FILE COPY

WASTE MANAGEMENT

CWM CHEMICAL SERVICES, LLC
1550 Balmer Road
P.O. Box 200
Model City, NY 14107
(716) 754-8231
(716) 754-0211 Fax

May 16, 2008

Mr. James Strickland, P.E.
New York State Department of
Environmental Conservation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999

Re: Proposed Fac Pond 8 Water Transfer Procedure - Revised

Dear Mr. Strickland:

On February 29, 2008, CWM submitted a proposed procedure for transferring accumulated precipitation from Facultative (Fac) Pond 8 which is needed prior to the completion of a detailed surface gamma walkover survey of its floor. NYSDEC provided comments regarding that procedure on April 24, 2008. Attached please find a proposed revision to the procedure which addresses the NYSDEC comments and replaces the February 29, 2008, procedure in its entirety.

CWM requests NYSDEC's expeditious approval of the attached procedure so that we may complete the dewatering of Fac Pond 8 and allow it to sufficiently dry out to enable the detailed gamma walkover survey to be completed this year. Please call Mr. John Hino at (716) 754-0278 or myself at (716) 754-0246 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 in accordance with 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."

Sincerely,
CWM CHEMICAL SERVICES, LLC

Jill A. Banaszak
Technical Manager
Model City Facility

JBH/JAB/jbh
Attachment

FACULTATIVE POND 8
WATER TRANSFER PROCEDURE

CWM CHEMICAL SERVICES, LLC.
MODEL CITY FACILITY

February 2008
(Revised May 2008)

Prepared By:

CWM Chemical Services, LLC.
1550 Balmer Road
Model City New York, 14107

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FIGURES

APPENDICES

I. Introduction

CWM Chemical Services, LLC (CWM) owns and operates a commercial hazardous waste treatment, storage, and disposal facility (TSDF) located in Model City, Niagara County, New York. The Model City facility began operation in 1972 as ChemTrol Pollution Services, Inc. As a result of corporate acquisitions and name changes, CWM Chemical Services, LLC, a subsidiary of Waste Management, Inc., is the present owner and operator of the facility. The facility is located on Balmer Road in Model City, New York approximately 1.9 miles east of New York State Route 18 (Creek Road) and occupies land in the towns of Lewiston and Porter. All existing treatment, storage, and disposal facilities on the site are located within the Town of Porter.

The CWM Model City facility is permitted as a TSDF under the Resource Conservation and Recovery Act (RCRA). Numerous units at the site are used to store, treat, and dispose of a variety of liquid and solid organic and inorganic hazardous wastes. Storage, treatment, and disposal capabilities include an Aqueous Wastewater Treatment (AWT) system (based on chemical, physical, and biological treatment processes) from which treated wastewater is discharged to the Niagara River in accordance with the facility's State Pollutant Discharge Elimination System (SPDES) Permit; secure landfilling of approved waste solids and semi-solids, including polychlorinated biphenyls (PCBs); waste stabilization; container and tank storage; transformer decommissioning; and, PCB treatment and storage. Prior to being operated as a TSDF, the Model City Facility was utilized by the U.S. Government from the early 1940s to the mid 1960s as part of the Lake Ontario Ordinance Works (LOOW). Some of these U.S. Government activities resulted in the contamination of certain areas of the Model City Facility with chemical and radioactive wastes.

During the summer of 2005, a walkover gamma radiation survey of Facultative (Fac) Pond 8 was completed, after it had been removed from operational service, in accordance with the approved Site Radiological Survey Plan (CWM, November 2006). This plan was developed by CWM and subsequently approved by the New York State Department of Environmental Conservation (NYSDEC) in August of 2007. The results of the initial walkover survey in 2005 indicated several locations of elevated radioactivity readings that were above the investigation level on the floor of Fac Pond 8. During the detailed investigation and sampling phase of the fac pond floor in 2007 by URS Corporation (URS), CWM's radiological consultant, URS found a substantial number of elevated radioactivity readings above the investigation level that was not just located in one area of the floor surface, but more widely spread out in many areas of the floor.

As a result of these findings, CWM has agreed to perform a more detailed surface gamma walkover survey of Fac Pond 8. A surveyor will walk at a speed of approximately 2 feet per second (ft/s) (0.5 meters per second [m/s]) while passing the detector over the fac pond floor surface in a serpentine survey traverse pattern. A data logger will be used to store the detector positions and will also record the gamma radiation count rates (counts per minute) every two seconds. This survey will be completed in accordance with the approved Site Radiological Survey Plan.

In order to perform this survey safely while obtaining accurate data, Fac Pond 8 must be dewatered to remove accumulated precipitation while minimizing the migration of potentially radioactive contaminated sediment to the receiving pond which is the focus of this report.

II. Project Purpose and Objective

The purpose of this report is to describe the equipment, materials, and procedures to be utilized in the dewatering of Fac Pond 8 in order to perform a detailed surface gamma walkover survey of the pond floor. The objective of this project is to dewater Fac Pond 8 while preventing, to the greatest practical extent, the transfer of radiological contaminated sediment/soil out of Fac Pond 8.

III. Fac Pond 8 Location and Description

Fac Pond 8 is located in the east-central portion of the CWM Model City facility (refer to Figure 1). It is located due west of Residuals Management Unit 1 (RMU-1) and north of Secure Landfill (SLF) 10. The construction of Fac Pond 8 was initiated in 1978 as a surface impoundment for the receipt of treated wastewater from the Facility's AWT system. The pond shares a common soil berm with SLF 10 on its south side, a common berm with RMU-1 on its east side, and two, above grade, stand alone berms on its west and north sides. Fac Pond 8 has an approximate capacity of 43 million gallons. Historically, CWM fills the pond with treated wastewater annually. After sampling, testing, and NYSDEC approval, CWM discharges the water through a filtration system, and then through an underground transfer line to the Niagara River. Each annual discharge is approximately 25 million gallons.

The last discharge event of treated wastewater from Fac Pond 8 occurred in 2004. After this, the pond was removed from service in order to perform closure activities. In 2005, stormwater, that had accumulated in the pond, was transferred to Fac Pond 3 in order to facilitate the closure sampling and the initial gamma walkover survey activities.

IV. Sediment Sampling Procedure

Prior to the placement of any material or equipment to be used for transferring water from Fac Pond 8, CWM obtained four (4) sediment samples in the immediate area of the suction inlet for the water transfer operation. This area of Fac Pond 8, to be utilized for the water transfer operation, is located in the northwest corner of the pond measuring approximately 20 feet by 20 feet. See Figure 2. This corner of the pond is generally covered with water even when the pond has been "emptied". This area was sectioned off in four, 10 feet by 10 feet quadrants. A sediment sample from each quadrant was obtained from a random location. The sampling technique is described below.

In January 2008, when CWM sampled the sediment in this area of Fac Pond 8 for particle size analysis, CWM found that there is a one inch thick mat of dead vegetation and algae over the floor surface in this corner of the pond. This layer was difficult to penetrate utilizing

a spaded shovel, but with additional effort, a sediment sample was obtained. In addition, the physical appearance of the sediment was of black sludge with a mild biological/sulfide odor associated with it. Due to these characteristics, traditional sampling techniques cannot be employed. In addition, during the 2007 investigation activities, it was observed that the fac pond floor outside of the northwest corner contained a thin layer of algae over the hardened clay surface. CWM used the following procedure for sampling and testing of the sediment in the area for the water transfer operation of Fac Pond 8:

1. A CWM Environmental Engineer, equipped with a clean, spaded shovel, waded into the northwest corner of Fac Pond 8. The Engineer wore hip waders, harness, life vest, life line and was be aided by at least two additional CWM personnel on the berm with radios as the Engineer descended into the water. At this pond location, the water was approximately 2 to 3 feet deep.

2. With the aide of the berm personnel, the Engineer estimated the location of each quadrant, and with the use of the shovel, cut/dug through the dead vegetation and algae and obtained approximately a five pound sample of the sediment. The sample was a combination of dead vegetation, algae, pond water, and sediment. During sampling, all efforts were made to minimize sediment disturbance.

3. The samples were collected into new, 5 gallon plastic buckets. One bucket was utilized for each quadrant sample. Between quadrant samples, the spaded shovel was rinsed with pond water to insure all sediment was removed. The buckets were sealed with lids and stored in the on-site Environmental Trailer until radiological scanning could be arranged. The Environmental Trailer was selected for storage and testing since it is considered an area of low background radiation level.

4. A qualified URS health physics consultant, experienced with radiological scanning procedures and equipment, surveyed the collected sediment utilizing a 2-inch x 2-inch Sodium Iodide (NaI) gamma scintillation detector (e.g. Ludlum Model 44-10 Gamma Scintillator 47-1104) with a scaler/ratemeter (e.g. Ludlum Model 2221 portable SCA 48-2065), or equivalent. The approximate detection sensitivities were 2120 pCi/g for Th-230, 2.8 pCi/g for Ra-226 and 39 pCi/g for U-238. All instrumentation had a current calibration (within the past 12 months). A field performance check (i.e. background and source check) was conducted in accordance with individual instrument use procedures. A performance check was performed prior to scanning the buckets, and after, to insure proper quality control.

   The probe was held at 12 inches from the side of the bucket samples and within 3 inches off the sediment surface. The readings were recorded for each sample. If any of the survey readings for each sample were found to be 50 percent greater than the established background level of the trailer, then the sample would be further evaluated to determine if the readings were due to radiological contamination or if the readings were normal for the soils in known, uncontaminated areas, near Fac Pond 8. If necessary, the sediment could be tested in accordance with the approved CWM Sitewide Radiological Investigation Soil Sampling Plan (May 2006). If the sample readings were found to be

less than 50 percent greater than the background level, the sediment sample would be returned to the Fac Pond upon NYSDEC approval. All data and sample locations were documented in a memorandum. The NYSDEC were notified at least 48 hours in advance to observe the sampling and testing. Also, no field construction activities, including stone placement, will be initiated until the NYSDEC has reviewed the radiological data and authorized CWM to proceed. If the samples exhibit excessive radiological readings, alternative pump locations and/or enhanced controls could be evaluated.

5. The CWM Engineers hip waders and spade shovel were cleaned and rinsed in the Fac Pond water and radiologically surveyed by the URS technician to insure that no potential contamination leaves the pond.

Based upon a verbal approval of the NYSDEC, CWM obtained the sediment samples, in accordance with the above described plan, on April 3, 2008. The samples were radiologically surveyed on April 4, 2008. Both activities were completed in the presence of the on-site NYSDEC Monitor. The radiological survey results did not indicate the presence of radiological contamination in any of the samples. The survey readings (3,800-4,100 cpm) were in the range of background readings. Details regarding the sampling activity and radiological survey results can be found in Appendix 1.

V. Water Transfer Process

In order to perform the detailed surface gamma walkover survey of Fac Pond 8, approximately 4-5 million gallons of water must be removed from the pond. The water is a result of precipitation from rain and snowfall events. The pond has a surface area of about 4 acres with a sloping floor surface. The high point of the floor is located in the southeast corner of the pond while the low point is located in the northwest corner of the pond. There are several additional low points in the floor of the pond, which, when the pond is emptied, will result in smaller ponded areas.

CWM will utilize the following water transfer process to empty Fac Pond 8:

1. In the northwest corner of Fac Pond 8, CWM will place a 6-inch to 8-inch layer of No. 4/5 stone (rip-rap quality) directly on top of the dead vegetation and algae. This larger stone will be placed in a 20-foot radial direction from the corner of the pond. A second layer, 4-inches thick, of No. 2 washed stone will be placed above the larger stone. Finally, a rock check dam, measuring approximately 3 feet high with 1 to 1 slopes, constructed of No. 2 washed stone, will be installed on the radial stone base that was previously placed above the dead vegetation and algae. Refer to Figures 2 through 4 for additional details. This rock check dam configuration is similar to the dams CWM has utilized in the stormwater management basins.

   CWM evaluated the use of a textile below the stone base, but based upon accessibility and several construction issues in placing textile under 3 feet of water, CWM believes that it is unnecessary to add this component. In addition, the existence of the dead vegetation and algae mat, in conjunction with the dual stone layer, will provide a

sufficient barrier insuring that any migration of the sediment is minimized during the water transfer process.

2. After the stone has been placed, CWM will install a perforated, 85-gallon steel drum wrapped with two to three layers of landscaping filter fabric (sides & bottom), in the northwest corner of the pond within the rock check dam. The drum perforations will be ½" diameter holes throughout the entire drum. Steel banding straps will be utilized to hold the fabric in place on the drum. Manufacturer's literature for the landscaping fabric can be found in Appendix 2. Unfortunately, technical specifications, such as Apparent Opening Size, is not available for this material since it is not an engineering design parameter for this material to perform its specified function. The purpose for the landscaping fabric is to act as a pre-filter to prevent the passage of larger particulate items such as algae, minnows, frogs, etc. from being sucked into the drum and pump. Too many layers of fabric will restrict the flow of water into the drum therefore restricting the pumping capacity of the pump. Since the landscaping fabric is not meant to capture or prevent the passage of micron sized sediment particulates, a separate engineering evaluation of its effectiveness is not required.

3. CWM will only utilize one pump to perform the transfer of water from Fac Pond 8. The proposed pump is a Goulds WS5034D3U (Appendix 3), 5 horsepower, electric submersible pump to transfer the water to Fac Ponds 1/2. The pump will be placed in the perforated drum. The pump will be plumbed into the existing 10-inch transfer line to the filtration station located north of Fac Pond 3 (refer to Figures 2 and 3). The pump will be electrically connected to the existing disconnect switch located west of Fac Pond 8. This switch will be operated to manually turn the pump on and off. From previous experience utilizing this size pump, CWM anticipates that it produces a flow rate of 150-200 gallons per minute. In the event that any signs of sediment migration is occurring in the pond, CWM will decrease the pump flow rate, via existing valving, or replace the pump with a smaller horsepower submersible pump.

4. Prior to entering Fac Ponds 1/2, the water will be additionally filtered utilizing the filtration station that CWM utilizes annually for the transfer of treated wastewater to the Niagara River. The filtration station consists of two steel pressure vessels units, with removable lids, operating in parallel, each equipped with approximately 50 filter media cartridges. The incoming water travels through the outside of the filter media cartridge and passes through it to the interior polyethylene flow tube, where it exits to the outlet nozzle of the vessel. The discharge of the filtration station will be configured to transfer the water to Fac Ponds 1/2.

   As stated previously, CWM obtained a sediment sample from the northwest corner of Fac Pond 8 where the proposed water transfer activities are to occur. The sediment sample was initially tested for radiological contamination by URS utilizing the gamma scintillation detector and found the sediment to be at background levels. The sample was then given to EnSol, Inc. (EnSol) for particle size analysis. The results of the analysis can be found in Appendix 1. Also, CWM contracted EnSol to evaluate the filtration

station filters and determine the filter efficiencies with respect particle size. This evaluation can be found in Appendix 4.

Summarizing the EnSol findings, the polypropylene yarn wound filter cartridges have a nominal micron rating of 10. The filter cartridges are expected to be capable of removing particles 10 microns and larger with an 85% efficiency. The results of the particle size analysis from the laboratory show that approximately 18 percent, by weight, of the sediment sample was finer than 10 microns. It is important to note that CWM currently utilizes this filtration station and filtration cartridges for the annual wastewater discharge to the Niagara River. Historically, this filtration system has met the settleable solids discharge criteria for CWM's SPDES Permit.

5. The frequency of changing the filters will be minimized. The filters will be replaced only when excessive back pressure develops which would threaten filter breakthrough. In addition, CWM will sample the filtered water on a daily basis and visually inspect for any noticeable sediment particulates. Also, the samples will be subjected to an in-field radiological survey to screen for particles with high concentrations of radioactive material. If any of the survey readings for each sample are found to be 50 percent greater than the established background level of Fac Pond 8 or Fac Pond 3 water samples, then the sample would be further evaluated. If necessary, the sediment could be tested in accordance with the approved CWM Sitewide Radiological Investigation Soil Sampling Plan (May 2006) if excessive sediments appear. If the sample readings are found to be less than 50 percent greater than the background level, the samples would be returned to the Fac Pond. Finally, each time the filters are changed out, and at the end of the Fac Pond 8 pumping process, each filter will be visually inspected and subjected to an in-field radiological survey. If any radiological survey result from a water sample or filter exhibits readings higher than the investigation level of 50 percent greater than the established background level of Fac Pond 8 or Fac Pond 3 water samples, the water transfer process will be terminated and not resumed without NYSDEC approval. CWM proposes to use the same instrumentation and qualified personnel to perform the in-field surveys as described in the sediment sampling section of this plan.

VI. Schedule

The sediment sampling was completed in April 2008 after receiving NYSDEC verbal approval to proceed. After receiving NYSDEC approval of this procedure, CWM will initiate the remaining steps of this plan. The water transfer process setup is expected to take one week to construct after receiving NYSDEC plan approval. Based upon the volume of water currently present in Fac Pond 8, CWM anticipates that it will take approximately 3-4 weeks of continuous pumping to empty Fac Pond 8. The estimated completion for emptying the pond is mid July 2008. Once the pond has been emptied of water, it may take up to 2 months, depending on precipitation and increasing temperatures, before the pond may be suitable, and safe, for the detailed surface gamma walkover survey to begin. Depending on precipitation, additional transfers may be required to maintain the pond empty long enough to complete the survey.

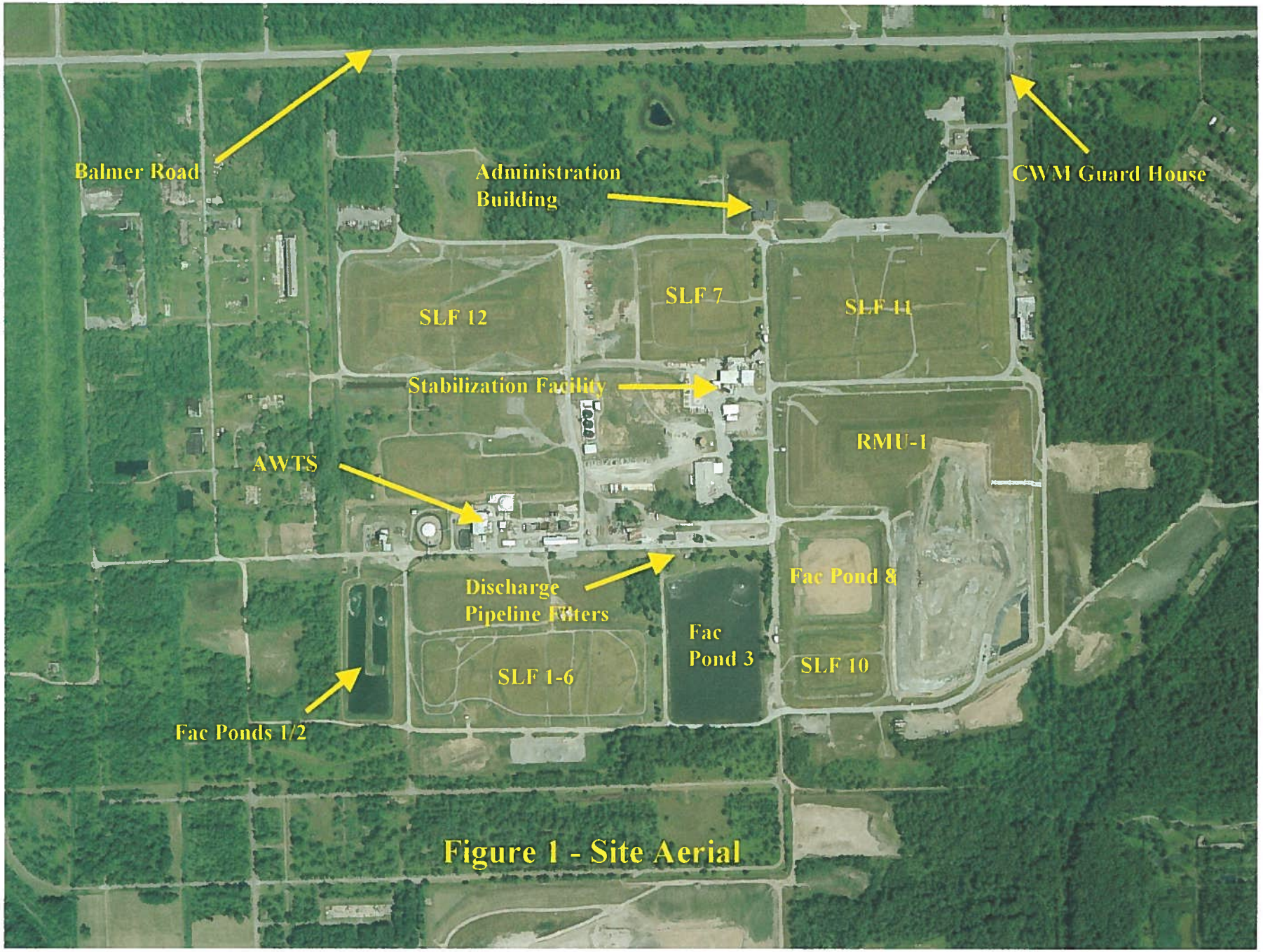


Figure 1 - Site Aerial

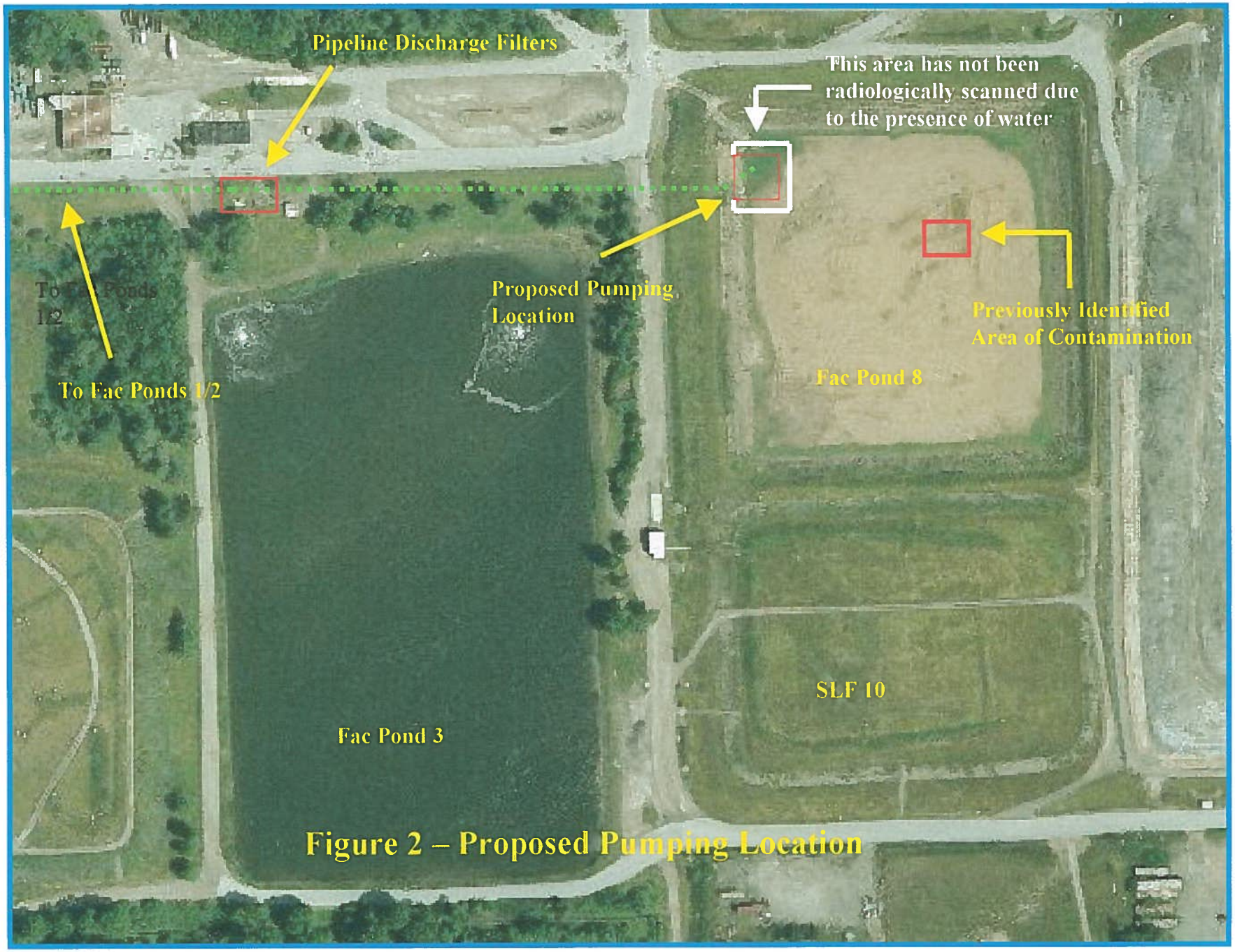


Figure 2 – Proposed Pumping Location

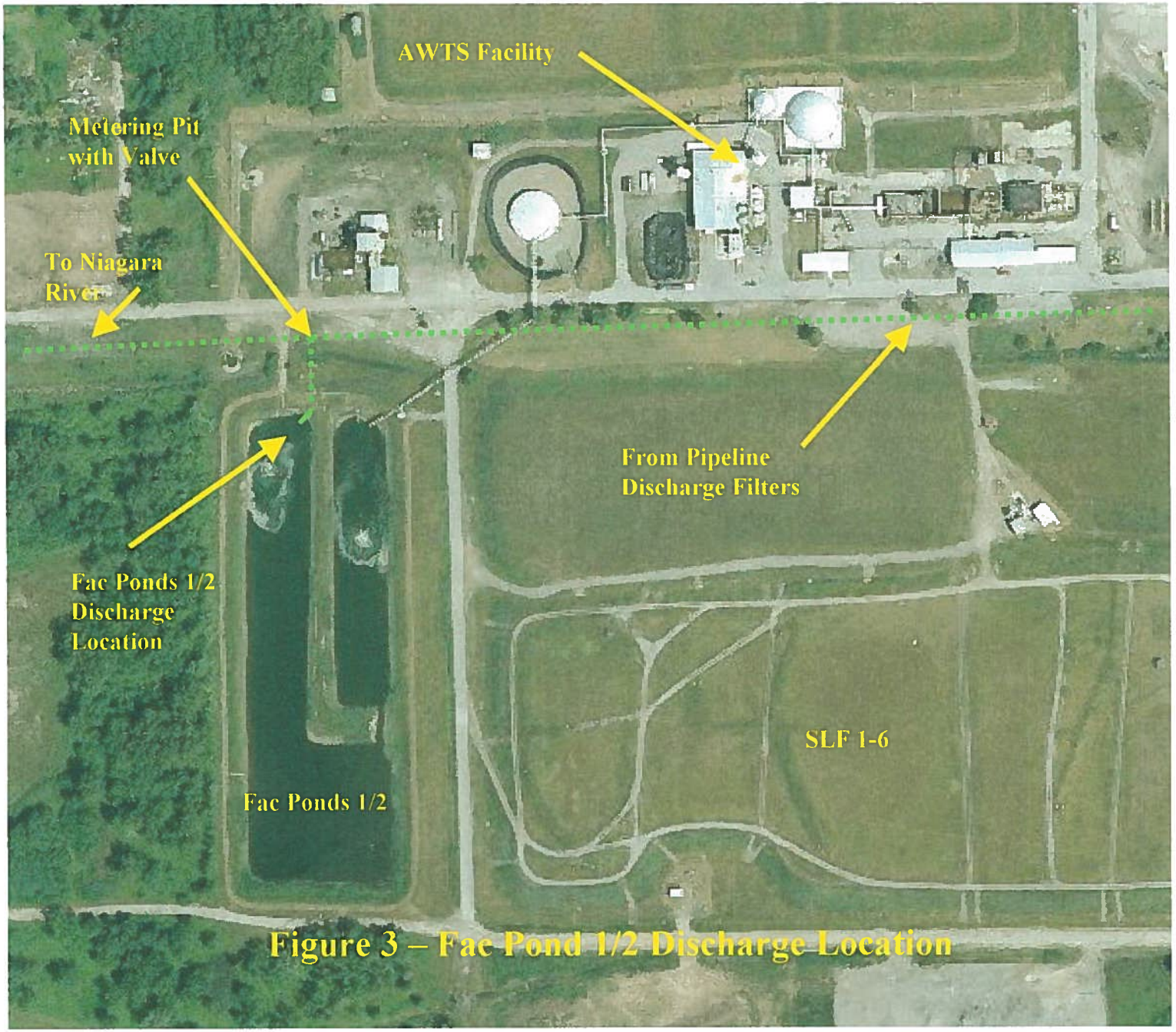
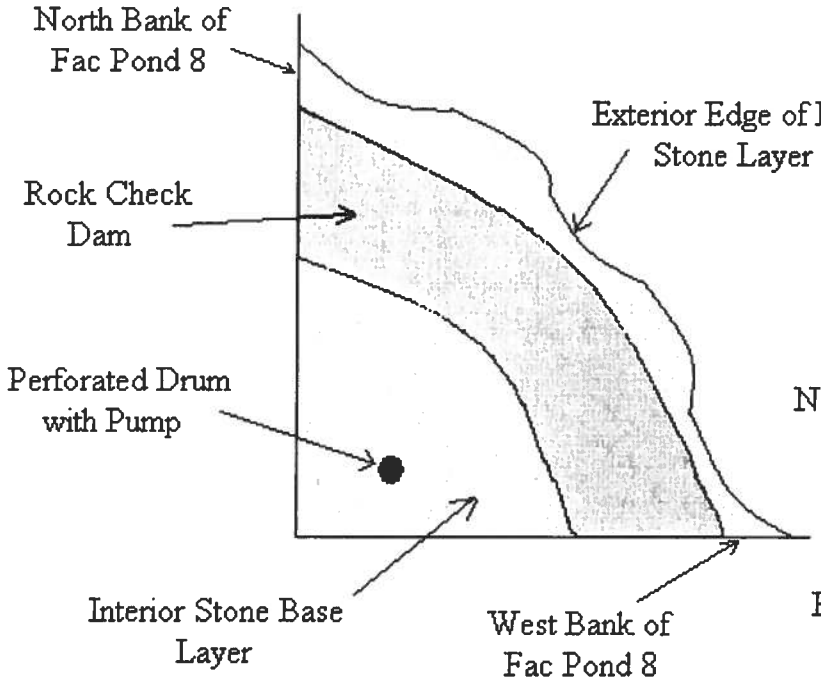


Figure 3 – Fac Pond 1/2 Discharge Location

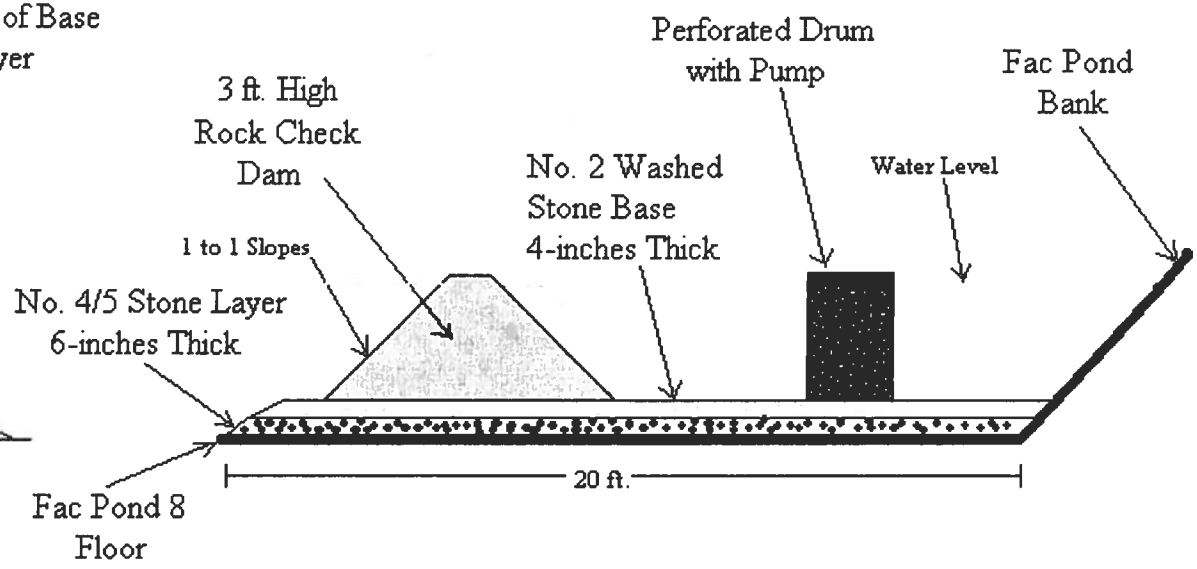
FIGURE 4.

Fac Pond 8 Northwest Corner



DETAIL 1

Note: Perforated drum to be wrapped with several layers of landscaping filter fabric.



DETAIL 2

APPENDIX 1

Memorandum

To: Jill Banaszak

CC: John Hino

From: Steve Rydzyk

Date: 4/7/2008

Re: Fac Pond 8 Sediment Sampling and Radiological Scanning

The purpose of the memorandum is to document the activities and results for the sediment sampling and radiological scanning of Fac Pond 8 sediments that are located in the proposed pumping area for the dewatering of Fac Pond 8. The sampling and scanning activities are required prior to initiating any construction work associated with the dewatering of Fac Pond 8. The procedures for obtaining the samples and testing were outlined in CWM's report titled "Facultative Pond 8 Water Transfer Procedure" dated February 2008.

Sediment Sampling:

Sediment sampling activities took place on April 3, 2008 at 1:00 pm. Prior to sampling, the northwest corner of Fac Pond 8 was staked out to identify 4 quadrants. Each quadrant measured approximately 10 foot by 10 foot. Refer to Figure 1 for more details. In the presence of two CWM employees and an NYSDEC On-Site Monitor (P. Reuben), I waded into the Fac Pond 8 water and obtained a sediment sample from a random location in each of the 4 quadrants. A spaded shovel was utilized to dig through the vegetative/algae mat to collect the samples. The water depth, where the samples were gathered from, ranged between 12 inches and 3.5 feet. Typically, the sample contained sediment, dead vegetation, algae, clay, and a minor amount of entrained water. Refer to the attached Pictures. The shovel was cleaned with pond water after each sample was obtained. The samples were placed into 4 separate, labeled, plastic containers. The quantity of each sample ranged between 5 and 10 pounds. The sample containers were closed and transported to the Environmental Trailer on site for overnight storage. The sampling was completed at 1:35 pm. A picture of the samples is attached to the memo.

Radiological Scanning

Radiological scanning activities for the Fac Pond 8 sediment samples took place on April 4, 2008 at 8:45 am. The testing occurred in the Environmental Trailer in the presence of myself and the NYSDEC On-Site Monitor (P. Reuben). Michael Pendl, a radiological technician from URS Corporation, performed the scanning activities. The instrument used was a Ludlum Model 2221 portable meter with 2 inch by 2 inch Sodium Iodide (NaI) gamma scintillation detector (Ludlum Model 44-10). The meter had been recently calibrated on February 4, 2008. In addition, Mike performed a quality control and source check on the instrument. In addition, an initial and final background reading was taken and documented. The samples were then opened and evaluated. Each sample underwent three static count measurements. One test with the NaI probe at a distance of 12 inches from the side of the container, another test at a distance of 3 inches from the side of the

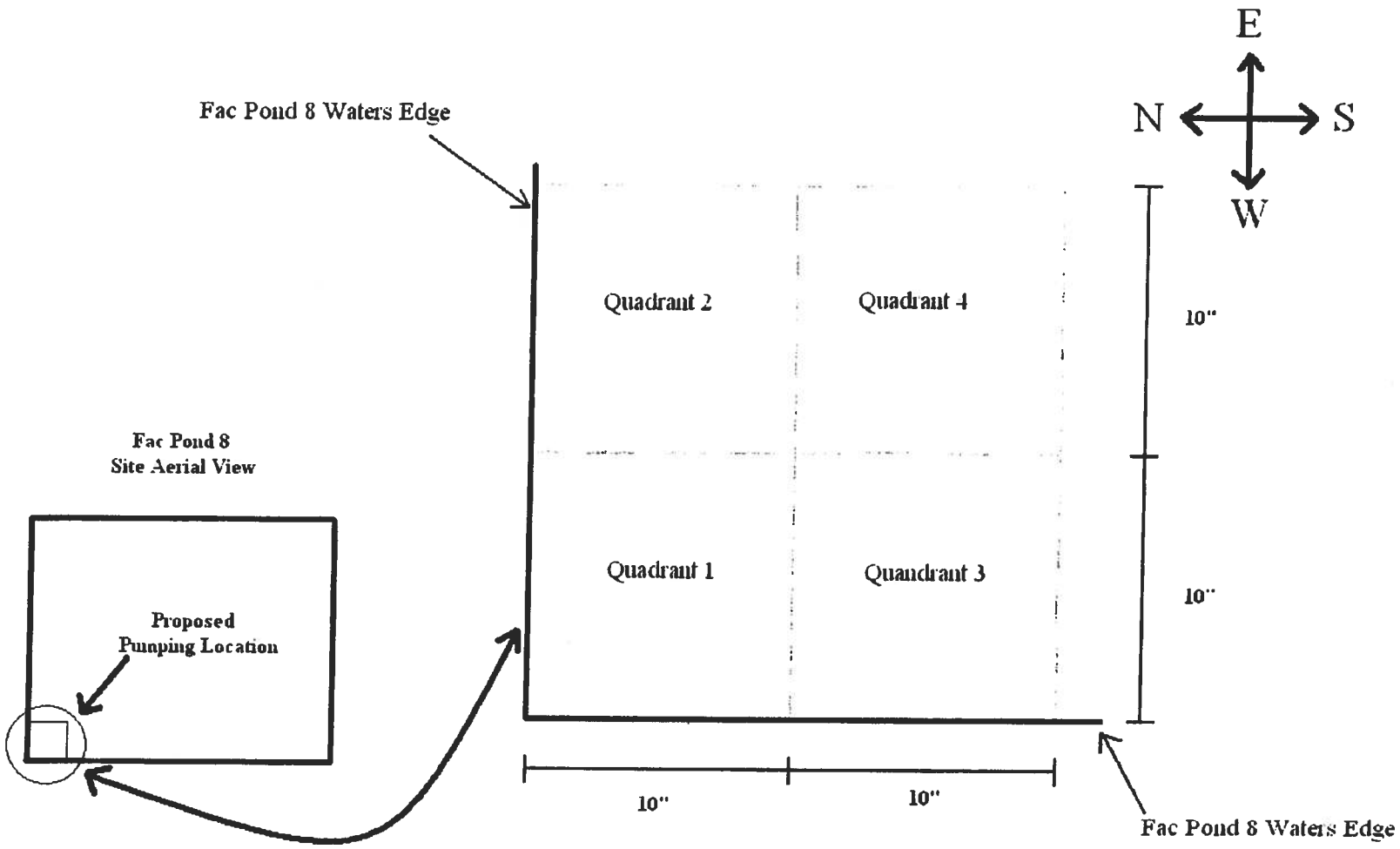
container, and a final test with the probe within the container at a distance of approximately 3 inches above the sample. Mike Pendl recorded all the results on the attached Radiological Survey Form.

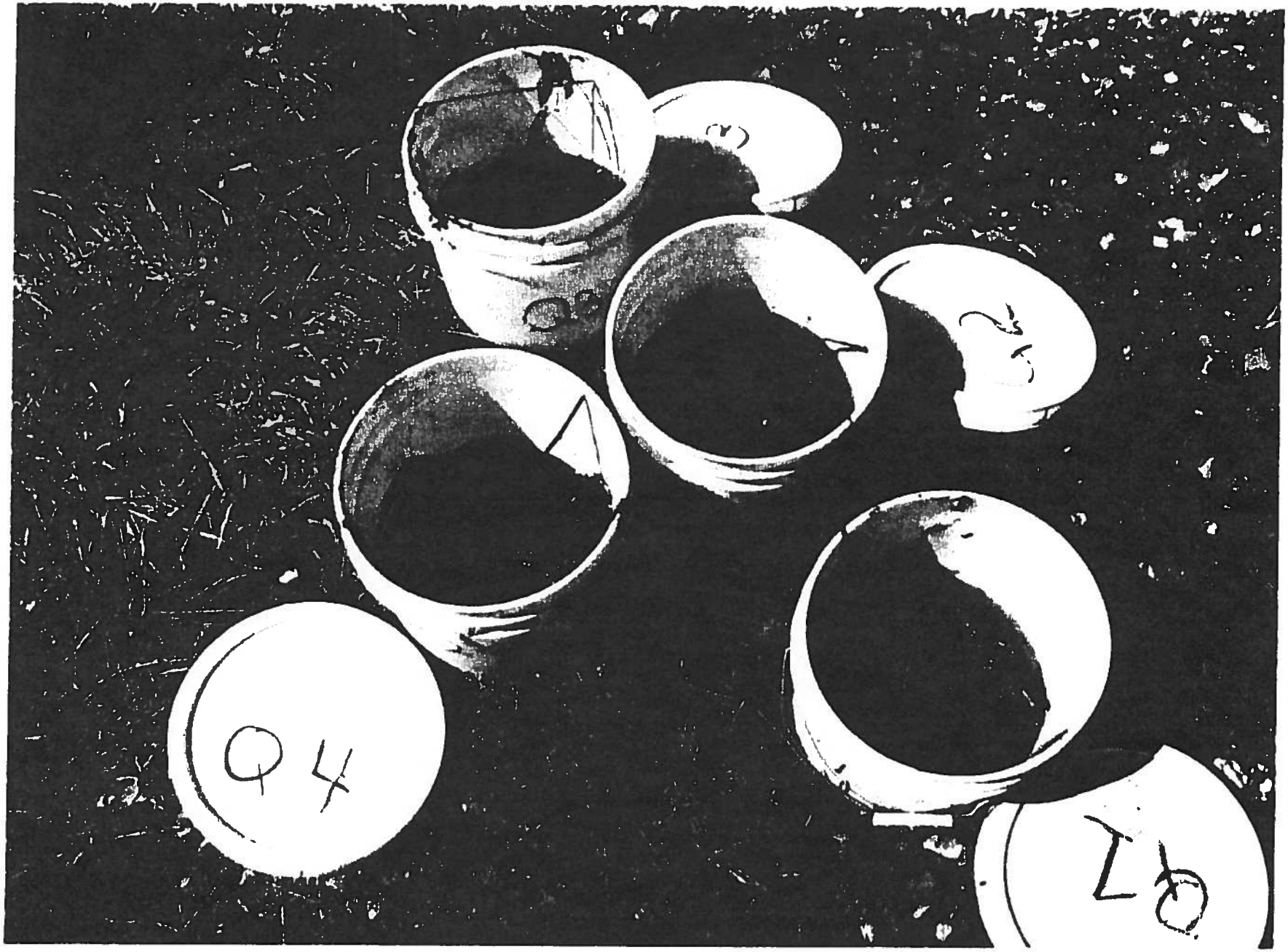
Results

Summarizing, the radiological scanning of the four sediment samples indicated no radiological contamination. All results were in the range of background levels.

If you have questions or comments regarding the procedures utilized in obtaining and testing of the Fac Pond 8 sediment samples, do not hesitate to contact me.

FIGURE 1.


E
N
S
W
Fac Pond 8 Waters Edge
Quadrant 2
Quadrant 4
Quadrant 1
Quandrant 3
10"
10"
10"
10"
Fac Pond 8
Site Aerial View
Proposed
Pumping Location
Fac Pond 8 Waters Edge


Q4

Radiological Survey Form

Instrument Used:	Ludlum Model 2221 #211782		
Calibrated on:	2/4/08	Calibration Expires:	2/4/09
Detector Information:	#220133	Model 44-10 (Hv=905	
Battery Check:	5.6	/ Min Background Check = 3,547 counts	Top of Freezer
Source Check	1 Minute Source count	56,907 counts	

↑ Near-body Detector. **Survey Information** 1.0 mCi May 2004.

Date of Survey:	4/4/08
Survey By:	Michael Pendl Michael Pendl - URS

Description	Soil / Sediment / Veg. from FAC Pond 8			
Sample Name	Q1 (Quadrant #1)			
Collection Date	4/3/08			
Distance from Detector	12"	3"	Open Top	
Count Rate (CPM)	3,725	3,926	3,947	

Description	Soil / Sediment / Veg. from Fac Pond 8			
Sample Name	Q2 (Quadrant #2)			
Collection Date	4/3/08			
Distance from Detector	12"	3"	Open Top	
Count Rate (CPM)	3915	3850	4,042	

Description	Soil / Sediment / Veg. from Fac Pond 8			
Sample Name	Q3 (Quadrant #3)			
Collection Date	4/3/08			
Distance from Detector	12"	3"	Open Top	
Count Rate (CPM)	3924	3897	3967	

Description	Soil / Sediment / Veg. from Fac. Pond 8			
Sample Name	Q4 (Quadrant 4)			
Collection Date	4/3/08			
Distance from Detector	12"	3"	Open Top.	
Count Rate (CPM)	3888	3848	3829	

Description	Final Bkgd 3784 cpm			
Sample Name	Final Source Check 87,515 cpm			
Collection Date				
Distance from Detector				
Count Rate (CPM)				

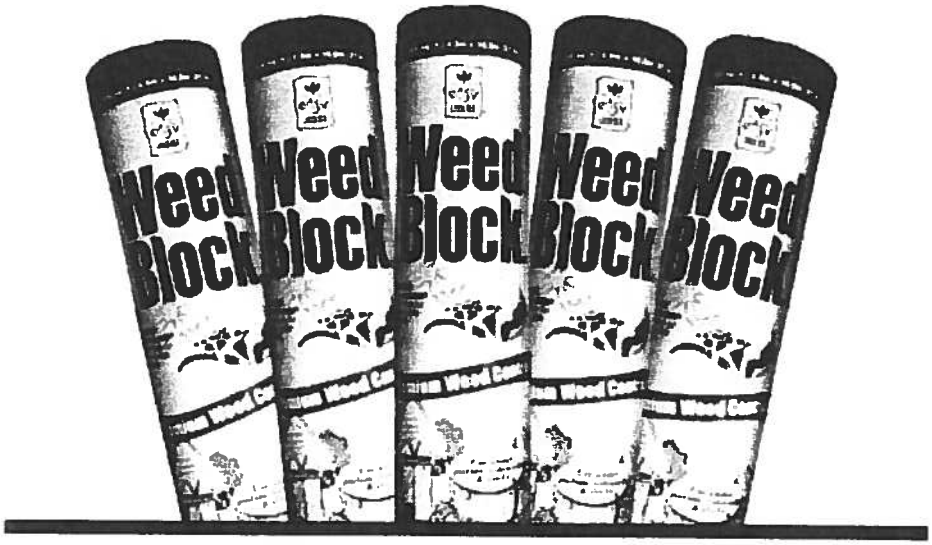
3 Gallon Buckets ~ 1/3 Full of Sediment / Some Water

APPENDIX 2

WeedBlock®

Stop wasting time pulling weeds and you'll have more energy to enjoy your garden. WeedBlock® Landscape Fabric not only deters weeds, it encourages root growth by keeping soil moist and cool. Made of UV-treated polyethylene, WeedBlock features patented "Microfunnels®" that allow the free flow of air, water and nutrients to soil while blocking sunlight - and weeds!

- Stops weeds for years®
- Let's water through to roots
- Saves time from weeding
- For permanent landscape and hardscape areas



Item #	Description	Color	Size
1001	WeedBlock®	Black	3' x 25'
1041	WeedBlock®	Black	3' x50'
1051	WeedBlock®	Black	3' x 100'
1071	WeedBlock®	Black	6' x 50'
1171	WeedBlock®	Black	6' x 100'
1081	WeedBlock®	Black	4' x 50'
1091	WeedBlock®	Black	4' x 100'

Where To Buy

FAQ Landscape Fabics

Q. What are landscape fabrics?

A. Landscape fabrics are designed to reduce weed growth while allowing the free flow of water, air and gases to and from the soil.

Q. How are landscape fabrics used?

A. Recommended applications:

- Weed Control
- Soil and embankment stabilization
- Drainage
- Erosion control
- Re-vegetation systems
- Earth wall reinforcement
- Moisture barriers
- Filtration

Q. Why should I use landscape fabrics?

A. Landscape fabrics can stop weed growth without using harmful chemicals, lower maintenance time and cost, conserve soil moisture during dry periods, reduces wash-away of bark and mulch and make plants healthier.

Q. Can soil be added on top of landscape fabrics?

A. No, by adding soil on top of the fabric, you are promoting weed growth on top of the fabric.

Q. Can landscape fabrics be placed on top of existing weeds and grasses?

A. No, we recommend preparing the planting area prior to installation of the fabric. (See "How do I prepare the area?")

Q. How do I prepare the area?

A. Recommended preparation, for best results:

- Thoroughly remove weeds and grasses from the planting area.
- Rake smooth.
- Nutgrass or rhizome grasses like Bermuda should be treated with a glyphosate-base weed preventing product.
- Because weed seeds may be present in freshly tilled areas or in newly added soils, treat with a pre-emergent weed control product.
- Cover area immediately with fabric.

Q. How do I install landscape fabric?

A. Recommended installation:

- Unroll fabric and overlap sections by 2 - 3 inches.
- Secure fabric with FabricPegs® or Garden Staples.
- Cut X's as needed for existing and new plants to pass through.
- Cover with 2 - 3 inches of bark or stone mulch for protection against UV rays and a longer life.
- After installation, a systemic herbicide may be used to kill persistent weeds and grasses.

Q. Can I use landscape fabrics in my vegetable garden?

A. Yes, Easy Gardener landscape fabrics are safe for growing vegetables. However, if the fabric is not covered with mulch, the life expectancy of our fabrics will range from 1 growing season to 3 years, depending on the fabric used.

Easy Gardener Products, Inc., 3022 Franklin Avenue, Waco, TX 76710 USA

Easy Gardener Products, Ltd
3022 Franklin Ave
Waco, TX 76710
800-327-9462

Material Safety Data Sheet

Section I – Product Identification

Product Name: WeedBlock
Item #(s): 1001, 1041, 1050, 1051, 1070, 1071, 1171, 1081, 1091
Chemical Description: Black Polyethylene Film

Section II – Hazardous Ingredients/Identify Information

Ingredient	CAS No.	Approx. %	Hazardous	Non-Hazardous
Carbon Black	1333-86-4	<5%	3.5 mg/m3 LTV & PEL Respirable Dust	

Section III – Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity	0.915 - 0.935
Vapor Pressure	N/A	Melting Point	105 - 125 C
Vapor Density	N/A	Evaporation Rate	N/A
Solubility in Water	Nil		
Appearance and Odor:	Black, Apertured Film/Shet; Negligible Odor		

Section IV – Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
> 572 F (300 C) ASTM-D1929	17.0 - 18.0 LOI	N/A	N/A

Extinguishing Media
CO2, Fog, Water Spray

Special Fire Fighting Procedures
Cool with water spray, remove heat source. Wear Positive Pressure, Self-contained breathing apparatus in any closed space

Unusual Fire and Explosion Hazards
Dense smoke emitted when burned without sufficient oxygen. Fine dust particles from slitting could pose explosion or flash fire hazard

Section V – Reactivity Data

Stability	Unstable		Conditions to Avoid: Temperatures over 572 F (300 C) will cause release of combustible gases
	Stable	X	

Incompatibility (Materials to Avoid)
Chlorinated solvents

Hazardous Decomposition or Byproducts
Combustible gases when exposed to high temperatures

Hazardous Polymerization	May Occur		Conditions to Avoid: N/A
	Will Not Occur	X	

Section VI – Health Hazard Data

Route(s) of Entry	Inhalation? Unlikely due to form	Skin? Unlikely due to form	Ingestion? Unlikely due to form
Health Hazards (Acute & Chronic) Encapsulation in the polymer matrix minimized chances of exposure to carbon black. Low hazard for commercial or industrial handling.			
Carcinogenicity	NTP? No	IARC Monographs? Carbon Black (Group 2b - Possible Carcinogen)	OSHA Regulated? 29 CFR 1910.1000 Table Z-1
Signs & Symptoms of Exposure None expected			
Medical Conditions Generally Aggravated by Exposure None expected. Like Nuisance dust, any dust created may aggravate certain pre-existing upper respiratory disorders.			
Emergency and First Aid Procedures See below			

Section VII – Precautions for Safe Handling and Use

Steps to be taken in case material is released or spilled Sweep up and recycle or dispose of in regulated landfill, or incinerator according to local and federal regulations
Waste Disposal Method Follow local codes. Can be recycled if clean; sanitary landfill or incineration if dirty
Precautions to be taken in handling and storing Protect employees when handling large rolls. Keep away from heat and steam pipes. Avoid sunlight.
Other Precautions None

Section VIII – Control Measures

Respiratory Protection (Specify Type) Not required		
Ventilation	Local Exhaust X	Special N/A
	Mechanical (General) N/A	Other N/A
Protective Gloves When handling hot plastic	Eye Protection Safety glasses	Other Protective Clothing N/A
Work/Hygiene Practices N/A		

Section IX – First Aid Measures

First Aid Procedures:	
Eyes:	N/A
Skin:	For skin contact with molten material, cool with water. Remove with silicone oil
Inhalation:	N/A
Ingestion:	N/A

Section X – Transportation Information

Shipping information

No special shipping required.

APPENDIX 3

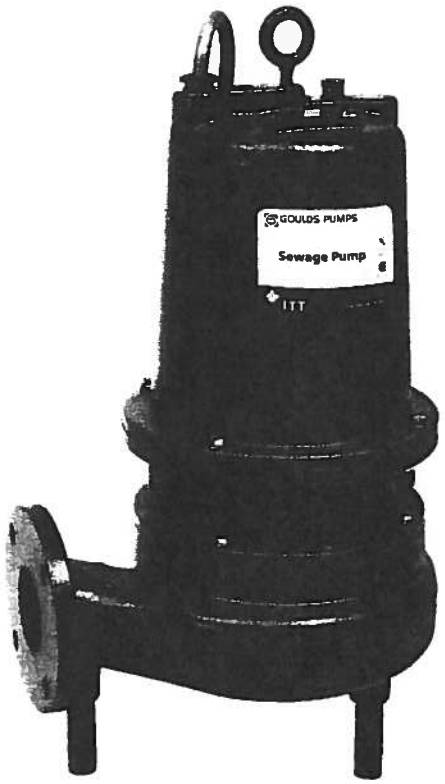
ITT

Wastewater

Goulds Pumps

WS_D3 Series Model 3888D3

Submersible Sewage Pump



FEATURES

- **Impeller:** Cast iron, ASTM A48, Class 30, two vane semi-open, non-clog design with pump out vanes for mechanical seal protection. Balanced for smooth operation. Silicon bronze impeller is an option.
- **Casing:** Heavy duty gray cast iron, ASTM A48, Class 30. Volute type casing with 3", 125#, ANSI flanged, horizontal discharge. Compatible with A10-30 cast iron or A10-30B cast iron and brass (non-sparking) guide rail assembly.
- **Dual Mechanical Seals:** Silicon carbide vs. silicon carbide outer seal and ceramic vs. carbon inner seal, stainless steel metal parts, BUNA-N elastomers. Upper and lower shaft seals are positioned independently and are separated by an oil-filled chamber.
- **Shaft:** 300 series stainless steel keyed design.
- **Fasteners:** 300 series stainless steel.
- Capable of running dry temporarily without damage to seals or motor.

GOULDS PUMPS

Goulds Pumps is a brand of ITT Water Technology, Inc.
- a subsidiary of ITT Industries, Inc.

www.goulds.com

Engineered for life

ITT

GOULDS PUMPS
Wastewater

APPLICATIONS

Used in a variety of residential, commercial and industrial applications such as:

- Sewage systems, Flood and Pollution Control, Dewatering/Effluent, Farms, Hospitals, Trailer Courts, Motels

SPECIFICATIONS

Pump:

- Maximum solid size: 2.5"
- Discharge size: 3", 125 # ANSI flange
- Maximum capacity: 470 GPM
- Maximum total head: 65 feet
- 300 Series stainess steel fasteners
- 20' Power cord
- Standard silicon carbide/silicon carbide outer seal

Motor:

- Maximum ambient temperature: 104° F (40° C) continuous duty, 140° F (60° C) intermittent duty
- Rated for continuous duty when fully submerged
- Insulation: Class F
- 60 Hertz
- Single row ball bearings
- 300 Series stainless steel keyed shaft

Single Phase:

- 1.5 - 5 HP; 208 and 230 volts
- Built-in thermal overloads with automatic reset
- Built-in capacitors

Three Phase:

- 1.5 - 5 HP; 200, 230, 460 and 575 volts
- Class 10 overload protection must be provided in control panel

MOTORS

- **Fully submerged in oil-filled chamber.** High grade turbine oil surrounds motor for more efficient heat dissipation, permanent lubrication of bearings and mechanical seal for complete protection against outside environment.
- **Class F insulation.**
- **Designed for Continuous Operation:** Pump ratings are within the motor manufacturer's recommended working limits and can be operated continuously without damage when fully submerged.
- **Bearings:** Upper and lower heavy duty ball bearing construction for precision positioning of parts and to carry thrust loads.
- **Power Cable:** Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. 20 foot standard with optional lengths available.
- **O-ring:** Assures positive sealing against contaminants and oil leakage.

AGENCY LISTINGS

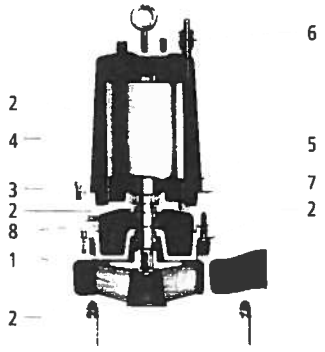
Tested to UL 778 and CSA 22.2 108 Standards By Canadian Standards Association File #LR38549

Goulds Pumps is ISO 9001 Registered.

MODEL AND MOTOR INFORMATION

Order No.	HP	Phase	Volts	RPM	Impeller Dia. (in.)	Maximum Amps	L.R. Amps	KVA Code	Power Cable	F.L. Motor Efficiency %	Resistance Start	Resistance Line-Line	Wt. (lbs.)
WS1518D3M	1.5	1	208	1750	5.25	15.0	50.8	B	14/3	80	1.1	0.9	192
WS1512D3M			230			12.5	29.5	E		70	1.4	1.8	
WS1538D3M		3	200			11.5	40.9	H	14/4	81	NA	1.7	190
WS1532D3M			230			10.0	40.0	F		83		2.3	
WS1534D3M			460			5.0	20.0	F		83		9.3	
WS1537D3M			575			4.0	14.4	H		74		14.8	
WS1518D3	1.5	1	208	1750	6.50	15.0	50.8	B	14/3	80	1.1	0.9	192
WS1512D3			230			12.5	29.5	E		70	1.4	1.8	
WS1S38D3		3	200			11.5	40.9	H	14/4	81	NA	1.7	190
WS1532D3			230			10.0	40.0	F		83		2.3	
WS1534D3			460			5.0	20.0	F		83		9.3	
WS1537D3			575			4.0	14.4	H		74		14.8	
WS2018D3	2	1	208	1750	7.00	19.0	50.8	B	14/3	80	1.1	0.9	196
WS2012D3			230			16.0	36.9	D		75	1.4	1.5	
WS2038D3		3	200			11.5	40.9	H	14/4	81	NA	1.7	194
WS2032D3			230			10.0	40.0	F		83		2.3	
WS2034D3			460			5.0	20.0	F		83		9.3	
WS2037D3			575			4.0	14.4	H		74		14.8	
WS3018D3	3	1	208	1750	7.25	25.5	50.8	B	10/3	80	1.1	0.9	205
WS3012D3			230			21.5	46.4	C		79	1.0	1.0	
WS3038D3		3	200			15.2	53.8	G	10/4	85	NA	1.3	200
WS3032D3			230			12.0	49.5	H	14/4	83		1.9	
WS3034D3			460			6.0	24.8	H		83		7.5	
WS3037D3			575			4.8	17.3	G		78		11.6	
WS5012D3	5	1	230	1750	8.00	26.5	57.7	A	10/3	80	1.0	0.8	210
WS5038D3		3	200			18.8	73.9	F	10/4	84	NA	0.9	205
WS5032D3			230			16.4	63.6	E		85		1.2	
WS5034D3			460			8.2	31.8	E	14/4	85		4.8	
WS5037D3			575			6.8	22.8	E		80		7.4	

MATERIALS OF CONSTRUCTION



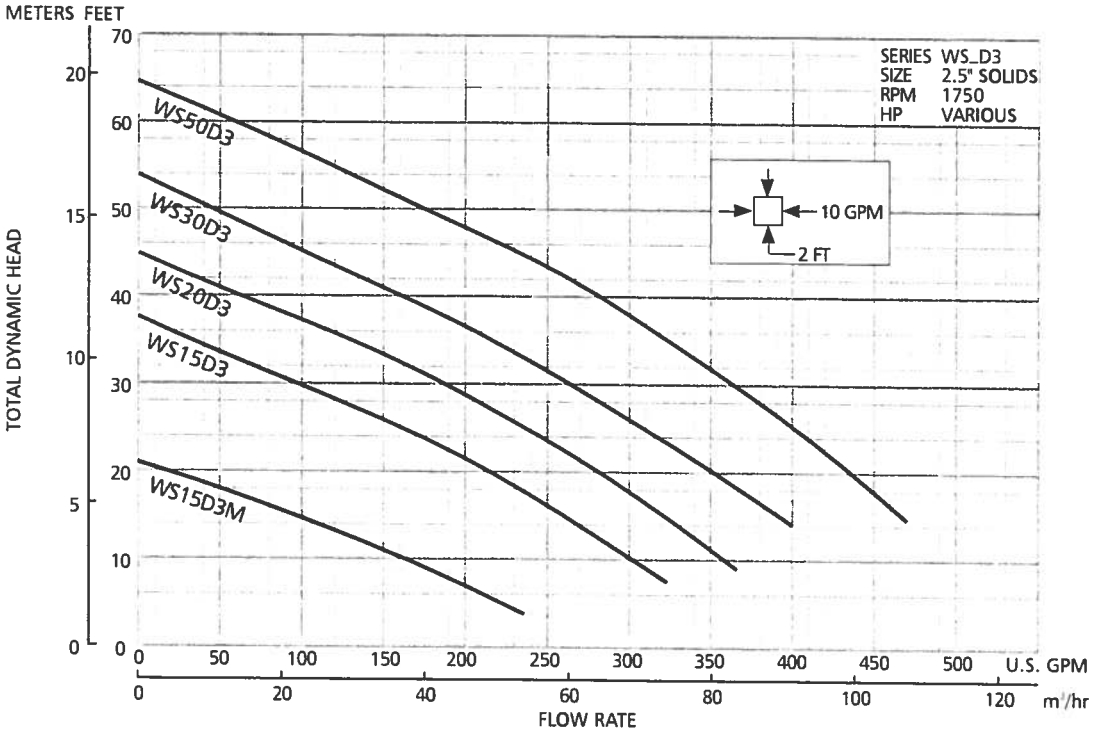
Item No.	Part Name	Material	
		Standard	Optional
1	Impeller, non-clog	1003	1179
2	Castings	1003	
3	Shaft–keyed	300 Series SS	
4	Fasteners	300 Series SS	
5	Ball bearings	Steel	
6	Power cable	STOW, 20 feet	Additional lengths
7	O-ring	BUNA-N	

Item No.	Outer Mech. Seal	Service	Rotary	Stationary	Elastomers	Metal Parts
8	OPT	Heavy duty	Silicon Carbide	Tungsten Carbide	BUNA-N	300 Series SS
	STD	Mild abrasives	Silicon carbide		BUNA-N	300 Series SS

Material Code	Engineering Standard
1003	Cast iron — ASTM A48 Class 30
1179	Silicon bronze — ASTM C87600

PERFORMANCE RATINGS (Gallons Per Minute)

Series No. ▶		WS15D3M	WS15D3	WS20D3	WS30D3	WS50D3
HP ▶		1½	1½	2	3	5
RPM ▶		1750				
Total Head Feet of Water	10	160	300			
	15	90	260	320		
	20		210	280	350	435
	25		160	235	310	400
	30		100	185	265	360
	35			130	210	325
	40			60	160	280
	45				100	230
	50					170
	55					115
	60					60



ITT

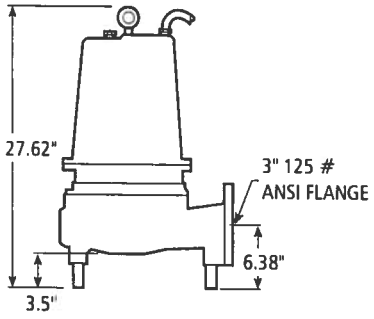
Wastewater

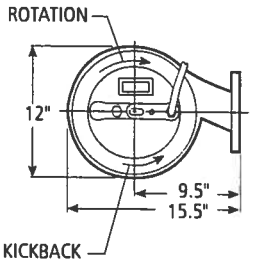
APPLICATION DATA AND CONSTRUCTION DETAILS

Maximum Solid Size		2.5"
Minimum Casing Thickness		5/16"
Casing Corrosion Allowance		1/8"
Maximum Working Pressure		30 PSI
Maximum Submergence		50 feet
Minimum Submergence		Fully submerged for continuous operation
		6" below top of motor for intermittent operation
Maximum Environmental Temperature		40° C (104° F) continuous operation, 60° C (140° F) intermittent operation
Power Cable – Type (See Motor Information for AWG data/size.)		Type SJTOW: single phase, 1½ and 2 HP
		Type STOW: single phase, 1½ – 3 HP and 5 HP, 460 V
		Type STOW: single phase, 3 and 5 HP, three phase 5 HP, 230 V
Motor Cover, Bearing Housing, Seal Housing, Casing		Gray Cast Iron – ASTM A48, Class 30
Impeller – Standard, Optional		Gray Cast Iron – ASTM A48 or Cast Bronze – ASTM B584 C87600
Motor Shaft		AISI 300 Series Stainless Steel
Motor Design		NEMA 56 Frame, oil filled with Class F Insulation
Motor Overload Protection		Single phase: on winding thermal overload protection auto reset
		Three phase: requires Class 10 overloads in control panel
External Hardware		300 Series Stainless Steel
Impeller Type		Semi-open with pump out vanes on back shroud
Oil Capacity – Seal Chamber		1.5 quarts
Oil Capacity – Motor Chamber		1½-5 HP single and three phase: 7 quarts
Mechanical Seals – Standard	Upper	Carbon/Ceramic; Type 21
	Lower	Silicon Carbide/Silicon Carbide; Type 31
Mechanical Seals – Optional Lower		Silicon Carbide/Tungsten Carbide; Type 31

DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)





GOULDS PUMPS

B3888D3 March, 2006

Engineered for life

APPENDIX 4

EnSol, Inc.
Environmental Solutions

661 Main Street
Niagara Falls, NY 14301

Professional Engineering • Business Consulting

Ph (716) 285-3920 • Fx (716) 285-3928

Transmitted Via Electronic Mail

February 20, 2008

Stephen Rydzyk
Engineer
CWM Chemical Services, LLC
P.O. Box 200
1550 Balmer Rd
Model City, NY 14107

Re: CWM Chemical Services, LLC
Model City Facility
Fac Pond 8 Sediment and Filtration Evaluation

Dear Mr. Rydzyk:

EnSol, Inc. (EnSol) is providing this letter to CWM Chemical Services, LLC (CWM) to present the results of the sediment and filtration evaluation performed for Facultative (Fac) Pond 8 at your Model City, NY Facility. Evaluation of the Pond's sediment particle size and existing effluent discharge system filter media was done to aid CWM in determining if the existing filter media is adequate to remove sediment from the effluent inlet pipe prior to discharge.

On January 15, 2008 a sediment sample was collected from the area around the Fac Pond 8 effluent inlet pipe. A hand shovel was used to collect the sample and approximately one-half of a five-gallon bucket was filled with the sample material. The sample was then transferred into a two-gallon, plastic-lined bucket for transport to the laboratory. Prior to removing the sample from site, the sample was scanned by a URS Corporation radiation technician for radiation levels above background levels, using a Ludlem 2221 meter with a NaI 2" x 2" probe. According to the technician, the meter was last calibrated on November 12, 2007. The meter did not detect any levels above background in the sample. The sediment sample was then transported by EnSol under chain of custody to Test America, Inc., Amherst, NY, for analysis. A Field Report with photographs is presented in Attachment 1.

The sediment sample was analyzed for Particle Size Distribution in accordance with ASTM Method D-422. The analytical report prepared by Test America's Burlington, VT office is presented in Attachment 2. The test results show that approximately 18.0 percent, by weight, of the collected sediment sample was finer than 10 microns in size. The test results also show that 9.9 percent of the sample was finer than 1.4 microns in size (the lower limit of the test).

In addition to the particle size analysis, EnSol also reviewed available filter media design documentation and manufacturer's literature. This information (refer to Attachment 3) was reviewed to evaluate and compare, based on the analytical results, the sediment particle size to the filtration media specifications of the effluent discharge system. During the site visit on January 15, 2008, EnSol collected information on the existing filtration system, including a visual observation of the filter media

and filter media housing unit. The current filter media being used are 2.5" diameter, 30" long polypropylene yarn wound filter cartridges, with polypropylene core, with a nominal micron rating of 10. According to information gathered from available industry sources, a filter with a nominal micron rating of 10 has the ability to capture particles as small as 10 microns and typically has an accepted efficiency of up to 85 percent. Factors that effect filter media efficiency include flow rate, pressure characteristics, clogging, and cleaning frequency. Information regarding the filter media efficiency characteristics, test methods, standards used to determine the micron rating, or other pertinent performance data for the filter media currently being used was not available from the manufacturer.

The filter housing assemblies currently being used were installed in 1980 and consist of two steel pressure vessel units, with removable lids, operating in parallel, each equipped with approximately 50 – 55 filter media cartridges. The incoming liquid travels through the outside of the filter media cartridge and passes through it to the interior polyethylene flow tube, where it exits to the outlet nozzle of the vessel. The units are identified as a Model 910373 manufactured by Filterite Corporation, Timonium, Maryland. We determined this company no longer manufactures filter units. Refer to the photos in Attachment 1 for additional information.

Findings and Conclusions

Based on information gathered during the sediment and filter media evaluation for Fac Pond 8 and effluent discharge system, the following conclusions can be made:

1. The laboratory test results found that approximately 18 percent, by weight, of the sediment sample tested from material collected from the area around the Fac Pond 8 effluent inlet pipe was finer than 10 microns in size, which is the nominal rating of the filter media currently being used. 9.9 percent was found to be finer than 1.4 microns, which was the lower particle size limit of the test.

2. The current filter media being used are 2.5" diameter, 30" long polypropylene yarn wound filter cartridges, with polypropylene core, with a "nominal" micron rating of 10. Information regarding the efficiency rating and test methods and standards used to determine the micron rating for the filter media currently being used, was not available. However, it is expected to be capable of removing particles 10 microns and greater in size with up to 85 percent efficiency.

3. It is currently undetermined as to how the filter media effectiveness or efficiency varies with flow rate, pressure, or caking/clogging. However, it is expected that some percentage of particles slightly larger than 10 microns in size could pass through the media when the media is initially installed and clean. Conversely, some percentage of particles less than 10 micron size will likely be captured by the media as it becomes used, due to caking and/or clogging. This is due to the 10 micron rating being "nominal" as compared to "absolute".

4. Considering the laboratory results show that approximately 18 percent, by weight, of the sediment sample was finer than 10 microns, it appears that replacing the current filter media with a lower micron rated filter may help increase particle capture, although this is also determined by the system efficiency factors (flow rate, pressure characteristics, clogging, and cleaning frequency) discussed previously.

Based on the laboratory test results from the particle size analysis performed on the sediment sample collected from the area around the Fac Pond 8 effluent inlet pipe, combined with a limited evaluation of

the current filter media system, EnSol considers the current system capable of removing particles of 10 microns in size and larger to an efficiency of up to 85 percent. The 10 micron rated filters currently being used are based on a nominal size rating as compared to an absolute size. Information regarding specific micron rating requirements, filter efficiency, and system performance characteristics was not available from the filter housing or media manufacturers.

Please do not hesitate to contact me if you have any questions or require additional information. I can be reached at (716) 285-3920 extension 218.

Sincerely,

ENSOL, INC.

Brian D. Shiah

Brian D. Shiah, P.E.
Vice President

Attachments

Cc: Daniel J. Popp – EnSol, Inc.

Attachment 1

EnSol, Inc. *Environmental Solutions*

professional engineering – business consulting

Field Report and Photographs

EnSol, Inc.
Environmental Solutions

Professional Engineering • Business Consulting

661 Main Street
Niagara Falls, NY 14301

Ph (716) 285-3920 • Fx (716) 285-3928

DAILY FIELD REPORT NO.: 1

FIELD REPORT

PROJECT: Fac Pond 8 Sediment and Filtration Evaluation **CLIENT:** CWM		**DATE:** 1-15-2008 **SHEET NO.** 1 **OF** 1 **PROJECT NO.:** 07-7024
CONTRACTOR:	**CONTRACT NO.:**	**DAY OF WEEK:** S M *T* W T F S
REPORT BY: Daniel J. Popp	**SIGNATURE:**	
WEATHER: Wind From: N NE E SE S SW W NW at ___ mph Sunny ***Partly Cloudy*** Cloudy Overcast Sprinkles Showers Thunderstorms		**TEMPERATURE:** **LOW** 33 **HIGH** 33

Daily Objective: Collect a sediment sample from Fac pond 8 for grain size analysis and evaluate filtration system media.

Field Notes: Arrived on site at approximately 9:00 A.M. Met with Mr. Steve Rydzyk, CWM engineer and two representatives with the NYSDEC.

Mr. Rydzyk collected the sediment sample from the area around the intake pipe using a shovel. Approximately one-half of a five-gallon bucket was filled with the sample material. The sample material was then transferred into a two-gallon, plastic-lined bucket for transfer to the laboratory. Prior to removing the sample from the site, the material was scanned for radioactivity using a Ludlem 2221 meter with a NaI 2"x2" probe. According to the operator, the meter was last calibrated on November 12, 2007, but a calibration check is also conducted on a daily basis.

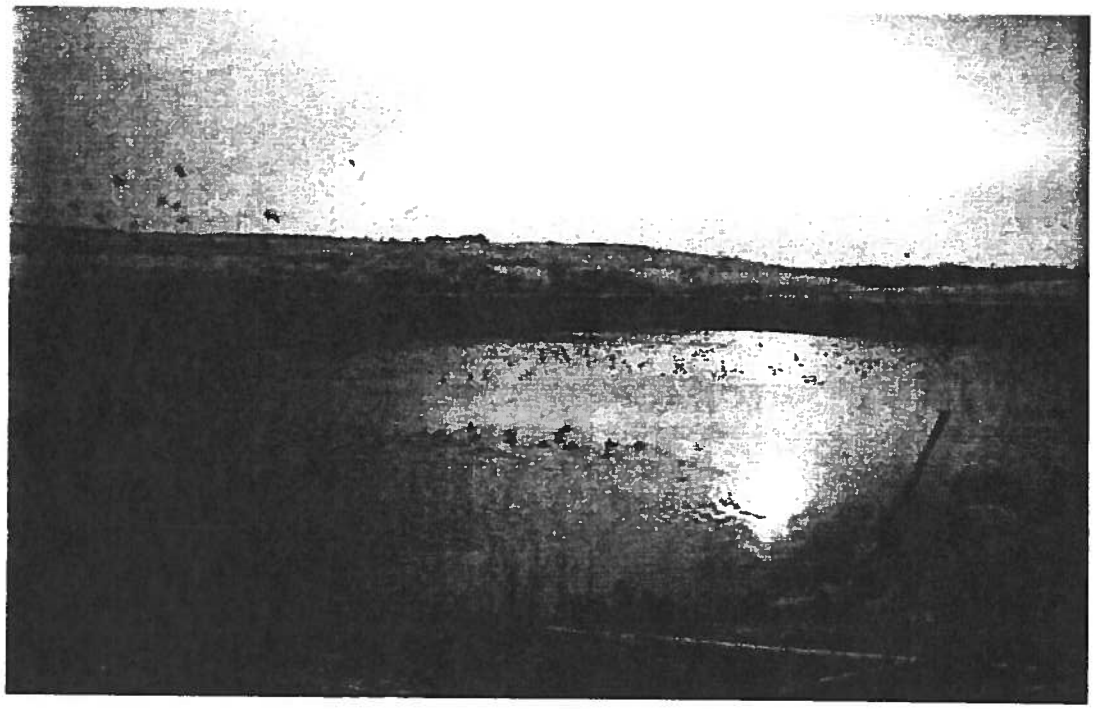


Photo #1 - Photo of Fac Pond 8 From North West Comer.

Photo #2 - Photo of Mr. Steve Rydzyk, CWM Engineer, Collecting the Sediment Sample.

EnSol, Inc. Environmental Solutions 661 Main Street, Niagara Falls, NY 14301 Ph:716-285-3920 Fax: 716-285-3928	**CWM Chemical Services, LLC.**	PROJECT PHOTOGRAPHS
	Fac Pond 8 Sediment & Filtration Evaluation	1 Page No.
Prepared By: DJP Date Prepared: 1/15/08 Filename: project photos		PN: 07-7024 February 2008

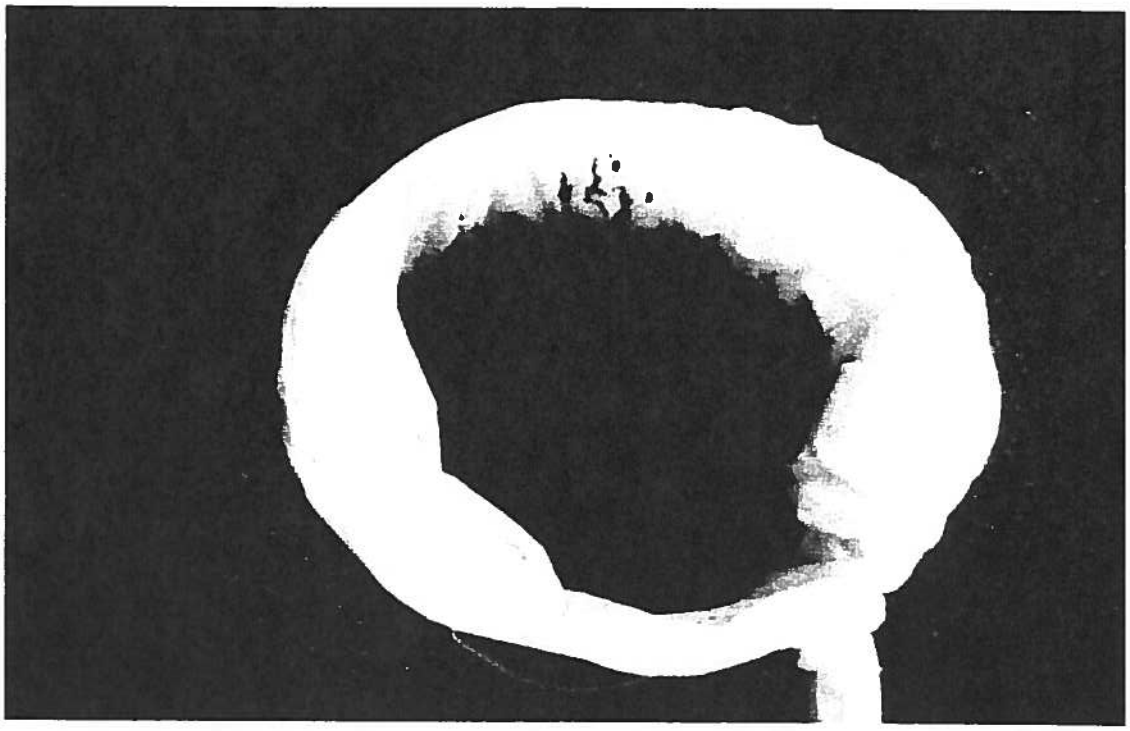


Photo #3 - Photo of Fac Pond 8 Sediment Sample.

Photo #4 - Photo of Effluent Dishcarge System Filtration Media Cartridges.

EnSol, Inc. Environmental Solutions 661 Main Street, Niagara Falls, NY 14301 Ph:716-285-3920 Fax: 716-285-3928	**CWM Chemical Services, LLC.**	PROJECT PHOTOGRAPHS
	Fac Pond 8 Sediment & Filtration Evaluation	2 Page No.
Prepared By: DJP Date Prepared: 1/15/08 Filename: project photos		PN: 07-7024 February 2008

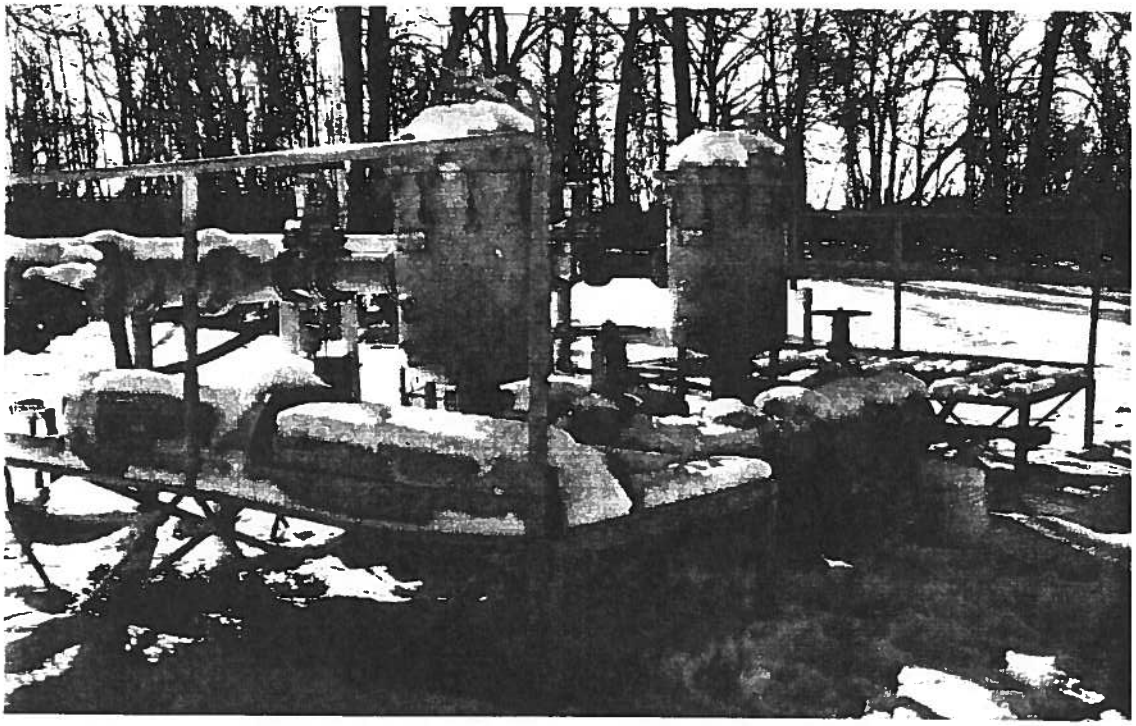


Photo #5 - Photo of Effluent Discharge System Filtration Assembly.

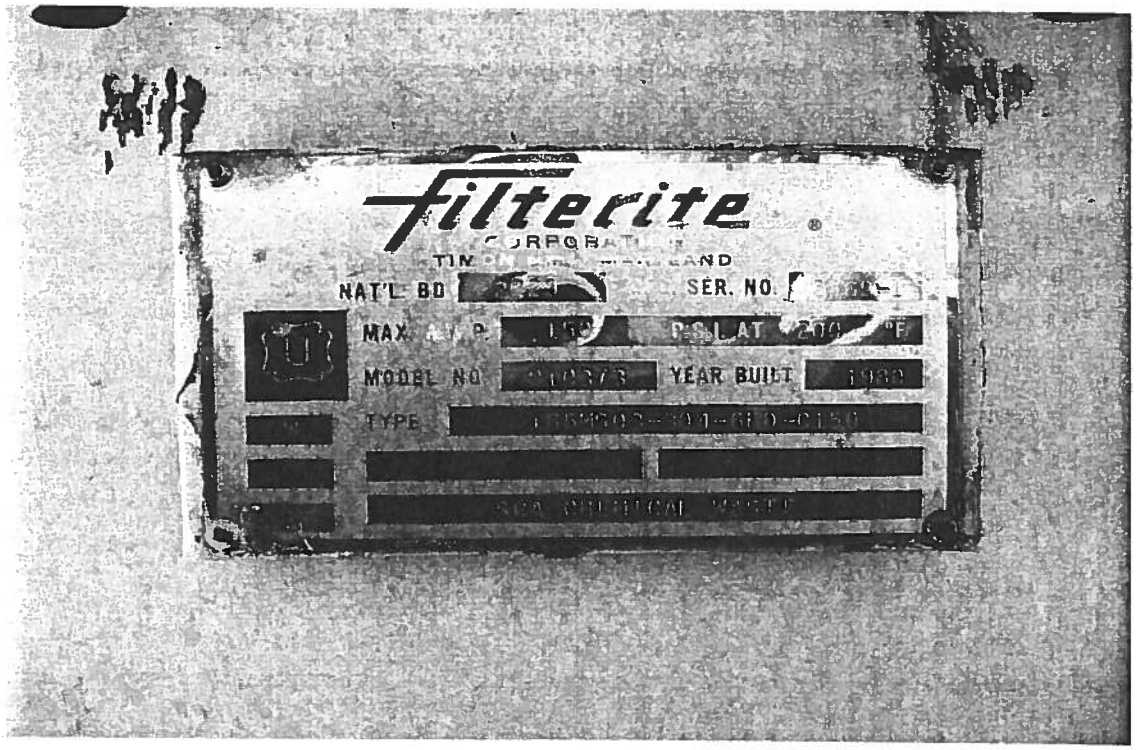


Photo #6 - Photo of Filtration Assembly Name Plate.

EnSol, Inc.
Environmental Solutions
661 Main Street, Niagara Falls, NY 14301
Ph:716-285-3920 Fax: 716-285-3928

Prepared By: DJP
Date Prepared: 1/15/08
Filename: project photos

CWM Chemical Services, LLC.

Fac Pond 8 Sediment & Filtration Evaluation

PROJECT PHOTOGRAPHS

PN: 07-7024 February 2008

Attachment 2

EnSol, Inc. *Environmental Solutions*

professional engineering – business consulting

Analytical Report Prepared by Test America

TestAmerica
South Burlington, VT

Extended Data Package

SDG: A080725

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Case Narrative

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

January 28, 2008

Mr. Daniel Popp
Ensol, Inc.
661 Main Street
Niagara Falls, NY 14301

Re: Laboratory Project No. 28012
Case: ENSOL; SDG: A080725

Dear Mr. Popp:

Enclosed are the analytical results for the sample that was received by TestAmerica Burlington on January 17th, 2008. A laboratory identification number was assigned, and designated as follows:

Lab ID	Client Sample ID	Sample Date	Sample Matrix
	Received: 01/17/08 ETR No: 123868		
738681	CWM-FAC POND 8 SEDMNT	01/15/08	SEDIMENT

Documentation of the condition of the sample at the time of its receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal.

The sample was analyzed for particle size by ASTM D422. There were no exceptions to the method quality control criteria during the analysis of this sample.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.) The analytical results associated with the sample presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.

If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

Kristine Dusablon

Kristine A. Dusablon
Project Manager

Enclosure

30 Community Drive, Suite 11 South Burlington, VT 05403 tel 802.660.1990 fax 802.660.1919 www.testamericainc.com

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Chain of Custody

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TAL-4142 (0907)

Client	Project Manager	Date	Chain of Custody Number
ENSOL, INC.	DANIEL POPP	1-16-08	370447
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page** 1 of 1
661 MAIN ST.	716-285-3920 / 716-285-3928		
City / **State** / **Zip Code**	**Site Contact**	**Lab Contact**	**Analysis (Attach list if more space is needed)**
NIAGARA FALLS / NY / 14301			
Project Name and Location (State)	**Carrier/Waybill Number**		
JM FAC POND 8 SEDIMENT/FILTER EVAL.			
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Other	Containers & Preservatives: Unpres.	H_2SO_4	HNO_3	HCl	NaOH	ZnAc/NaOH	Particle Size	Special Instructions/ Conditions of Receipt
JM-FAC. POND 8 SEDIMENT	1-15-08	0930			X			X						X	METHOD TO BE DETERMD

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

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☑ Archive For 1 Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☑ Other STANDARD

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By: DANIEL POPP	1-16-08	09:30	1. Received By:	11-16-08	09:30
2. Relinquished By:	11/16/08	1550	2. Received By:	1/17/08	0930
3. Relinquished By:			3. Received By:		

Comments

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

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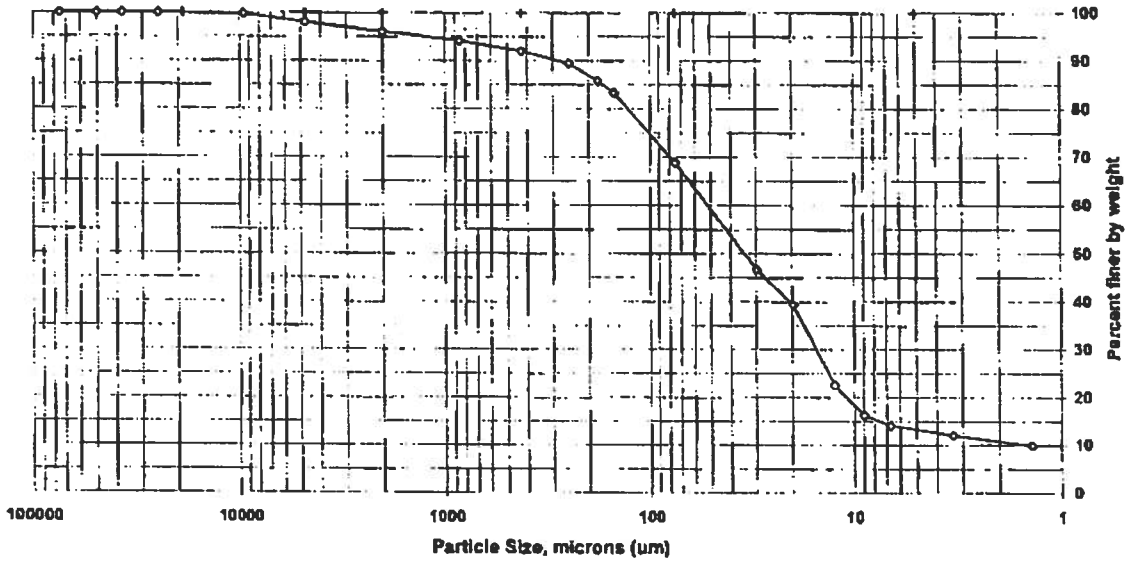
Particle Size Results

Particle Size of Soils by ASTM D422

Client Code:	STLNYB	SDG:	A080725	Date Received:	1/17/2008
Sample ID:	CWM-FAC POND 8 SEDMNT	ETR(s):	123868	Start Date:	1/22/2008
Lab ID:	738661			End Date:	1/25/2008

Percent Solids:	54.4%	Non-soil material:	plant, shell
Specific Gravity:	2.650	Shape (> #10):	subangular
Maximum Particle Size:	19 mm	Hardness (> #10):	hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	99.7	0.3
#4	4750	98.1	1.7
#10	2000	96.1	1.9
#20	850	94.2	1.9
#40	425	92.0	2.2
#60	250	89.5	2.6
#80	180	85.8	3.6
#100	150	83.3	2.5
#200	75	68.8	14.5
Hydrometer	29.8	46.8	22.1
I	19.8	39.4	7.4
I	12.5	22.6	16.8
I	9.0	16.3	6.3
I	6.7	14.2	2.1
I	3.3	12.1	2.1
V	1.4	9.9	2.2

Soil Classification	Percent of Total Sample
Gravel	1.9
Sand	29.2
Coarse Sand	1.9
Medium Sand	4.1
Fine Sand	23.2
Silt	54.6
Clay	14.2

Preparation Method: D2217
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

Particle Size Analysis of Soils
By ASTM D422
Hydrometer Data

Set Number: A080725

Client Code: STLNYB
SDG: A080725
ETR(s): 123668

Date Received: 17-Jan-08
Start Date: 22-Jan-08
End Date: 25-Jan-08

Date and Analyst	Percent Solids	Weighed	Mixed	Hydrometer	Large sieves	Small sieves
	DJP 1-22-08 DJP 1-23-08	DJP 1-22-08	MAP 1-22-08	TEH 1-23-08 TEH 1-24-08	MAP 1-22-08 TEH 1-25-08	TEH 1-24-08 TEH 1-25-08

Test number	1	2	3	4	5	6	7	8	9	10	11	12
Lab number												738681
Time, min. (2)	2	2	2	2	2	2	2	2	2	2	2	2
Reading												1.0255
Temperature, C												20.0
Time, min. (5)	5	5	5	5	5	5	5	5	5	5	5	5
Reading												1.0220
Temperature, C												20.0
Time, min. (15)	15	15	15	15	15	15	15	15	15	15	15	15
Reading												1.0140
Temperature, C												20.0
Time, min. (30)	30	30	29	29	31	31	31	32	30	30	30	31
Reading												1.0110
Temperature, C												20.0
Time, min. (60)	59	58	58	63	60	59	59	60	63	57	63	57
Reading												1.0100
Temperature, C												20.0
Time, min. (250)	256	256	250	250	240	234	265	259	253	247	241	235
Reading												1.0090
Temperature, C												20.0
Time, min. (1440)	1440	1440	1434	1434	1424	1418	1412	1406	1400	1394	1388	1382
Reading												1.0080
Temperature, C												19.5

Hydrometer used: 313119 Model #: ASTM 151H Manufacturer: ELE Hydrometer start time: 12:45

Calibrations:	L temp, C	L read	H Temp, C	H read
	17.0	1.0035	23.0	1.0030

Cal. Date: 09/09/07
Hydrometer data entered: TEH 1-25-08

Particle Size Analysis of Soils
By ASTM D422
Hydrometer Data

Set Number: A080725

Client Code: STLNYB
SDG: A080725
ETR(s): 123868

Date Received: 17-Jan-08
Start Date: 22-Jan-08
End Date: 1/25/08

Date and Analyst

Percent Solids	Weighed	Mixed	Hydrometer	Large sieves	Small sieves
JJJ 1-22-08	JJJ 1-22-08	MJP 1.22.08	TEH 1.23.08	MJP 1.22.08	TEH 1/24/08
JJJ 1-23-08			TEH 1/24/08	TEH 1/25/08	TEH 1/25/08

Test number	1	2	3	4	5	6	7	8	9	10	11	12
Lab number												738681
Time, min. (2)	2	2	2	2	2	2	2	2	2	2	2	2
Reading												1.0255
Temperature, C												20.0
Time, min. (5)	5	5	5	5	5	5	5	5	5	5	5	5
Reading												1.0220
Temperature, C												20.0
Time, min. (15)	15	15	15	15	15	15	15	15	15	15	15	15
Reading												1.0140
Temperature, C												20.0
Time, min. (30)	30	30	29	29	31	31	31	32	30	30	30	31
Reading												1.0110
Temperature, C												20.0
Time, min. (60)	59	58	58	63	60	59	59	60	63	57	63	57
Reading												1.0100
Temperature, C												20.0
Time, min. (250)	256	256	250	250	240	234	265	259	253	247	241	235
Reading												1.0090
Temperature, C												20.0
Time, min. (1440)	1440	1440	1434	1434	1424	1418	1412	1406	1400	1394	1388	1382
Reading												1.0080
Temperature, C												19.5

Hydrometer used: 313I5 Model #: ASTM 151H Manufacturer:

Hydrometer start time: 12:45

Calibrations:

L temp, C	L read	H Temp, C	H read
17.0		23.0	

Cal. Date:

Hydrometer data entered: TEH 1/25/08

FSL024:07.29.05:0
TestAmerica Burlington

Particle Size Analysis of Soils By ASTM D422

Sieve Data

Client Code: STLNYB | ETR(s): 123868 | SDG: A080725 | Date Rec: 17-Jan-08 | Start Date: 22-Jan-08 | End Date: 25-Jan-08

SET: A080725

Test	1	2	3	4	5	6	7	8	9	10	11	12
Laboratory No												738661
Sample ID												CWM-FAC-POND-8.5

Dry prep = D421
Wet prep = D2217

Standard Values	
Sieve	Opening, um
3 inch	75000
2 inch	50000
1.5 inch	37500
1 inch	25000
3/4 inch	19000
3/8 inch	9500
#4	4750
#10	2000
#20	850
#40	425
#60	250
#80	180
#100	150
#200	75

Sample Prep												D2217
Pan, g												
Pan/sample, g												140.36
Pan/dry sample, g												
Hygroscopic Moisture correction factor (HMCF) for dry prep / Percent Solids for dry and wet prep												
Pan, g												14.16
Pan/sample, g												120.14
Pan/dry sample, g												87.31
HMCF												100.0%
Description of >#10 particles												
Non-soil material												plant, shell
Shape												subangular
Hardness												hard
Sample % Solids												54.4%
Dry sample wt, g												78.42

Sieve (tares)		
Size	Mass, g	
3 inch		
2 inch		
1.5 inch		
1 inch		
3/4 inch		
3/8 inch	447.67	
#4	484.93	
#10	459.13	
#20	382.93	A
#40	354.85	A
#60	338.25	A
#80	325.83	A
#100	334.04	A
#200	323.40	A

Sieve + Sample Weights												
Size	Mass, g	Mass, g	Mass, g	Mass, g	Mass, g	Mass, g	Mass, g	Mass, g	Mass, g	Mass, g	Mass, g	Mass, g
3 inch												
2 inch												
1.5 inch												
1 inch												
3/4 inch												
3/8 inch												447.67
#4												489.22
#10												460.62
#20												384.38
#40												356.64
#60												340.22
#80												328.60
#100												335.95
#200												324.49

Maximum Particle size													19 mm
Default SG	2.65	Specific gravity											2.660

Sample Mass Parameters													
Sample Mass >#10, g	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.98
Sample mass <#10, g	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	73.44

TestAmerica

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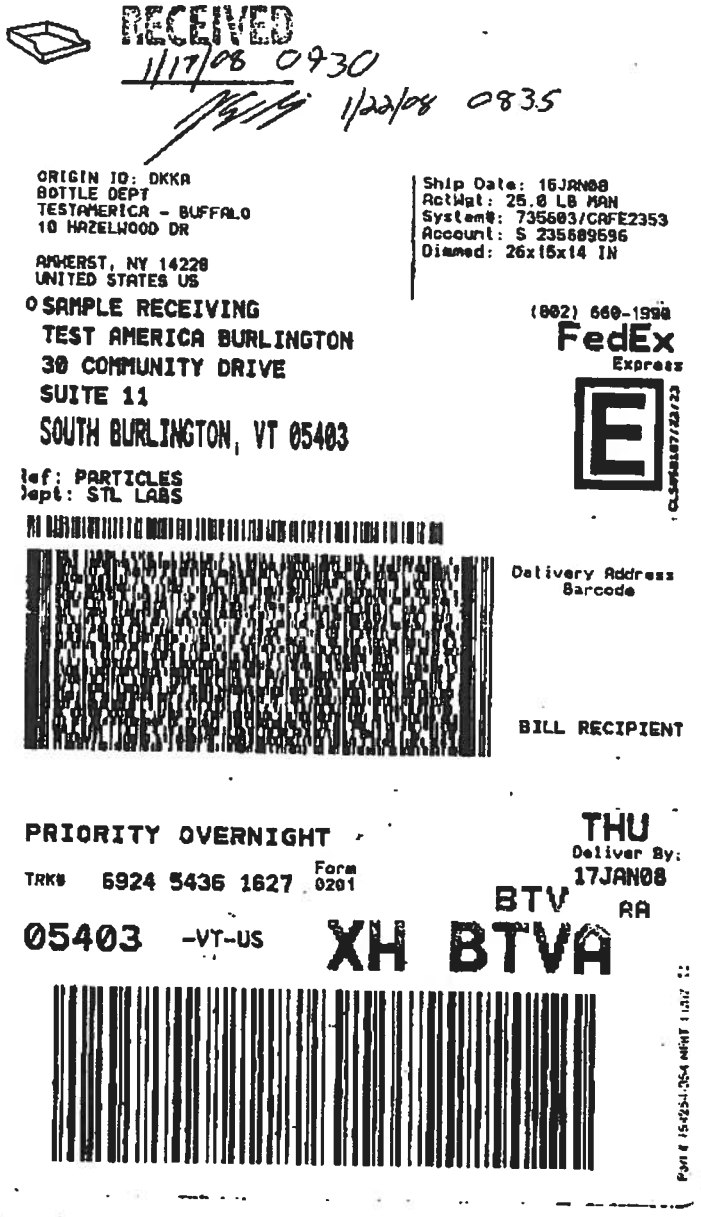
Sample Handling


RECEIVED
1/17/08 0930
1/22/08 0835

ORIGIN ID: DKKA
BOTTLE DEPT
TESTAMERICA - BUFFALO
10 HAZELWOOD DR

AMHERST, NY 14228
UNITED STATES US

Ship Date: 16JAN08
ActWgt: 25.0 LB MAN
System#: 735603/CAFE2353
Account: S 235689696
Dimmed: 26x15x14 IN

SAMPLE RECEIVING
TEST AMERICA BURLINGTON
30 COMMUNITY DRIVE
SUITE 11
SOUTH BURLINGTON, VT 05403

(802) 660-1990

FedEx
Express

Ref: PARTICLES
Dept: STL LABS

Delivery Address Barcode

BILL RECIPIENT

PRIORITY OVERNIGHT

THU
Deliver By:
17JAN08

TRK# 5924 5436 1627 Form 0201

BTV
RA

05403 -VT-US XH BTVA

Part # 154234-354 NEWT 1/07

TestAmerica Burlington
SAMPLE RECEIPT & LOG IN CHECKLIST

Client: STLNYB	Date Received: 1/17/08	Log In Date: 1/22/08	
ETR: 123668	Time Received: 0930	By: JEG	
SDG: A080725	Received By: JEG	Signature:	
Project: 28012	# Coolers Received: 1	PM Signature: Timothy Dusault	
Samples Delivered By: X Shipping Service ☐ Courier ☐ Hand ☐ Other (specify)		Date: 1/24/08	
List Air bill Number(s) or Attach a photocopy of the Air Bill:			

COOLER SCREEN	YES	NO	NA	COMMENTS
There is no evidence to indicate tampering	X			
Custody seals are present and intact	X			
Custody seal numbers are present	X			
If yes, list custody seal numbers: 210765				

Thermal Preservation Type: X Wet Ice ☐ Blue Ice ☐ None ☐ Other (specify)

IR Gun ID: 62 Correction Factor (CF) = 0 °C

Cooler 1: 4.1	°C	Cooler 6	°C	Cooler 11	°C	Cooler 16	°C
Cooler 2:	°C	Cooler 7	°C	Cooler 12	°C	Cooler 17	°C
Cooler 3:	°C	Cooler 8	°C	Cooler 13	°C	Cooler 18	°C
Cooler 4:	°C	Cooler 9	°C	Cooler 14	°C	Cooler 19	°C
Cooler 5	°C	Cooler 10	°C	Cooler 15	°C	Cooler 20	°C

Unless otherwise documented, the recorded temperature readings are adjusted readings to account for the CF of the IR Gun

EPA Criteria: 0-6°C, except for air and geo samples which should be at ambient temperature and tissue samples, which may be frozen.

Some clients require thermal preservation criteria of 2-4°C or other such criteria. The PM must notify SM when alternate criteria is specified.

SAMPLE CONDITION	YES	NO	NA	COMMENTS
Sample containers were received intact	X			
Legible sample labels are affixed to each container	X			

CHAIN OF CUSTODY (COC)	YES	NO	NA	COMMENTS
COC is present and includes the following information for each container:				
• Sample ID / Sample Description	X			See below
• Date of Sample Collection	X			
• Time of Sample Collection	X			
• Identification of the Sampler		X		
• Preservation Type			X	
• Requested Tests Method(s)	X			
• Necessary Signatures	X			
Internal Chain of Custody (ICOC) Required		X		
If yes to above, ICOC Record initiated for every Worksheet			X	

SAMPLE INTEGRITY / USABILITY	YES	NO	NA	COMMENTS
The sample container matches the COC		X		Collection time not listed
Appropriate sample containers were received for the tests requested	X			
Samples were received within holding time	X			
Sufficient amount of sample is provided for requested analyses	X			
VOA vials do not have headspace or a bubble >6mm (1/4" diameter)			X	
Appropriate preservatives were used for the tests requested			X	
pH of inorganic samples checked and is within method specification			X	
If no, attach Inorganic Sample pH Adjustment Form			X	

ANOMALY / NCR SUMMARY

Sample ID was truncated due to limitations of LIMS.

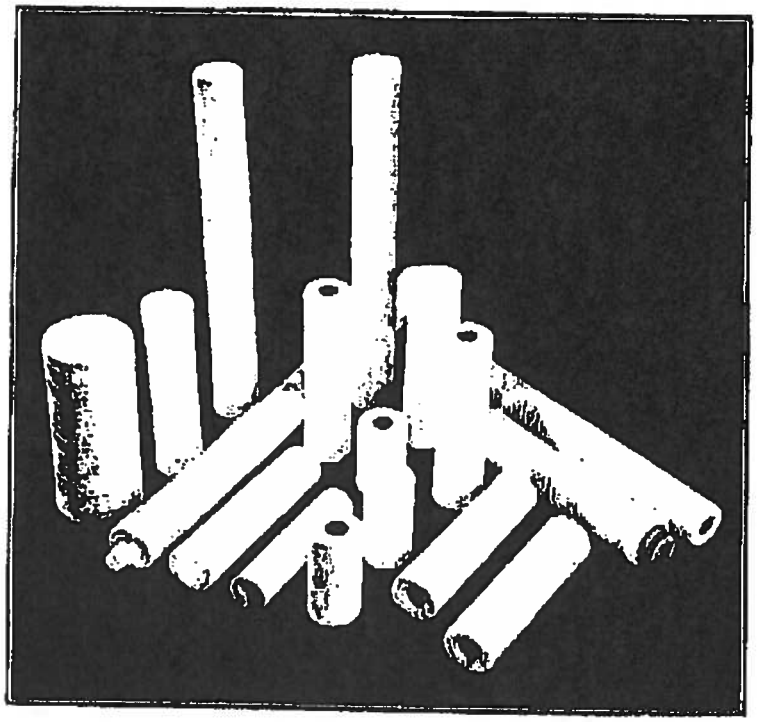
Attachment 3

EnSol, Inc. *Environmental Solutions*

professional engineering – business consulting

Filter Media Product Literature

YARN WOUND FILTER CARTRIDGES



TFT's depth wound cartridge, with its tapered passages, assures the best filtration available.

All *TFT* filter cartridges are wound in a precise manner to provide true depth filtration through hundreds of tapered passageways. Depth wound cartridges offer gradual pressure increase, compared to the sudden increase with surface-type filters. Progressive dirt removal from surface to core provides high dirt holding capacity. Core covers are available to prevent fiber migration.

One of the main advantages of the wound filter cartridge is its exceptionally high structural strength that can withstand severe operating and handling conditions. *TFT* cartridges are available in a wide variety of materials compatible with most liquids and gases, and in micron ratings from 0.5 to 300 nominal.

APPLICATIONS BY INDUSTRY

Food and Beverage:	soft drink process water, filtered bottled water, edible oil processing, corn/fructose syrup polishing, beer polishing, wine clarifying, spice oils
Chemicals:	polishing colloidal silica fluids, water polishing fluids, industrial chemical polishing, monomer filtration for PVC, cooling water, organic solvents
Electronics:	printed circuit process water, plating solutions, precious metal recovery, photo resist, solvents, acids, DI water, R.O. prefiltration
Photographic:	photo processors, photo emulsions, wash water, rinse water, chemicals
Hospitals:	water, X-ray processing, dialysis prefiltration
Magnetic Coatings:	audio, video, computer tape, computer hard disks, solvents
Oil Production:	secondary oil recovery, well completion, waterflood
Cosmetics:	oils, perfumes, creams, gels
Pharmaceuticals:	solvents, process water, cooling water, R.O. prefiltration
Paint and Ink:	process water, emulsions, pigments, dyestuffs
Consumer Products:	household and municipal water, prefilter for desalination
Plating:	process water, plating solutions

Trumpler-Clancy, inc.
INDUSTRIAL FILTRATION
WASTEWATER TREATMENT
P.O. BOX 483, 75 ELMVIEW AVENUE, HAMBURG, NY 14075 / (716) 649-9330 / FAX NO. (716) 649-9006

⇒ Model: 10P30V
MYA858

ORDERING CODES

5 P 10 P F

Micron Ratings:
0.5, 1, 2, 3, 5, 10, 15, 20, 25,
30, 40, 50, 75, 100, 150, 200, 300

Filter Media:
Polypropylene - P
Polypropylene (Fibrillated) - PF
Bleached Cotton - C
Natural Cotton - CU
Rayon - R
Nylon - N
Acrylic - A
Jute - J *(non-standard)*
Teflon - PTF *(non-standard)*
Polyester - PE
Aramid - AR
(Nomex™ a DuPont Registered Trademark)

Lengths:
3 7/8" - 50" in 1/16" increments
Examples: Length 10" = Order Code 10
Length 29 1/4" = Order Code 294
Length 19 1/2" = Order Code 198
Length 9 3/4" = Order code 912

Options:
FDA Approved Fiber - F
Core Cover - C
Extended Core - X
End Treatment - E
4 1/2" Outer Diameter - BB

Core:
Polypropylene - P
Tin - T
304 Stainless Steel - A
316 Stainless Steel - S
Nylon - N
Phenolic - H
Polypropylene (Heavy Wall) - PH

Standard Outside Diameter: 2 1/2"
Standard Inside Diameter: 1.08"
others available

PACKAGING

2 1/2" Outer Diameter		4 1/2" Outer Diameter	
4" and 5" filters	60/carton	10" filters	8/carton
6" filters	48/carton	20" filters	6/carton
10" filters	30/carton		
20" and 30" filters	15/carton		
40" and 50" filters	10/carton		

Total Filter has the capability to design and manufacture many different filtration products to help you solve your specific problem. We invite your inquiries to custom design and manufacture a filter cartridge for your specific need.

All data and statements concerning these products may be considered as being indicative of representative properties and characteristics obtainable. Since industry practices vary, we make no warranty, express or implied, concerning their use, nor do we accept responsibility for any misapplication of these products, or their use under any conditions.

Trumpler-Clancy, inc.
INDUSTRIAL FILTRATION
WASTEWATER TREATMENT
P.O. BOX 493, 75 ELMVIEW AVENUE, HAMBURG, NY 14075 / (716) 649-9330 / FAX NO. (716) 649-9006

Issue No.13 July 2007

EVERYTHING ABOUT WATER

OEM AIZER

For OEMs and Water Professionals

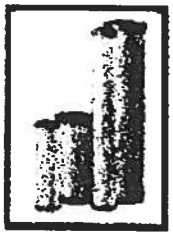
AN EARTH WATER ENTERPRISE

ARTICLES

Types of filter cartridges and its applications

Removal of small and large particles is required during all production processes at different stages. Filter cartridges offer a revolutionary result to the industries to achieve the final filtration levels.

By Mehul Panchal



Filtration (separation) of large or small volumes of solid particles is required by all types of industries. A variety of filter aids were previously used to remove fine particles and to achieve desired levels of filtrate quality. This however was not sufficient to achieve the final filtration level. At the same time, polishing of all finished products has become compulsory for all most all demanding application of industries. Referring to such requirements of polishing filter for removable of fine suspended particles; filter cartridges have offered a revolutionary result to the industries.

Role and operation of filter cartridges

Filter cartridges work on the positive pressure concept. They offer a wide range of filtration ratings starting from 0.01 micron to 100 micron. Normally, a majority of filter cartridges work on flow direction, outside to inside, depending upon the requirement of the process and design of cartridge filter housings. Unfiltered material enters into cartridge filter housing with positive pressure and passes through filter cartridges, where contaminants of stipulated micron rating are retained outside the filter cartridge and clean filtrate passes through central core.

Designing parameters

Each industry has its own requirement of polishing filter where it can not be concluded with any particular kind of filter cartridge. The applications and requirements of filtration levels define the sizes and type of filter cartridge. Following are the basic parameters which play a major role for the selection of a filter cartridge:

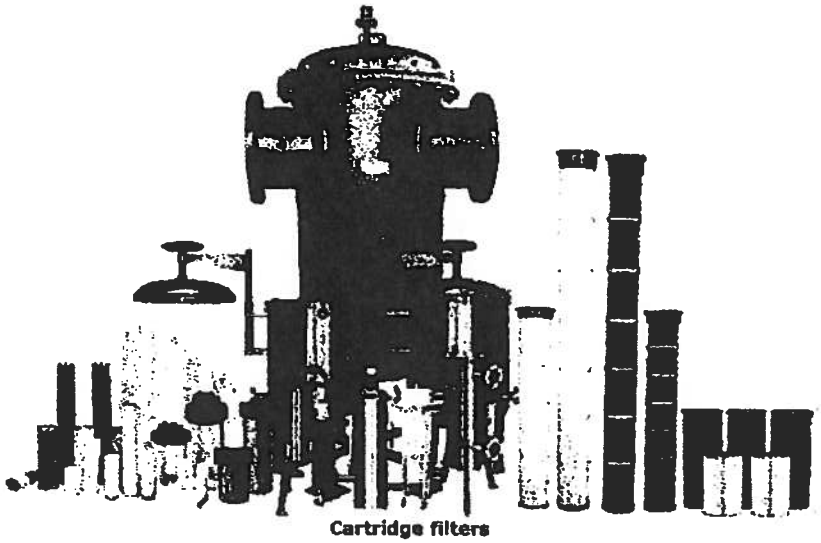
- Application
- Desired flow rate
- pH of material
- Viscosity of material
- Specific gravity
- Desired filtration level
- Working pressure
- Working temperature
- Percentage of solid contaminates
- Nature of contaminates

Each cartridge carries a particular nomograph to derive flow rate data at a particular pressure drop and filtration rating. Apart from these, filter cartridges are to be selected as per process requirement, working pressure and temperature requirement

Mechanism of retention

There are around seven mechanisms through which a filter can capture particles. All of these mechanisms are at work in a filter at any given time to varying degrees and may change as operating condition changes. The seven mechanisms of particle capture are as follows:

- Direct interception



Cartridge filters

Direct interception is usually the governing mechanism during liquid filtration. The interception of a particle occurs by this method when a particle approaches a media obstruction at a distance equal to or less than the particle radius. In essence, if the particle is captured once it runs into a physical barrier.

- Bridging

A single particle may be too small to be directly intercepted or blocked by the filter medium. However, two particles hitting the obstruction at the same time may stick together and be deposited. Particles form a bridge across the pores by hitting them simultaneously or by adhering to each other earlier in the process and then being deposited. Bridged particles may not clog the opening completely thus creating a smaller pore that is more difficult to pass through. The gradual accumulation of the particles results in the formation of a filter cake. This cake creases a finer matrix for subsequent interception.

- Sieving

Similar to bridging, sieving is a specialised case of direct interception. Sieving occurs when the opening or the pore in the medium is more constrictive than the diameter of the particle as it is too large to pass through the pore. Sieving may occur on the surface of the filter or throughout the depth of the medium.

- Inertial impaction

Inertial impaction is based on the scientific principle of inertia, staring that a moving object will continue to move in a straight line unless acted on by an outside force. As particles flow through a filter, they may encounter an obstruction and can be captured while the fluid flows around the barrier. Due to the inertia of the particle it continues to move in a straight line and becoming impact. Fluid viscosity also affects the inertial impaction. Fluids that are highly viscous exert a greater drag on the particles, reducing the chances of inertial impaction. Gases, on the other hand, have an extremely low viscosity enhancing inertial impaction to the point of being a primary mechanism of capture in gas filtration.

- Diffusion interception

The mechanism of diffusion interception is an attributable to the fact that molecules are constantly in random motion. The motion enhances the opportunity for a particle to become intercepted by the filter medium. Diffusion interception is more prevalent is particles that are 0.1 to 3 microns is size, since molecular bombardment affects the smaller particles the most. Diffusion interception is primarily found in gases due to their inherently low viscosity and high degree of molecular mobility.

- Electrokinetic's effects

Electrical charges may be present on the filter medium and on the particles. Particle deposition can occur due to attractive forces between changes or induced forces due to the proximity of the particles to the proximity of the particles to the medium. Some manufacturers purposely alter the surface of the filter medium to enhance the electrokinetic's capture.

- Gravitational setting

Cartridges are classified into two different filtration styles:

- Surface filtration
- Depth filtration

Surface filtration

A true surface filter can be thought of as a screen that is challenged with particles that are too large to pass through its opening. The particles will collect on the surface forming a filter cake. The retention will be absolute since particle will be able to penetrate through the surface. This mechanism of the capture is recognised as sieving. However, if the same screen was challenged with small particles, it would no longer capture all of the contaminants at surface. Hence, the process of surface filtration is strictly dependent upon the particle size/pore size relationship.

Surface vs. Depth filtration

Deformable particles	May blind off pleats	Recommended–adsorptive retention
Non deformable particles	Removes narrow range	Removes broader range of particles
Classifications/clarifications	Classification	Clarification
Retention rating	Absolute rated	Nominal rated
Economics	Hold more dirt load than depth filter and offers high throughputs	More economical than pleated at greater than 10 micron filtration level

Depth filtration

True depth filtration processes allow particles to penetrate into the filter matrix and are captured throughout the depth of medium. As with surface filtration, the particle size is conductive to the process for which the cartridge was designed. The depth filter matrix has broad pore size distribution. Hence, the depth filter cartridges rely on adsorptive retention for a portion of their dirt holding capacity. Depth cartridges should not be subjected to flows as high as those that are possible for pleated cartridges. Most of depth filter cartridges are made of extruded melt blown depth fibres or twisted yarn fibres. They are nominally rated but offer the advantages of being made from a variety of material.

Types of filter cartridges

- Yarn wound type filter cartridge
- Spun bonded filter cartridge
- Polypropylene pleated filter cartridges
- PES and PTFE membrane pleated filter cartridges
- Sintered non metal filter cartridge
- Stainless steel sintered metal filter cartridges
- Stainless steel wiremesh filter cartridges
- Granular carbon filter cartridges
- Resin bonded filter cartridge
- Oil adsorbing filter cartridge

Yarn wound filter cartridge

Filter concepts' yarn wound cartridges are designed to meet the most demanding filtration duties. They offer an economic, compact, easily installed and maintained filtration system for particulate removal from liquids. They are processed into fibres of specific grades using the latest technology. After carding and spinning into roving, they are wound into cartridges with carefully controlled micron rating. The cartridges are appreciated due to their high dirt holding capacity and to the rugged construction which allow them to face different applications in liquid and gas filtration.

Operation

Unfiltered fluid passes through depth filter matrix, enabling the progressive retention of finer particles. This provides high efficiency, high dirt retention and filter life. The fluid flows from outside to inside through the filter media. Particulates are held securely in the filter matrix and clean fluid flows to the downstream side of cartridge.

Salient features

- Standard and customised sizes fit most housings
- Filtration rating from 1 to 100 micron

- High strength and pressure resistance
- Manufactured in continuous length
- Full range of sizes from 10" to 60" length
- Excellent flow with low pressure drop
- High dirt holding capacity
- Compatible with a wide range of fluids
- NSF and FDA approved

Technical specifications

Sizes: 10", 20", 30"40", 60" long
Micron rating: 0.5, 1, 5, 10, 25, 50, 75, 100
Outer diameter: 58mm (2.3"), 64mm (2.5"), 100mm (4"), 110mm (4.5"), 6", 8"
Inner diameter: 25mm

Construction

- Polypropylene with polypropylene core
- Cotton with stainless steel core
- Glass fibre with stainless steel core

Application

The wound filter cartridges are useful in:
Polypropylene wound filter cartridge:

- Organic acids and solvents
- Concentrated alkalis
- Water
- Electroplating solution
- Photographical process fluid Cotton wound filter cartridge:
- Vegetable oils
- Dilute acids
- Alkalis
- Organic solvents
- Portable liquids

Spun bonded filter cartridge

Spun bonded filter cartridges are made of 100% polypropylene fibres. The fibres are carefully spun together to form a true gradient density from the outer to the inner surface. The filter cartridges are available with a core and without core version. The superior structure remains integral even under severe operating conditions and there is no media migration. Polypropylene fibres are continuously blown on central moulded core, without the need for binders, resins or lubricants.

Operation

The unfiltered fluid passes through depth filter matrix, enabling the progressive retention of finer particles, providing high efficiency, high dirt retention and filter life. Fluid flows from outside to inside through filter media. Particulates are held securely in the filter matrix and clean fluid flows to the downstream side of the cartridge.

Salient features

- Free of surfactants, binders and adhesives
- Excellent flow with low pressure drop
- High dirt holding capacity
- High strength and pressure resistance
- 100% polypropylene for wide chemical compatibility
- One piece construction up to 1016mm
- Nominal and absolute filtration rating

Technical specification

Sizes: 10",20",30"40" long
Micron rating: 0.5 , 1 , 5, 10, 25, 50 , 75 , 100
Outer diameter:64mm (2.5"), 114mm (4.5"), 6", 8"
Inner diameter: 25mm

Construction

The spun bonded filter cartridges are made of 100% polypropylene.

Application

The spun bonded filter cartridges are used in various industries like, food and beverages, pharmaceuticals, fine chemicals, water treatment, metal finishing and electronics.

Polypropylene pleated cartridge

Polypropylene filter cartridges are precisely manufactured for use in critical filtration applications within food, pharmaceuticals, biotech, dairy, beverages, brewing, semiconductor, water treatment and other process industries.

Polypropylene pleated cartridges use the latest gradient density micro fibre media technology to provide a combination of excellent micro ratings, high flow rates and high contaminant holding capacities. A special combination of polypropylene media with variation in the fibre diameter has created a gradient density matrix, ranging from open on the outside to finer on the inside, thereby providing a filter within filter, which considerably increases the contamination holding capacity and throughputs.

All components used during manufacturing are biologically safe, chemically inert and meet FDA and other international quality requirements. Polypropylene offers an extremely broad chemical compatibility making it suitable for many applications.

Features and benefits

Following are the main features and benefits of polypropylene pleated cartridge:

- All polypropylene construction
- Absolute and nominal efficiency
- Gradient density micron fibre media
- High surface area (more than 0.5m2)
- Robust outer cage
- Biologically safe
- Wide compatibility
- Non fibre migration
- Thermal welded construction
- FDA approved filters
- End connections to fit all standard housings

Technical specification:

Sizes: 10", 20",30"40" long
Micron rating: 0.1, 0.2, 0.45, 1, 5, 10, 20 microns
Outer diameter: 69mm
Inner diameter: 28 mm

Construction

- Filter media: 100 % melt blown micro denier polypropylene fiber
- Support media: polypropylene fiber
- Inner core: high strength polypropylene
- Outer core: high strength polypropylene
- End caps: high strength polypropylene
- Oring/gaskets: epdm/buna n/ silicone/viton

Application

The filters are applicable to:

- Fine chemicals and pharmaceuticals
- Photographic film and paper
- Beverages
- Electronic and semi-conductors

PTFE cartridge

The PTFE cartridges are made of poly tetrafluroethylene. PTFE are characterised by high chemical inertness. These are specifically designed for sterile filtration applications of air and gas streams. They are certified be bio safe, non-pyrogenic and fully validated to pharmaceutical standard. The PTFE cartridge membrane is used in filtering the highly corrosive solutions such as strong such as strong

acids, bases solution and solvents. The membrane has about 80-95% porosity and uniform pore size distribution. Moreover, the filtration area of each cartridge is as high as 0.7m2. Therefore it offers high flow rate, low pressure drop and long service life. These can be steam sterilise direct or reverse as per standard operating data.

Features and benefits

The main features include:

- PTFE membrane has excellent chemical resistance.
- End caps and connectors are sealed by thermal bond, free binder.
- Low pressure drop and high flow rate due to high filtration area of 0.7m2 per 10" cartridge.
- Inherently hydrophobic expanded PTFE micro porous membrane for broad chemical compatibility to prevent moisture obstruction in venting and wet air filtration.
- Absolute rated and precisely controlled pore size distribution for superior and constant bacterial retention.
- Autoclave or in situ team sterilisation features.
- Integrity test is possible.
- FDA approved.

Technical specification

Sizes: 10", 20", 30"40" long
Micron rating: 0.05, 0.1, 0.2, 0.45, 1 micron
Filtration area: More than 0.7m2 per 10" cartridge
Outer diameter: 69mm
Inner diameter: 28mm

Application

The cartridges are suitable for sterilisation of inlet and exhaust flow, acid/solvents and base filtration, wet etching process, fine filtration of di-water and photoelectron chemical filtration.

PES (poly ether sulphone) cartridge

PES cartridges are made of poly ethersulphone with uniform pore distribution to ensure maximum performance in bacterial retentions. Its' upstream and down stream polyester support ensure resistance to pressure shocks. Polyethersulphone membrane is hydrophilic in nature and allows easy integrity testing for all applications where daily controls are required. The membrane possesses broad chemical compatibilities and contains no surfactants. PES cartridges are produced in controlled environments and under stringent production conditions that ensure filter quality cleanness. Their assembly is performed integrally by thermo-welding. This process minimises the presence of oxidisation of substance and yield a durable filter cartridges suitable for extended use. This can be sanitised by chemical agents or by inline steaming. PES and polypropylene, the two unique materials used in cartridge manufacturing, are chemically inert, non-shedding and biologically safe. The filtration area of each cartridge is as high as 0.56m2. Therefore it offers high flow rate, low pressure drop PES and PTFE cartridge and long service life.

Features and benefits

- PES membrane is inherently hydrophilic with excellent hydrolytic stability and chemical compatibility
- Specific pore size distribution for full bacterial retention to assure sterile effluent even under process upsets
- End caps and connectors are sealed by thermal bond, free binder
- Low pressure drop and high flow rate due to high filtration area of 0.56m2 per 10" cartridge
- Absolute rated
- Autoclave or in situ team sterilisation features
- Integrity test is possible
- FDA approved

Technical specification

Sizes: 10", 20", 30"40" long
Micron rating: 0.1, 0.2, 0.45, 1 micron
Filtration area: More than 0.56 m2 per 10" cartridge
Outer diameter: 69 mm Inner
diameter: 28 mm

Construction

- Filter media: PES (poly ether sulphone) membrane
- Support media:polyester fibre

- Inner core: high strength polypropylene
- Outer core: high strength polypropylene
- End caps: high strength polypropylene
- O ring/gaskets:epdm/buna n / silicone / viton

Application

The PES cartridges are best suitable for pharmaceuticals, food and beverages and di-water filtration.

Stainless steel cartridges

Filter concept's stainless steel cartridges are designed to overcome the temperature and chemical compatibility limitations of fabric or synthetic fibre media. This offers high temperature resistance and can withstand high differential pressure. Stainless steel cartridges are offered in SS 304, SS 316, and SS 316 l material. These elements can be plain cylindrical or pleated configuration to increase filtration area. Normally all stainless steel pleated and cylindrical filters are supported with coarser filter media to ensure any direct damages to main filtering media under process upsets. A bubble point tests can be done to certify that no opening larger than the specified pore size exist in product joints or seams. No media migration due to stainless steel material. These elements can be back washed and reused.

Type of filters

Stainless steel cartridges include:

- Stainless steel wire mesh type
- Stainless steel sintered metal type
- Stainless steel random fibre/sintered metal fibre type

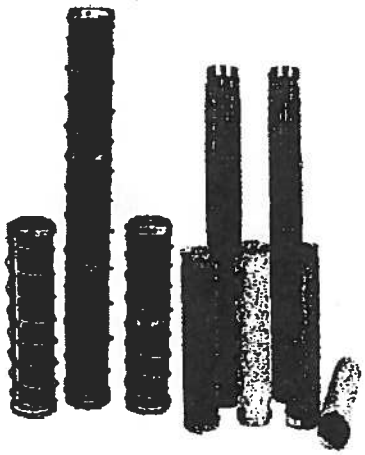
Features and benefits

The features and benefits of these cartridges include:

- Stable pore PES
- High permeability
- Low pressure drop
- High dirt-holding capacity (longer lifetime)
- High temperature resistance
- High differential pressure with stand capacity
- Strong corrosion resistant
- Back flushing
- Excellent mechanical strength
- No media migration
- Size customisation

Construction of sintered material

The composite fibre material is sintered together with a wire mesh under vacuum conditions and rolled to mats of a specific thickness. Stainless cartridge can be wrought into tubes, cartridges or disks, plain, pleated or according to customer requests.



Stainless steel cartridges

Technical specification

Standard sizes: 10", 20", 30"40" long Micron rating: 0.5, 1, 3, 5,10, 20, 25, 50 Standard outside: 64 mm diameter Inner diameter: 28 mm

Application

The stainless steel cartridges are utilised for catalyst recovery in petrochemical/ chemical industries, polymer filtration, cross flow filtration, aerosol application, RO pre filtration etc.

Oil-adsorbing cartridge

Modified cellulose-based filter material chemically bond specifically with hydrocarbons and other pollutants such as dissolved and dispersed oils from water instantaneous adsorption. These are more effective than activated carbon. 90% of the total hydrocarbons are removed in a single pass for use in 20-inch jumbo filter housing.

Features and benefits

The main features include:

- Instantaneous adsorption
- Removes dissolved and dispersed oils. High efficiency removal of oils or glycol
- Typically, over 90% of total hydrocarbons are removed in a single pass through the cartridge with no release once adsorbed
- Lower outlet levels of hydrocarbons can be achieved by connecting cartridges in series
- Higher flow rates also can be achieved by connecting cartridges in parallel
- Connecting two or three cartridges in series, filter concept inc.

Oil adsorbing cartridges are made from modified cellulose-based filter media is processed into sheets and assembled into cartridges for use in standard 20" big blue filter housing

Applications

The main applications include:

- Gas and oil facilities
- Leisure/commercial shipping bilge water
- Surface water run off (truck stops, airports)
- Auto service stations
- Machine shops
- Industrial processes
- Factories and repair shops
- Car and truck washes

About the Author

The author, Mehul Panchal is the CEO of M/S Filter Concept Inc. He has specialty in application analysis of filtration technology. He can be contacted on filterconcept@sify.com
info@filter-concept.com.