the following information determined since the previously submitted report:

A. The results of all monitoring, testing, and analytical work obtained or prepared in accordance with the requirements of this permit, including a summary of background groundwater quality values, groundwater monitoring analyses, any statistical calculations, graphs, and drawings.

B. The facility will submit the LCN, a laboratory checklist or a copy of the laboratory QA/QC report, and the laboratory analytical data. All analytical data will be submitted in either electronic or in hard copy format as requested by TCEQ.

C. Any information required in the laboratory case narrative that cannot be completed by the laboratory will be completed by the permittee.

D. Results from the groundwater monitoring events will be submitted to the agency on TCEQ-0312 forms.

E. The groundwater flow rate and direction in the uppermost aquifer. The groundwater flow rate and direction of groundwater flow shall be established using the data collected during the preceding calendar year's sampling events from the monitoring wells of the Detection Monitoring Program. The owner or operator shall also include in the report all documentation used to determine the groundwater flow rate and direction of groundwater flow.

F. A contour map of piezometric water levels in the uppermost aquifer based at a minimum upon concurrent measurement in all monitoring wells. All data or documentation used to establish the contour map should be included in the report.

G. Recommendation for any changes.

H. Any other items requested by the TCEQ.

TABLES

30 TAC §330.417

Hawthorn Park Recycling & Disposal Facility
Table 5B-1
Groundwater Monitoring Parameters

PARAMETER	METHOD*
Cadmium (total)	6010B
Chloride	9251
Iron (total)	6010B
Manganese (total)	6010B
Total dissolved solids	160.1
Zinc (total)	6010B
Specific conductance (field and laboratory)	9050A
pH (field and laboratory)	9040C
Total organic carbon (TOC) (non-purgeable organic compounds) (4 replicates per well per event)	9060A

*U.S. Environmental Protection Agency, Publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, September 1986, 3rd Edition (as revised).*
*Analytical methods listed above may be substituted as necessary provided that the alternate methods provide adequate analytical data to fulfill monitoring requirements and meet regulatory performance standards.

Hawthorn Park Recycling & Disposal Facility
Table 5B-2
Sample Collection, Preservation, and Holding Times

PARAMETER	SAMPLE COLLECTION[1] AND CONTAINER	SAMPLE[2,3] PRESERVATION	RECOMMENDED[4] HOLDING TIMES
Metals, total (Cadmium, Iron, Manganese, and Zinc)	1000 ml P, G	HNO_3 to pH<2	6 months
Chloride	250 ml P, G	None required	28 days
pH (field & lab)	25 ml P, G	None required	Analyze immediately
Specific Conductance (field & lab)	100 ml P, G	None required	Analyze immediately
Total Dissolved Solids Residue on evaporation (TDS/ROE) 180°C	1000 ml P	Cool, 4°C	7 days
Total Organic Carbon (TOC) (Non-Purgeable Organic Compounds	2-40 ml P	Cool, 4°C H_2SO_4 to pH<2	28 days

1. Plastic (P) or Glass (G). For metals, polyethylene with polypropylene cap (no liner) is preferred.

2. Simple preservation should be performed immediately upon sample collection. For composite samples, each aliquot should be preserved at the same time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.

3. When any sample is to be shipped by common carrier or sent through the United States mail, it must comply with the Department Of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring each compliance. The Office of Hazardous Materials, Materials Transportation Bureau, Department Of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCL) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions and concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

4. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of sample understudy are stable for a longer time, and has received a variance from the Regional Administrator. Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show this is necessary to maintain sample stability.

Hawthorn Park Recycling & Disposal Facility
Table 5B-3
Analytical Methods

Parameter	Method Description	Reference Method*
Chloride	Colorimetric, Automated Ferricyanide AAII	9251
Total metals	ICP/ICP-MS	6010B
Total dissolved solids	Gravimetric	160.1
Total organic carbon (TOC) (Non-Purgeable Organic Compounds)	Combustion or oxidation	9060A
pH	Probe	9040C
Specific conductance	Probe	9050A

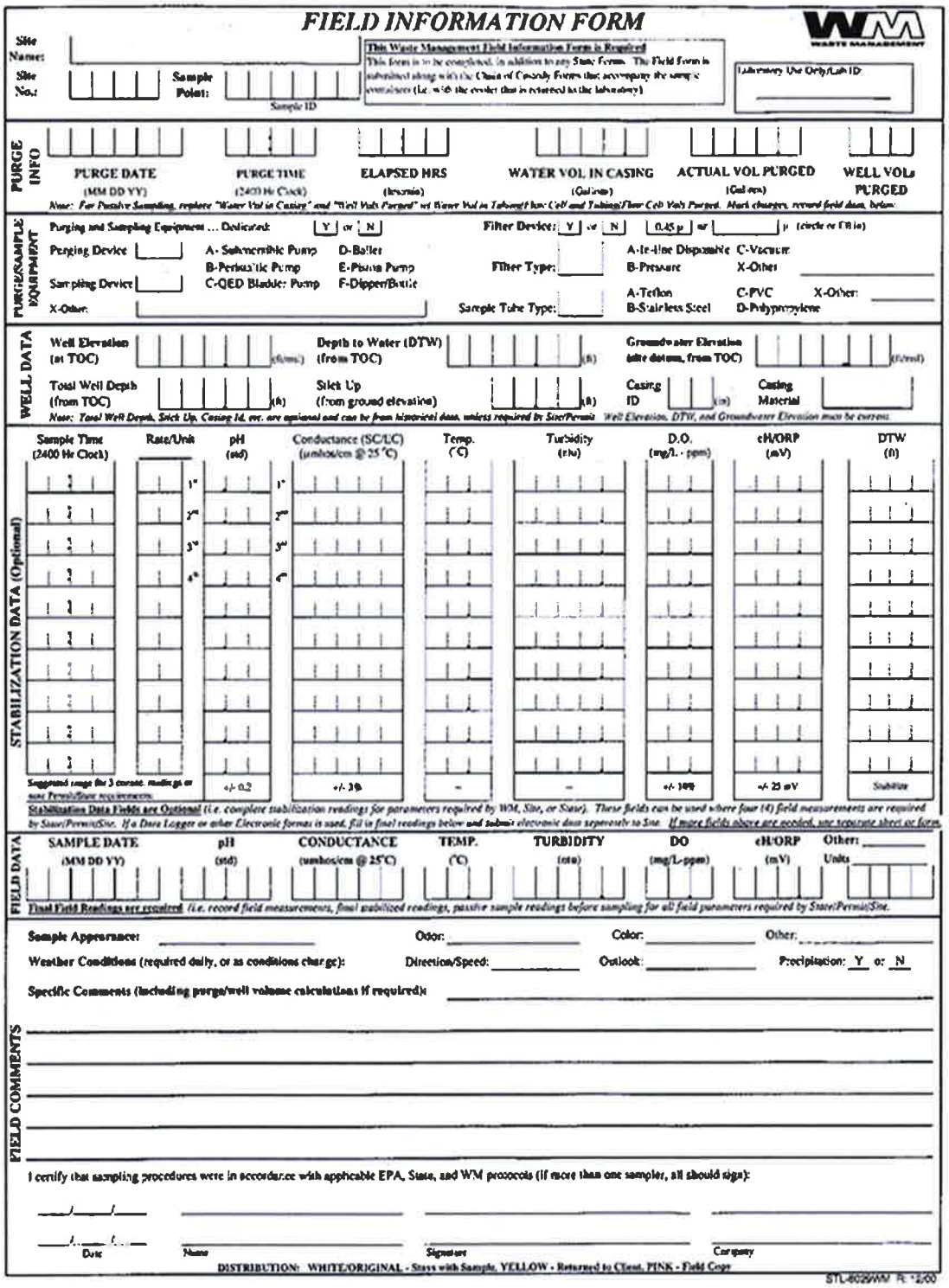
*U.S. Environmental Protection Agency, Publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, September 1986, 3rd Edition (as revised).*

Note: Analytical methods listed above may be substituted as necessary provided that the alternate methods provide adequate analytical data to fulfill monitoring requirements and meet regulatory performance standards.

ATTACHMENTS

III-5B-A Field Information Form
III-5B-B Chain-of-Custody Example
III-5B-C Laboratory Review Checklist

ATTACHMENT III-5B-A



FIELD INFORMATION FORM

WASTE MANAGEMENT

Site Name:

Site No.:

Sample Point:

Sample ID

This Waste Management Field Information Form is Required

This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e., with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hours)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLS PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing#1 for Cell and Tubing#2 for Cell Vols Purged. Mark changes, record field data, below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: Y or N

Filter Device: Y or N 0.45 µ or _____ µ (circle or fill in)

Purging Device: A- Submersible Pump, B-Peristaltic Pump, C-QED Bladder Pump, D-Bailer, E-Piston Pump, F-Dipper/Bottle

Sampling Device: A-Teflon, B-Stainless Steel, C-PVC, D-Polypropylene, X-Other: _____

Filter Type: A-In-line Disposable, B-Pressure, C-Vacuum, X-Other: _____

X-Other:

Sample Tube Type:

WELL DATA

Well Elevation (at TOC) (ft/msl)

Depth to Water (DTW) (from TOC) (ft)

Groundwater Elevation (site datum, from TOC) (ft/msl)

Total Well Depth (from TOC) (ft)

Stick Up (from ground elevation) (ft)

Casing ID (in)

Casing Material

Note: Total Well Depth, Stick Up, Casing Id, etc. are optional and can be from historical data, unless required by State/Permit. Well Elevation, DTW, and Groundwater Elevation must be current.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit	pH (std)	Conductance (SC/EC) (µmhos/cm @ 25 °C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
	1"							
	2"							
	3"							
	4"							
Suggested range for 3 consec. readings or state Permit/State requirements:		+/- 0.2	+/- 3%	-	-	+/- 10%	+/- 25 mV	Stabilize

Stabilization Data Fields are Optional (i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (umhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L-ppm)	eH/ORP (mV)	Other: _____ Units _____

Final Field Readings are required (i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.

FIELD COMMENTS

Sample Appearance: _____ Odor: _____ Color: _____ Other: _____

Weather Conditions (required daily, or as conditions change): Direction/Speed: _____ Outlook: _____ Precipitation: Y or N

Specific Comments (including purge/well volume calculations if required):

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
___/___/___			
___/___/___			

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

STL-6028/WM R. 12/00

III-5B-B CHAIN-OF-CUSTODY EXAMPLE

Chain of Custody Record

SEVERN TRENT SERVICES **Severn Trent Laboratories, Inc.**

STL-4124 (0700)

Client	Project Manager	Date	Chain of Custody Number 036068
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page _____ of _____
City / State / Zip Code	Site Contact / Lab Contact	Analysis (Attach list if more space is needed)	Special Instructions/ Conditions of Receipt
Project Name and Location (State)	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.	Matrix / Containers & Preservatives		

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil	Unpres.	H_2SO_4	HNO3	HCl	NaOH	ZnAc/ NaOH	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other_____

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

III-5B-C LABORATORY REVIEW CHECKLIST

Laboratory Data Package Cover Page

This data package consists of:

☐☐☐ This signature page, the laboratory review checklist, and the following reportable data:

☐☐☐ R1 Field chain-of-custody documentation;

☐☐☐ R2 Sample identification cross-reference;

☐☐☐ R3 Test reports (analytical data sheets) for each environmental sample that includes:

a) Items specified in NELAC Chapter 5 for reporting results, e.g., Section 5.5.10 in 2003 NELAC Standard
b) dilution factors,
c) preparation methods,
d) cleanup methods, and
e) if required for the project, tentatively identified compounds (TICs).

☐☐☐ R4 Surrogate recovery data including:

a) Calculated recovery (%R), and
b) The laboratory's surrogate QC limits.

☐☐☐ R5 Test reports/summary forms for blank samples;

☐☐☐ R6 Test reports/summary forms for laboratory control samples (LCSs) including:

a) LCS spiking amounts,
b) Calculated %R for each analyte, and
c) The laboratory's LCS QC limits.

☐☐☐ R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:

a) Samples associated with the MS/MSD clearly identified,
b) MS/MSD spiking amounts,
c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,
d) Calculated %Rs and relative percent differences (RPDs), and
e) The laboratory's MS/MSD QC limits

☐☐☐ R8 Laboratory analytical duplicate (if applicable) recovery and precision:

a) the amount of analyte measured in the duplicate,
b) the calculated RPD, and
c) the laboratory's QC limits for analytical duplicates.

☐☐☐ R9 List of method quantitation limits (MQLs) for each analyte for each method and matrix;

☐☐☐ R10 Other problems or anomalies.

☐ The Exception Report for every "No" or "Not Reviewed (NR)" item in laboratory review checklist.

Release Statement: I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data.

Check, if applicable: [ ] This laboratory is an in-house laboratory controlled by the person responding to rule. The official signing the cover page of the rule-required report (for example, the APAR) in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name (Printed)	Signature	Official Title (printed)	Date

III-5B-C LABORATORY REVIEW CHECKLIST

Laboratory Review Checklist: Reportable Data								
Laboratory Name:			LRC Date:					
Project Name:			Laboratory Job Number:					
Reviewer Name:			Prep Batch Number(s):					
#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]	
R1	OI	**Chain-of-custody (C-O-C)**						
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?						
		Were all departures from standard conditions described in an exception report?						
R2	OI	**Sample and quality control (QC) identification**						
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?						
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?						
R3	OI	**Test reports**						
		Were all samples prepared and analyzed within holding times?						
		Other than those results < MQL, were all other raw values bracketed by calibration standards?						
		Were calculations checked by a peer or supervisor?						
		Were all analyte identifications checked by a peer or supervisor?						
		Were sample quantitation limits reported for all analytes not detected?						
		Were all results for soil and sediment samples reported on a dry weight basis?						
		Were % moisture (or solids) reported for all soil and sediment samples?						
		If required for the project, TICs reported?						
R4	O	**Surrogate recovery data**						
		Were surrogates added prior to extraction?						
		Were surrogate percent recoveries in all samples within the laboratory QC limits?						
R5	OI	**Test reports/summary forms for blank samples**						
		Were appropriate type(s) of blanks analyzed?						
		Were blanks analyzed at the appropriate frequency?						
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?						
		Were blank concentrations < MQL?						
R6	OI	**Laboratory control samples (LCS):**						
		Were all COCs included in the LCS?						
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?						
		Were LCSs analyzed at the required frequency?						
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?						
		Does the detectability data document the laboratory's capability to detect the COCs at the MDL used to calculate the SQLs?						
		Was the LCSD RPD within QC limits?						
R7	OI	**Matrix spike (MS) and matrix spike duplicate (MSD) data**						
		Were the project/method specified analytes included in the MS and MSD?						
		Were MS/MSD analyzed at the appropriate frequency?						
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?						
		Were MS/MSD RPDs within laboratory QC limits?						
R8	OI	**Analytical duplicate data**						
		Were appropriate analytical duplicates analyzed for each matrix?						
		Were analytical duplicates analyzed at the appropriate frequency?						
		Were RPDs or relative standard deviations within the laboratory QC limits?						
R9	OI	**Method quantitation limits (MQLs):**						
		Are the MQLs for each method analyte included in the laboratory data package?						
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?						
		Are unadjusted MQLs included in the laboratory data package?						
R10	OI	**Other problems/anomalies**						
		Are all known problems/anomalies/special conditions noted in this LRC and ER?						
		Were all necessary corrective actions performed for the reported data?						
		Was applicable and available technology used to lower the SQL and minimize the matrix interference affects on the sample results?						

III-5B-C LABORATORY REVIEW CHECKLIST

Laboratory Review Checklist: Supporting Data								
Laboratory Name:			LRC Date:					
Project Name:			Laboratory Job Number:					
Reviewer Name:			Prep Batch Number(s):					
#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]	
5.4.11	OI	**Initial calibration (ICAL)**						
5.4.1		Were response factors and/or relative response factors for each analyte within QC limits?						
		Were percent RSDs or correlation coefficient criteria met?						
		Was the number of standards recommended in the method used for all analytes?						
		Were all points generated between the lowest and highest standard used to calculate the curve?						
		Are ICAL data available for all instruments used?						
		Has the initial calibration curve been verified using an appropriate second source standard?						
5.4.1	OI	**Initial and continuing calibration verification (ICCV and CCV) and continuing calibration**						
5.4.1		Was the CCV analyzed at the method-required frequency?						
		Were percent differences for each analyte within the method-required QC limits?						
		Was the ICAL curve verified for each analyte?						
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?						
5.4.1	O	**Mass spectral tuning:**						
5.4.1		Was the appropriate compound for the method used for tuning?						
		Were ion abundance data within the method-required QC limits?						
5.4.1	O	**Internal standards (IS):**						
5.4.1		Were IS area counts and retention times within the method-required QC limits?						
5.4.1	OI	**Raw data (NELAC Section 1 Appendix A Glossary, and Section 5)**						
5.4.1		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?						
		Were data associated with manual integrations flagged on the raw data?						
5.4.1	O	**Dual column confirmation**						
5.4.1		Did dual column confirmation results meet the method-required QC?						
5.4.1	O	**Tentatively identified compounds (TICs):**						
5.4.1		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?						
5.4.1	I	**Interference Check Sample (ICS) results:**						
5.4.1		Were percent recoveries within method QC limits?						
5.4.1	I	**Serial dilutions, post digestion spikes, and method of standard additions**						
5.4.1		Were percent differences, recoveries, and the linearity within the QC limits specified in the						
5.4.1	OI	**Method detection limit (MDL) studies**						
5.4.1		Was a MDL study performed for each reported analyte?						
5.4.1		Is the MDL either adjusted or supported by the analysis of DCSs?						
5.4.1	OI	**Proficiency test reports:**						
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation						
5.4.1	OI	**Standards documentation**						
5.4.1		Are all standards used in the analyses NIST-traceable or obtained from other appropriate						
5.4.1	OI	**Compound/analyte identification procedures**						
5.4.1		Are the procedures for compound/analyte identification documented?						
5.4.1	OI	**Demonstration of analyst competency (DOC)**						
5.4.1		Was DOC conducted consistent with NELAC Chapter 5C?						
		Is documentation of the analyst's competency up-to-date and on file?						
5.4.1	OI	**Verification/validation documentation for methods** (NELAC Chapter 5)						
5.4.1		Are all the methods used to generate the data documented, verified, and validated, where						
5.4.1	OI	**Laboratory standard operating procedures (SOPs):**						
5.4.1		Are laboratory SOPs current and on file for each method performed?						

III-5B-C LABORATORY REVIEW CHECKLIST

Laboratory Review Checklist: Exception Reports	
Laboratory Name:	LRC Date:
Project Name:	Laboratory Job Number:
Reviewer Name:	Prep Batch Number(s):

ER #[5]	DESCRIPTION

1. Items identified by the letter "R" must be available as a hard copy or as a .pdf file. Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

CCB = Continuing Calibration Blank