

Appendix R

Environmental Monitoring Plan

Environmental Monitoring and Maintenance Plan

Vernon County Landfill

Viroqua, Wisconsin

VERSW 167824 | August 23, 2023



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Environmental Monitoring and Maintenance Plan

Vernon County Landfill

Prepared for Vernon County, Wisconsin

1 Introduction

This plan summarizes the environmental monitoring program and maintenance requirements for the Vernon County Landfill.

The Vernon County Landfill is a 250-acres parcel located in the Town of Viroqua, Wisconsin. The site is located in Section 15, T13N, R4W, City of Viroqua, Vernon County, Wisconsin. The site is owned by Vernon County and has been operating since 1993. The integrated waste management system includes, but is not limited to:

- An approximate 10-acre municipal solid waste landfill, with an approximate design capacity of 590,000 cubic yards (WDNR License No. 3268).
- A closed small sized (50,000 cubic yard) C&D Landfill (WDNR License No. 3712).
- A recyclable material processing and baling facility.

Figure 1, “Environmental Monitoring Plan” shows existing facility layout of the Landfill. The monitoring requirements summarized in this plan are based on the requirements outlined in Wisconsin Department of Natural Resources (WDNR) site approvals.

2 Groundwater Monitoring Well Sampling

The groundwater monitoring requirements for the Landfill are summarized within **Table 1**. Groundwater sampling and decontamination procedures will follow guidelines established by the WDNR. Groundwater samples will be collected at the frequency specified by WDNR plan approvals. Groundwater sampling involves the preparation of the groundwater monitoring wells for sampling, the collection of representative groundwater samples, analysis of the groundwater samples, comparison of the analytical results to the applicable groundwater standards, and reporting of the results to the WDNR Groundwater Environmental Monitoring Database (GEMS). Well Information Forms (WIFs) are found in **Appendix A**. The sampling procedures are outlined below:

- All sampling preparation is completed by the sampling team prior to sampling event.
- Measure water elevation: Measure the distance from the top of the monitoring well casing to the top of groundwater in the well to the nearest hundredth (0.01) of a foot, using an electronic water level indicator. Subtract the measured distance from the elevation of the top of the well casing to obtain groundwater elevation. The well casing is referenced to USGS elevation. The measurements are recorded on the field form.

- As necessary, pumps will be pulled that interfere with obtaining accurate water levels. This procedure may need to be completed 1-2 days before a water level measurement can be taken to stabilize water level in the well.
- Well Purging and Field Measurements: Wells are purged using dedicated pumps or a portable pump, decontaminated prior to use. Four well volumes of water or the amount of water to purge the well dry is removed from each well before sampling. The amount of water purged is recorded on the field form. Field tests for specific conductance, temperature, and pH are performed on an unfiltered sample in the field. The appropriate meters are used for measurements. Also, the presence of any color, turbidity, or odor in the sample is noted on the field form.
- Collect Sample: Collect the necessary sample from the monitoring well after the required volume of water has been purged. If the well is purged dry, wait for the well to recharge sufficiently to allow removal of an adequate sample volume. Typically, the volatile organic compound (VOC) samples are collected first at the wellhead, immediately upon removal of the sample from the well. Appropriate samples for indicator parameters and metals are filtered through a 0.45-micron membrane. The samples are then preserved as outlined in **Table 2**, "Analytical Parameters, Methods, and Preservatives." All samples are stored at 4° C.
- Calibration: Field measurement meters are to be calibrated daily according to manufacturer's instructions. Calibrations are to be recorded in field form or field book format.
- Equipment decontamination: All equipment used for sampling, except for dedicated well pumps and tubing, is cleaned between wells by triple rinsing with distilled/deionized water to prevent cross-contamination.
- The volume of sample needed is determined by the laboratory and is relative to the parameters being tested. Sample volume, bottle type, and preservative type listed on **Table 2** are recorded on the chain-of-custody form at the completion of each sampling event.
- Chain-of-Custody: The samples are maintained under chain-of-custody procedures throughout the sampling event. The field sampler is responsible for care, custody, and transportation of the samples to the WDNR certified laboratory.

To evaluate data quality, one duplicate groundwater sample is typically collected for each group of 10 samples. These samples are typically collected from wells which are downgradient of the facility. Field/equipment blanks will be collected and transported during groundwater sampling to evaluate decontamination procedures. One field/equipment blank for each group of 10 samples is to be collected. The field/equipment blanks are typically collected after sampling of a downgradient well. One trip blank for VOCs per cooler is to be initiated at the laboratory and transported with the sample bottles. All samples are tracked on the chain-of-custody forms.

The list of groundwater wells and parameters for the Landfill are provided on **Table 1**. The locations of groundwater wells for the Landfill are shown on **Figure 1**.

Analytical parameters will be analyzed by the laboratory in accordance with methods in the latest edition of Test Methods for Evaluating Solid Waste Physical/Chemical Methods SW 846. The parameters, analytical methods, and appropriate preservatives for the detection monitoring parameters are listed in **Table 2** and Wis. Admin. Code NR 507 Appendix I, Table 3.

Groundwater quality analyses results are provided by the laboratory in both electronic and hard copy format. The electronic data is uploaded into a data management system and reported electronically to WDNR-GEMS by the County's landfill consultant. Analytical results are reported with the limit of detection (LOD) and the limit of quantification (LOQ) for each parameter. If a substance is detected below the limit of quantification, the detected value is reported with the appropriate qualifier.

Groundwater laboratory analytical and field data are reported to WDNR-GEMS semi-annually in January and July. The GEMS submittal will also include:

- NR 140 Exceedance Notification,
- Monthly Landfill Gas Well Data,
- Semi-Annual Perimeter Gas Probe Data,
- Leachate Discharge Quantities,
- Semi-Annual Sedimentation Basin Data,
- Environmental Monitoring Data Certification Form 4400-231 (R 1/04).

3 Private Well Monitoring

One private water supply well is present on the facility property, but it is located greater than 1,200 feet from the proposed expansion area. One private water supply well is located south of the landfill property and is also greater than 1,200 feet south of the proposed expansion area. Currently, the monitoring conducted on these wells is summarized in **Table 3**.

The procedures for sampling private water supply wells are as follows:

- Flush the system from private wells as close to the pump as possible and before the water softener, water heater, or pressure tank, if possible. Purge and sample only from the cold water ports. If it is not possible to collect a sample before treatment, note this on the field form. There is usually a sample tap just prior to entering the pressure tank.
 - Remove aerators, filters, or other devices from the sample tap before taking a sample.
 - If the sample must be taken from an outside tap, remove any hoses before taking a sample.
 - If the sample is collected on the well side of the pressure tank, make sure the pump is running and allow the water to run from the tap for at least ten minutes or four pump cycles prior to sample collection. Ensure the flowing water is cold before sampling.
 - If the sample is collected on the plumbing side of the pressure tank, allow the water to run at least 20 minutes prior to sample collection to flush out water in the pressure tank and cycle the water pump. For large pressure tanks, calculate the necessary flushing time based on pressure tank volume and flow rate. Ensure the flowing water is cold before sampling.
 - If not purging from sampling port, purge water supply line to sampling port to ensure a fresh representative sample is collected. Ensure the flowing water is cold before sampling.
 - Make every effort possible to reduce the amount of aeration of the sample by filling the sample container with the least amount of turbulence. If the sample port has any aeration screen or strainer filter or other device remove it prior to sampling.
 - Reduce the water flow to a thin stream before collecting sample for VOCs.
-

- Do not filter samples taken from water supply wells. Sample directly into sample containers. Sample order should be:
 - preserved vials
 - unpreserved vials
 - preserved glass bottles
 - unpreserved glass bottles
 - preserved plastic bottles
 - unpreserved plastic bottles
- Make every effort to reduce any possible sources of contamination in area of sampling port (example: remove gas containers, fertilizers, etc. from area).
- For each sampling event, the same sample port should be used.

In-field measurements, color, odor, turbidity, field pH, and field conductivity (corrected to 25° C) are performed on a separate unfiltered sample at the time of sampling. In-field measurements are recorded on the field form.

The private water supply wells are sampled for the parameters outlined in **Table 3**. Samples from private wells may use Method EPA 524.2 but must include additional VOCs on the Method 8260 list and NR 507 Appendix III list.

To evaluate drinking water data quality, one duplicate VOC drinking water sample is collected at each event. The duplicate sample is collected at the P-2 or “Williams” well whenever possible. Field/equipment blanks will be collected/transported during drinking water sampling to evaluate decontamination procedures. One trip blank for VOCs per cooler will be initiated at the laboratory and transported with the sample bottles. All samples are tracked on the chain of custody forms.

The results are reported to WDNR-GEMS semi-annually with the environmental monitoring data for the Active MSW Landfill (License #3268).

4 Surface Water Monitoring

Surface water from the landfill flows into a sedimentation basin located southeast of the Active MSW Landfill, as shown on **Figure 1**.

A surface water sample will be collected at the inspection point (Sedimentation Basin) semi-annually for analysis of parameter identified in **Table 4**.

All analytical parameters collected semi-annually shall be collected as a grab direct immersion sample. Pond samplers, pumps, boats, hip boots, waders, and other water sampling devices may be required to collect a surface water or stormwater sample safely. A direct immersion sampling method shall be implemented for sample collection whenever possible and is described below.

- Don appropriate health and safety equipment.
 - Obtain the required sample container(s).
 - If entering the water body, always do so with as little bottom disturbance as possible and wait for the water around the planned sampling area to return to its undisturbed state (clarity) before sampling.
-

- Collect each liquid sample by slowly submerging the sample container with minimal surface disturbance. If sampling in a stream or current, make sure the open end of the sample container is pointed upstream.
- Retrieve the container from the liquid with minimal disturbance; cap and wipe the outside of the container with a towel or cloth.

The surface water monitoring results will be reported to WDNR-GEMS semi-annually with the environmental monitoring data for the Active MSW Landfill (License #3268).

5 Leachate Monitoring Program

5.1 Leachate Sampling Points

The leachate collection system for the Active MSW Landfill (License #3268), drains to leachate storage tank located near the southwest side of the property. Additional design and configuration detail information for the leachate system is located in **Appendix B**, “Leachate Figures”.

5.2 Leachate Quality

Leachate operation monitoring requirements are to be in accordance with Chapter NR 507. Monitoring requirements are summarized on **Table 5**, “Leachate and Lysimeter Monitoring Requirements.” The locations of leachate monitoring points are shown on **Figure 1**.

Grab samples are collected from the leachate storage tank (WDNR Point ID 300). A representative grab sample will be collected using a composite sampler, bailer or similar method. These samples will be collected semi-annually in the months of March and September.

During collection of the unpreserved sample, field pH and field specific conductance are to be measured. Additionally, the color, turbidity, and odor of the sample are noted. All field measurements are recorded on the field form. Leachate quantities are recorded monthly and reported semi-annually with the leachate quality data.

Reporting of the semi-annual monitoring for the landfill to the WDNR-GEMS database will be completed on a semi-annual basis.

5.3 Leachate Head

Leachate head monitoring is conducted at the Active MSW Landfill (License #3268), in accordance with the schedule outlined on **Table 5**. **Figure 1** shows the location of the leachate head monitoring wells for the above reference sites.

A Plan modification was submitted to the WDNR on October 2, 2020, proposing the revised leachate monitoring system that is summarized on **Table 5**. This modification proposed to monitor leachate cleanout location CO-3S, CO-7S, CO-3N, and CO-6N instead of damaged or missing leachate wells LHW-1, LHW-2, LHW-3, and LHW-4. This proposed plan modification was approved by the WDNR in a letter dated February 9, 2021.

When measuring the liquid elevation at the leachate cleanouts, the elevation must be adjusted by 18-inches to reflect leachate head elevation on the liner versus the leachate collection trend. Leachate quantities pumped are recorded monthly with the leachate quality data. Reporting leachate head volumes for Active MSW Landfill (License #3268) to WDNR-GEMS database is included in the semi-annual GEMS submittal.

6 Landfill Gas Monitoring

The landfill gas (LFG) monitoring network consists of LFG monitoring probes located on the perimeter of the Active MSW Landfill (License #3268). The location of LFG probes are shown on **Figure 1**.

6.1 LFG Monitoring

LFG probe monitoring is conducted in accordance with the Plan of Operation as specified on **Table 6**, “Landfill Gas Monitoring”. Gas probes will be monitored using a handheld combustible gas meter, i.e., LANDTEC GEM 5000. Each probe will be monitored semi-annually for percent methane and percent oxygen. Site conditions will also be required at the time of gas monitoring which includes monitoring of ambient temperature, barometric pressure, barometric pressure trend, and ground surface conditions. The data results from LFG probes are reported to the WDNR semi-annually. The location of LFG monitoring points are shown on **Figure 1**, “LFG Monitoring Plan.”

Once final closure occurs, the LFG produced by the Active MSW Landfill (License #3268) will be extracted and conveyed to a blower and flare system. Future LFG extraction monitoring is summarized on **Table 7**, “Landfill Gas Extraction System Monitoring Requirements”. Data will be collected from the LFG extraction blower twice monthly while it is operating. The blower inlet, blower outlet, and flare data are reported under WDNR Point ID 400 through 402, respectively. The data results from the LFG extraction points will be reported to the WDNR semi-annually.

7 Inspection and Maintenance Requirements

The Landfill Operations Coordinator, or designee, conducts daily, weekly, and monthly of all active and closed landfill areas. Inspection and maintenance requirements for the Landfill are shown on **Table 8**, “Inspection and Maintenance Requirements.” Results of the inspections are documented on inspection logs and retained by the Landfill Operations coordinator.

The inspections will include but not be limited to review of the following:

- Site Conditions shall be noted for:
 - Weather conditions and station data.
 - Dust/Water application volume.
 - Odors.
 - Intermediate and final cover shall be inspected, and observations of the following noted:
 - Growth of vegetation and presence of any bare spots.
 - Erosion of the waste slope and/or intermediate cover.
 - Sloughing or slumping of the waste face or intermediate cover.
 - Presence of any leachate seeps.
 - Evidence of gas leakage through the cover.
 - Leachate management system shall be checked for:
 - Leachate extraction wells working.
 - Building inspection.
 - Integrity of the leachate transfer piping.
-

- Sedimentation/clogging in the leachate manhole.
 - Proper operation of the leachate pump including manufacturer's recommended periodic maintenance.
 - SCADA and leachate totals.
- Surface water management structures shall be checked for:
 - Integrity of surface water and erosion control devices.
 - Siltation or sedimentation in surface water conveyance structure.
 - Erosion in and/or around surface water conveyance structure.
- Operating gas and leachate management system on the Landfill shall be:
 - SCADA and gas monitor operation and calibration.
 - LFG quality measurements.

The Landfill Operations Manager, or designee, shall take action within 48 hours to correct any deficiency on any of the listed structures. The corrective action shall return the damage structure to its original condition or better.

Tables

Table 1 – Groundwater Monitoring Requirements

Table 2 – Analytical Parameters, Methods, and Preservatives

Table 3 – Private Water Supply Well Monitoring

Table 4 – Surface Water Monitoring

Table 5 – Leachate and Lysimeter Monitoring Requirements

Table 6 – Landfill Gas Probe Monitoring

Table 7 – Landfill Gas Extraction System Monitoring Requirements

Table 8 – Inspection and Maintenance Requirements

Table 1
Groundwater Monitoring Requirements
Vernon County Landfill (License # 3268)

WELL ID	DNR ID	Grid Location		GW Elevation 04189	Odor 00001	Color 00002	Turbidity 00003	Field Temp. 00010	Field Conductivity 00094	Field pH 00400	Chloride 00940	Total Hardness 22413	Alkalinity 39036	Dissolved Iron 74010	VOCs ¹
		Northing	Easting												
MW-1	101	1745979.0	582815.9	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-1R	120	1745703.8	582940.9	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-1P	102	1745957.4	582809.9	SA	SA	SA	SA	SA	SA	SA	--	--	--	--	--
MW-1RZ	123	1745693.7	582922.0	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-1PR ²	121	1745694.9	582942.0	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-2	103	1745492.1	583625.4	SA	SA	SA	SA	SA	SA	SA	--	--	--	--	--
MW-2P	104	1745476.6	583625.5	SA	SA	SA	SA	SA	SA	SA	--	--	--	--	--
MW-3	105	1746427.5	584086.5	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-4P	107	1746438.4	584086.3	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-5 ³	108	1746588.2	583468.0	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-5A ^{2,3}	109	1746571.9	583467.9	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-6	110	1746417.5	584086.7	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-7	111	1745887.8	583843.8	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-8R	112	1745874.2	583837.0	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-9 ²	113	1745892.3	583858.6	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-10	114	1746433.2	582822.1	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-11	115	1746432.0	582806.2	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-12 ²	116	1746413.0	582806.6	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-13P	117	1746035.6	582910.5	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-14 ³	118	1746475.7	583881.3	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-14Z ³	119	1746488.0	583867.0	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-14WT	125	1746693.1	583964.8	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-15WT	127	1746728.6	583598.0	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-16WT ²	129	1746673.4	583157.4	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-16	131	1746669.7	583147.8	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-17WT2	133	1746684.9	582907.9	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-5R ⁴	TBD	Future	Future	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A
MW-5AR ^{2,4}	TBD	Future	Future	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-14R ⁴	TBD	Future	Future	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A

SA = Semi Annual Monitoring (March and September).

A= Annual Monitoring (September).

1. VOCs within ch. NR 507, Appendix III, including acetone, carbon disulfide, methyl ethyl ketone, and tetrahydrofuran.

2. Subtitle "D" Wells.

3. Well will need to be abandoned during proposed expansion construction. Sampling will occur until well is abandoned.

4. Proposed replacement monitoring wells to be installed when exisiting monitoring wells MW-5, MW-5A, MW-14, and MW-14Z are abandoned due to proposed expansion construction.

Table 2
Analytical Parameters, Methods, and Preservatives
Vernon County Landfill (License # 3268)

Parameter	Minimum Sample Size	Container	Preservative ¹	Method
Volatile Organic Compounds	120 ml	GV40T	HCL	EPA 8021, 8260
Alkalinity	100 ml	P or G	---	EPA 310.2
Antimony	250 ml	P or G	HNO ₃ , pH <2	EPA 200.9
Arsenic	250 ml	P or G	HNO ₃ , pH <2	EPA 200.9
Barium	250 ml	P or G	HNO ₃ , pH <2	EPA 6010
Beryllium	250 ml	P or G	HNO ₃ , pH <2	EPA 6010
Biochemical Oxygen Demand (BOD)	100 ml	P or G	---	SM5210B
Boron	250 ml	P or G	HNO ₃ , pH <2	EPA 6020
Cadmium	250 ml	P or G	HNO ₃ , pH <2	EPA 6020
Chemical Oxygen Demand (COD)	50 ml	P or G	HNO ₃ , pH <2	EPA 410.4, 5220B
Chloride	50 ml	P or G	---	EPA 300.0
Chromium	250 ml	P or G	HNO ₃ , pH <2	EPA 6010
Cobalt	250 ml	P or G	HNO ₃ , pH <2	EPA 6010
Color	---	---	---	---
Conductivity (Field)	---	---	---	---
Copper	250 ml	P or G	HNO ₃ , pH <2	EPA 6010
Fluoride	250 ml	P or G	---	EPA 340.2
Groundwater Elevation	---	---	---	---
Hardness	50 ml	P or G	---	EPA 6010
Iron	250 ml	P or G	HNO ₃ , pH <2	EPA 6010
Lead	250 ml	P or G	HNO ₃ , pH <2	EPA 6020
Manganese	250 ml	P or G	HNO ₃ , pH <2	EPA 6010
Mercury	50 ml	P or G	HNO ₃ , pH <2	EPA 245.1
Nickel	250 ml	P or G	HNO ₃ , pH <2	EPA 6010
Nitrate + Nitrite (NO ₃ +NO ₂)	50 ml	P or G	---	EPA 3531
Odor	---	---	---	---
pH (Field)	---	---	---	---
Selenium	250 ml	P or G	HNO ₃ , pH <2	EPA 6020
Silver	250 ml	P or G	HNO ₃ , pH <2	EPA 6010
Sodium	250 ml	P or G	HNO ₃ , pH <2	EPA 200.7
Sulfate	250 ml	P or G	---	EPA 300.0
Temperature (Field)	---	---	---	EPA 170.1, 2550 B
Thallium	250 ml	P or G	HNO ₃ , pH <2	EPA 200.9
Total Kjeldahl Nitrogen	250 ml	P or G	H ₂ SO ₄ , pH <2	SM 4500-NH ₃ E
Total Suspended Solids	250 ml	P or G	---	USGS I-3765
Turbidity	---	---	---	---
Vanadium	250 ml	P or G	HNO ₃ , pH <2	EPA 6010
Zinc	250 ml	P or G	HNO ₃ , pH <2	EPA 6010

1. All samples must be cooled to 4 C.
GV 40T - 40 ml glass vial with teflon cap
G = Glass
P = Plastic

Table 3
Private Water Supply Well Monitoring
Vernon County Landfill (License # 3268)

Private Water Supply WELL ID	DNR ID	Color 00002	Odor 00001	Turbidity 00003	Field Temp. 00010	Field pH 00400	Field Conductivity 00094	Alkalinity, total 39036	Total Hardness 22413	Chloride 00940	VOCs ¹
Facility Well (P-1)	201	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Williams Well (P-2)	202	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA

SA = Semi Annual Monitoring (March and September).

1. Samples from private wells may use Method EPA 524.2, but must include additional VOCs on Method EPA 8260 list and NR507 Appendix III list.

Table 4
Surface Water Monitoring
Vernon County Landfill (License # 3268)

Sample Point	DNR ID	Surface Water Elevation 99520	Dissolved Oxygen 299	Odor 00001	Color 00002	Turbidity 00003	Field Temp. 00010	Field Cond 00094	Field pH 00400	Total Alkalinity 00410	Chloride 00940	Total Iron 74010	Filtered Nitrate 00620	Total Phosphorous 00665	Total Hardness 00900
Sedimentation Basin	502	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
SA = Semi Annual Monitoring (March and September).															

Table 5
Leachate and Lysimeter Monitoring Requirement
Vernon County Landfill (License # 3268)

[illegible]

1. VOCs within ch. NR 507, Appendix III, including acetone, carbon disulfide, methyl ethyl ketone, and tetrahydrofuran.

2. SVOCs within ch. NR 507, Appendix IV.

3. To be abandoned during proposed expansion construction. Sampling will occur until location is abandoned.

SA - Semiannually

A - Annually

Table 6
Landfill Gas Probe Monitoring
Vernon County Landfill (License # 3268)

Sample Point	DNR #	Grid Location		Gas Quality		Field Temperature F	Barometric Pressure mm of HG	Barometric Pressure Trend	Ground Surface Condition
				Methane %	Oxygen %				
		Northing	Easting	85547	85550	46388	00025	46381	
Reported under Active MSW Landfill (License #3253)									
GP-1	460	1745680.9	583357.5	Q	Q	Q	Q	Q	--
GP-2R	463	1745951.2	583821.3	Q	Q	Q	Q	Q	--
GP-3	464	1746000.7	582918.3	Q	Q	Q	Q	Q	--
GP-4	TBD	Future	Future	Q	Q	Q	Q	Q	--
Q = Quarterly Monitoring (March, June, September, and December).									

Table 7
Landfill Gas Extraction System Monitoring Requirements
Vernon County Landfill (License # 3268)

Sample Point	DNR ID #	Coordinates		Gas Quality				Vacuum " H2O 46390	Pressure 46382	Header Pressure " H2O 46382	Field Temperature F 46388	Flow Rate 46386
				Carbon Dioxide %	Methane %	Nitrogen %	Oxygen %					
		Northing	Easting	85544	85547	99181	85550					
Blower Inlet	400	Future	Future	Mx2	Mx2	Mx2	Mx2	Mx2	Mx2	--	Mx2	Mx2
Blower Outlet	401	Future	Future	Mx2	Mx2	Mx2	Mx2	Mx2	Mx2	--	Mx2	Mx2
Flare	402	Future	Future	--	--	--	--	--	--	Mx2	--	Mx2
GW-1	410	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-2	412	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-3	414	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-4	416	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-5	418	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-6	420	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-7	422	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-8	424	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-9	426	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-10	428	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-11	430	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-12	TBD	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-13	TBD	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-14	TBD	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
GW-15	TBD	Future	Future	--	Q	--	Q	--	--	Q	Q	Q
Mx2 = Twice Monthly M = Monthly Q = Quarterly A = Annually 1. Required at the time of any gas monitoring.												

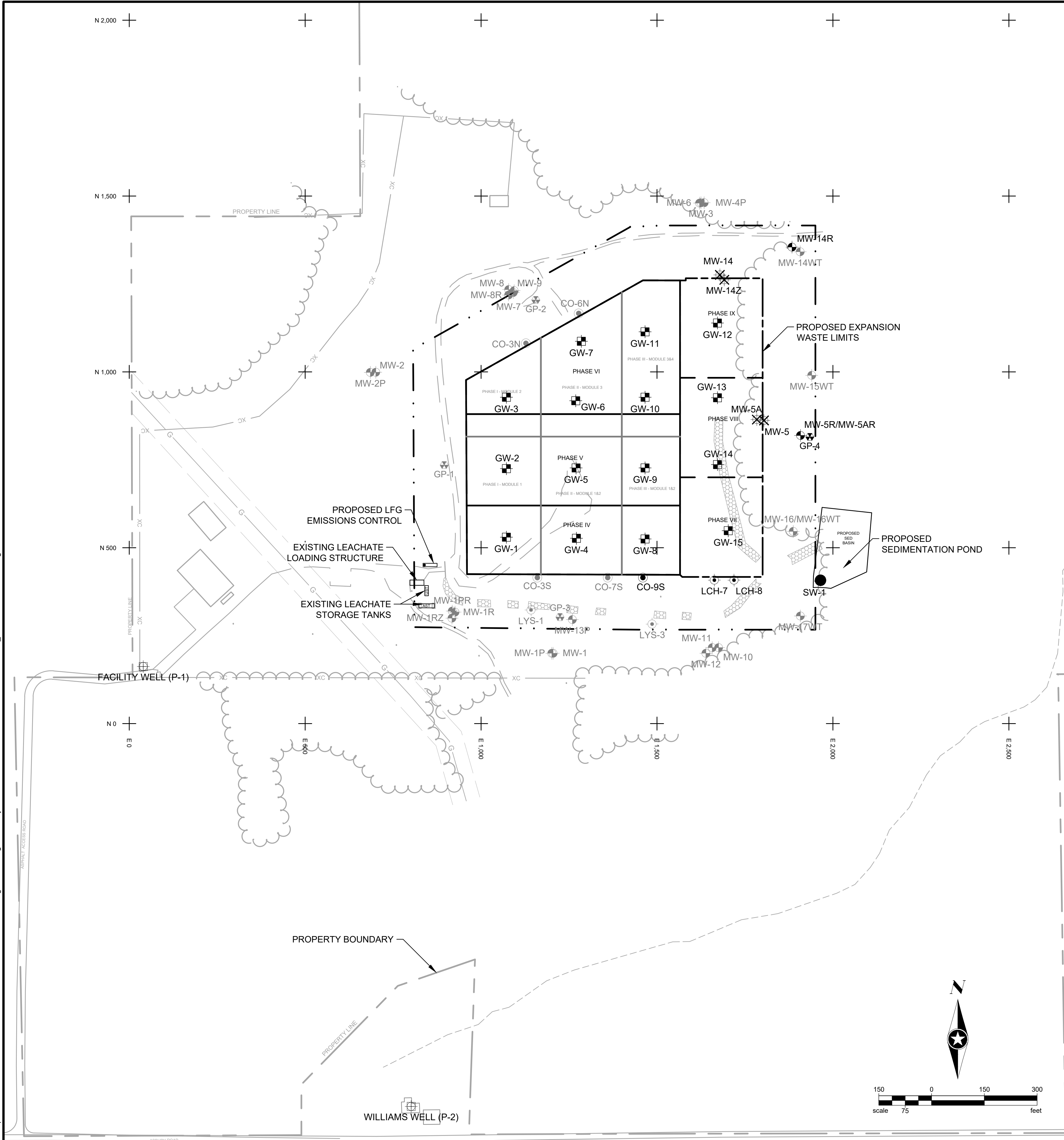
Table 8
Inspection and Maintenance Requirements
Vernon County Landfill (License # 3268)

Location	Inspection Schedule	Maintenance Schedule
Cover Vegetation	Semi-Annually	Maintain Healthy Vegetative Growth, Repair as Necessary
Cover Vegetation	Annually	Mow Cover
Runoff Control Strcutres	Semi-Annually	Inspect for Erosion and Sedimentation, Repair as Necessary
Cap Settlement	Semi-Annually	Check for Cap Settlement, Repair as Necessary
Road Repair	Semi-Annually	Inspect Roads, Repair as Necessary
Gas Extraction System	Monthly	Inspect Wells, Blower, Piping, etc.
Leachate Collection System	Semi-Annually	Inspect Lift Station, Pumps, Tank, Loading Structure, Cleanout Riser, etc.
Leachate Collection System	Annually	Clean out Leachate Lines
Lysimeters	Semi-Annually	Inspect Sampling Ports and Manholes
Groundwater Monitoring Wells	Semi-Annually	Inspect Surface Seal, Protective Casing/Cover, Lock, Well Casing, Labels, Cap, Bailer Fit, etc.
Groundwater Monitoring Wells	Annually	Measure Well Depth
M = Monthly A = Annually		
SA - Semi-Annually		

Figures

Figure 1 – Environmental Monitoring Plan

Save: 8/30/2023 1:24 PM npterson Plot: 01/12/2023 10:29 AM X:\UZ\IVERSW\167824\5-final-dgn\51-drawings\85-HeavyCw\FEASIBILITY STUDY\SHSHEET\SV\G167824\FG1_ENVIRO MON PLAN.dwg



LEGEND:

EXISTING:

- MW-15WT
- FACILITY WELL (P-1)
- LHW-5
- CO-3N
- LYS-1
- GP-3

- GROUNDWATER MONITORING WELL
- PRIVATE GROUNDWATER WELL
- LEACHATE HEAD WELL
- CLEANOUT (HEAD WELL)
- LYSIMETER

PROPOSED:

- MW-X
- MW-5
- LHW-7
- GP-4
- GW-15
- SW-1

- GROUNDWATER MONITORING WELL
- GROUNDWATER MONITORING WELL (TO BE ABANDONED)
- LEACHATE HEAD WELL
- GAS PROBE
- LANDFILL GAS MONITORING/EXTRACTION WELL
- SURFACE WATER SAMPLING LOCATION

GENERAL:

- 150-FT DESIGN MANAGEMENT ZONE (DMZ)
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING APPROVED WASTE LIMITS
- PROPOSED EXPANSION WASTE LIMITS
- PROPOSED SEDIMENTATION BASIN LIMITS
- PROPOSED FLARE LOCATION
- EXISTING LEACHATE STORAGE TANK

LFG Monitoring			
Monitoring Points	Parameters	Sample Interval	
Existing Gas Monitoring Wells GP-1 GP-2R GP-3	% Methane	Q	March, June, September, and December
	% Oxygen	Q	
	Field Temperature	Q	
	Barometric Pressure	Q	
	Barometric Pressure Trend	Q	
Proposed Gas Monitoring Wells GP-4	% Methane	Q	March, June, September, and December
	% Oxygen	Q	
	Field Temperature	Q	
	Barometric Pressure	Q	
	Barometric Pressure Trend	Q	
Proposed LFG Extraction Wells GW-1 GW-6 GW-12 GW-2 GW-7 GW-13 GW-3 GW-8 GW-14 GW-4 GW-9 GW-15 GW-5 GW-10 GW-15 GW-4 GW-11	Header Pressure in Water Column	M	March, June, September, and December
	% Methane	Q	
	% Oxygen	Q	
	Field Temperature	Q	
	Flow Rate	Q	
Proposed LFG System Blower Inlet Blower Outlet	% Methane	Mx2	Twice Monthly
	% Oxygen	Mx2	
	% Carbon Dioxide	Mx2	
	% Nitrogen	Mx2	
	Vacuum (in H2O)	Mx2	
	Pressure	Mx2	
	Field Temperature	Mx2	
	Flow Rate	Mx2	
Flare	Head Pressure (in H2O)	Mx2	Twice Monthly
	Flow Rate	Mx2	

Operation and Maintenance Activities		
Location	Inspection Schedule	Maintenance Schedule
Cover Vegetation	Semi-Annually	Maintain Healthy Vegetative Growth, Repair as Necessary
Cover Vegetation	Annually	Mow Cover
Runoff Control Structures	Semi-Annually	Inspect for Erosion and Sedimentation, Repair as Necessary
Cap Settlement	Semi-Annually	Check for Cap Settlement, Repair as Necessary
Road Repair	Semi-Annually	Inspect Roads, Repair as Necessary
Gas Extraction System	Monthly	Inspect Wells, Blower, Piping, etc.
Leachate Collection System	Semi-Annually	Inspect Lift Station, Pumps, Tank, Loading Structure, Cleanout Riser, etc.
Leachate Collection System	Annually	Clean out Leachate Lines
Lysimeters	Semi-Annually	Inspect Sampling Ports and Manholes
Groundwater Monitoring Wells	Semi-Annually	Inspect Surface Seal, Protective Casing/Cover, Lock, Well Casing, Labels, Cap, Bailor Fit, etc.
Groundwater Monitoring Wells	Annually	Measure Well Depth

Groundwater Monitoring Wells/Piezometers				
Well ID		Parameters		Sample Interval
Existing Wells		Groundwater Elevation	SA	March & September
MW-1	MW-6	Field pH	SA	
MW-1R	MW-7	Field Conductivity	SA	
MW-1RZ	MW-8R	Field Temperature	SA	
MW-3	MW-10	Diss. Alkalinity	SA	
MW-4P	MW-11	Diss. Chloride	SA	
MW-5	MW-13P	Total Hardness	SA	
		Color, Odor, Turbidity	SA	
		Dissolved Iron	SA	
		VOCs	A	
Proposed Wells ¹				September
MW-5R	MW-14R			
Existing Wells		Groundwater Elevation	SA	March & September
MW-1P	MW-2	Field pH	SA	
		Field Conductivity	SA	
		Field Temperature	SA	
		Color, Odor, Turbidity	SA	
Existing Subtitle D Wells		Groundwater Elevation	SA	March & September
MW-1PR	MW-9	Field pH	SA	
MW-5	MW-12	Field Conductivity	SA	
	MW-17WT	Field Temperature	SA	
Proposed Subtitle D Wells ¹		Diss. Alkalinity	SA	
MW-5AR		Diss. Chloride	SA	
		Total Hardness	SA	
		Color, Odor, Turbidity	SA	
		Dissolved Iron	SA	
		VOCs	SA	
Proposed to be Abandoned Wells				
MW-5	MW-14			
MW-5A				

1. Proposed replacement monitoring wells to be installed when existing monitoring wells MW-5, MW-5A, MW-14, MW-14Z are abandoned due to proposed expansion construction.

Private Wells			
Well ID	Parameters		Sample Interval
Facility Well (P-1) Williams Well (P-2)	Field pH	SA	March & September
	Field Conductivity	SA	
	Field Temperature	SA	
	Color, Odor, Turbidity	SA	
	Diss. Alkalinity	SA	
	Diss. Chloride	SA	
	Total Hardness	SA	
	VOCs	SA	

1. Proposed replacement monitoring wells to be installed when existing monitoring wells MW-5, MW-5A, MW-14, MW-14Z are abandoned due to proposed expansion construction.

Leachate				
Monitoring Points		Parameters	Sample Interval	
Leachate Head Wells		Leachate Volume Pumped	M	Monthly
CO-3S	CO-3N	LCH-5	M	
CO-7S	CO-6N	LCH-6	M	
Proposed Leachate Head Wells		Leachate Depth	M	
LCH-7	LCH-8	CO-9S		
Proposed to be Abandoned Head Wells				
LCH-5	LCH-6			
Leachate Storage Tank		Leachate Volume Pumped	M	Monthly
		BOD	SA	March & September
		Total Ammonia Nitrogen	SA	
		Field pH	SA	
		Field Conductivity	SA	
		Total Alkalinity	SA	
		Total Chloride	SA	
		Total Suspended Solids	SA	
		Total Hardness	SA	
		Total Sulfate	SA	
		Total Sodium	SA	
		Total Cadmium	SA	
		Total Iron	SA	
		Total Lead	SA	
		Total Manganese	SA	
		Total Mercury	SA	
		Total Kjeldahl Nitrogen	SA	
		Color, Odor, Turbidity	SA	
		VOCs	SA	
		SVOCs	A	

Lysimeters				
Monitoring Points		Parameters	Sample Interval	
Lys-1 Lys-3		Lysimeter Discharge (gallons)	M	Monthly
		Depth to Liquid	M	
		Liquid Elevation	SA	
		Field pH	SA	
		Field Conductivity	SA	
		Total Alkalinity	SA	
		Total Chloride	SA	
		Total Hardness	SA	
		Total Sodium	SA	
		Total Sulfate	SA	
		Total Kjeldahl Nitrogen	SA	
		Color, Odor, Turbidity	SA	
		VOCs	A	
		SVOCs	A	
Surface Water Monitoring				
Monitoring Points		Parameters	Sample Interval	
Sedimentation Basin (SW-1)		Surface Water Elevation	SA	March & September
		Dissolved Oxygen	SA	
		Field pH	SA	
		Field Conductivity	SA	
		Field Temperature	SA	
		Total Alkalinity	SA	
		Total Chloride	SA	
		Total Hardness	SA	
		Total Iron	SA	
		Filtered Nitrate	SA	
		Total Phosphorous	SA	
		Color, Odor, Turbidity	SA	

Appendix A

Well Information Forms

GROUNDWATER MONITORING WELL AND POINT INFORMATION

Form 4400-089 (R 04/19)

Page 1 of 7

Use the Groundwater Monitoring Well and Point Information Form to record identification, location and construction information for groundwater monitoring wells and any other sample "points," (e.g., gas probes, lysimeters, leachate collection systems, etc.), that are part of the environmental monitoring program. **NOTE:** Not all fields will be applicable to all point types. Only **one** coordinate reference system may be used per site. Allowable coordinate systems are listed below. (Coordinates for each system require a minimum number of digits as described below.) Local grid coordinates cannot be accepted. Identify the Coordinate Reference System, Datum and Method used.

Facility Name Vernon County MSW Landfill			County Vernon				Facility ID No. (FID) 663038310		License, Permit or Monitoring No. 3268			Date 04/11/2023		Completed By (Name and Firm) Brian Kent, SEH		
DNR Point ID No.	Point Name ¹	WUWN ² (if app.)	Type	Status	Gradient	Enf. Stds. Y/N.	Construction Date	Elevations msl (ft)		Well Casing			Well Screen Length (ft)	Well (Pt) Total Length ⁵ (ft)	Coordinates ^{6,7,8,9}	
								Ground Surface	Well Top (of casing)	Type	Diam ³ (in)	Length ⁴ (ft)			Y / Lat / Northing	X / Long / Easting
102	MW-1P		11	A			12/30/1987	1236.4	1238.41	P	2	101.1	10	111.1	1745957.3	582809.9
101	MW-1		12	A			12/30/1987	1236.4	1238.11	P	2	148.0	10	158.0	1745978.9	582815.9
121	MW-1PR		11	A			01/12/1994	1245.0	1247.61	P	2	112.7	15	127.7	1745694.8	582942.0
120	MW-1R		12	A			01/12/1994	1244.6	1247.25	P	2	149.6	15	164.6	1745703.8	582940.8
123	MW-1RZ		12	A			03/12/2003	1244.0	1245.45	P	2	181.5	5	186.5	1745693.6	582921.9
104	MW-2P		11	A			01/17/1988	1252.5	1254.88	P	2	114.8	10	124.8	1745476.5	583625.4
103	MW-2		12	A			01/17/1988	1252.5	1254.35	P	2	164.6	10	174.6	1745492.0	583625.4
105	MW-3		12	A			02/02/1988	1233.0	1235.25	P	2	175.0	5	180.0	1746427.4	584086.5
107	MW-4P		11	A			01/29/1988	1232.9	1235.19	P	2	85.0	10	95.0	1746438.4	584086.2
109	MW-5A		11	A			11/08/1989	1224.0	1225.18	P	2	88.3	15	103.3	1746571.9	583467.8
108	MW-5		12	A			02/17/1988	1223.3	1225.32	P	2	140.6	10	150.6	1746588.2	583467.9
110	MW-6		12	A			02/20/1988	1233.0	1235.37	P	2	197.2	5	202.2	1746417.4	584086.7
111	MW-7		12	A			11/07/1989	1255.7	1258.03	P	2	229.5	5	234.5	1745887.7	583843.8
112	MW-8R		12	A			11/13/1989	1256.1	1258.84	P	2	187.5	15	202.5	1745874.1	583836.9
113	MW-9		11	A			08/29/1989	1255.4	1257.50	P	2	111.8	15	126.8	1745892.2	583858.6
114	MW-10		12	A			09/15/1989	1215.6	1217.52	P	2	178.5	5	183.5	1746433.1	582822.1
115	MW-11		12	A			09/22/1989	1216.4	1218.36	P	2	147.5	15	162.5	1746431.9	582806.2
116	MW-12		11	A			09/22/1989	1216.4	1218.36	P	2	83.5	15	98.5	1746413.0	582806.6
117	MW-13P		11	A			02/26/2003	1224.5	1227.42	P	2	87.4	15	102.4	1746035.5	582910.4
118	MW-14	JX072	12	A			03/12/2003	1247.5	1249.69	P	2	171.1	15	186.1	1746475.7	583881.3
119	MW-14Z	JX073	12	A			03/07/2003	1247.5	1250.22	P	2	205.8	5	210.8	1746488.0	583866.9
125	MW-14WT	WC334	11	A			09/20/2022	1247.2	1249.70	P	2	90.0	15	105.0	1746693.0	583964.7
127	MW-15WT	WC335	11	A			09/28/2022	1220.6	1223.24	P	2	72.8	10	82.8	1746728.6	583598.0

GROUNDWATER MONITORING WELL AND POINT INFORMATION

Form 4400-089 (R 04/19)

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DNR Point ID No.	Point Name ¹	WUWN ² (if app.)	Type	Status	Gradient	Enf. Stds. Y/N.	Construction Date	Elevations msl (ft)		Well Casing			Well Screen Length (ft)	Well (Pt) Total Length ⁵ (ft)	Coordinates ^{6,7,8,9}	
								Ground Surface	Well Top (of casing)	Type	Diam ³ (in)	Length ⁴ (ft)			Y / Lat / Northing	X / Long / Easting
129	MW-16WT	WC336	11	A			09/21/2022	1184.7	1187.41	P	2	64.9	10	74.9	1746673.3	583157.3
131	MW-16	WC337	12	A			08/25/2022	1184.3	1186.92	P	2	91.9	5	96.9	1746669.6	583147.8
133	MW-17WT	WC338	11	A			09/26/2022	1196.4	1199.18	P	2	76.9	10	86.9	1746684.9	582907.9
FU046	P-1 (Facility)	201	13	A			12/10/1992			S	6					
8IW73 0	P-2 (Williams)	202	13	A			07/10/1969			S	6					
	Sedimentation Basin	502	22	A												
	Leachate Storage Tank	300	23	A											1745623.2	583001.6
	Lys-1	340	14	A											1745918.7	1745918.7
	Lys-2	341	14	A											1746103.3	582916.5
	Lys-3	342	14	A											1746261.9	582892.9
	LHW-1	310	24	P											1745934.8	583130.8
	LHW-2	314	24	P											1745941.7	583452.2
	LHW-3	318	24	P											1746129.7	583120.3
	LHW-4	322	24	P											1746077.0	583793.7
	LHW-5	326	24	A											1746365.6	583124.4
	LHW-6	330	24	A											1746372.4	583461.2
	CO-3S	331	24	A											1745938.8	583031.8
	CO-7S	332	24	A											1746138.8	583027.6
	CO-3N	333	24	A											1745920.5	583698.8
	CO-6N	334	24	A											1746072.3	583780.5
	GP-1	460	51	A											1745680.9	583357.5
	GP-2	462	51	A											1745951.2	583821.2
	GP-3	464	51	A											1746000.6	582918.3

GROUNDWATER MONITORING WELL AND POINT INFORMATION

Form 4400-089 (R 04/19)

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¹Include previous name as well if one exists. ²Wisconsin Unique Well Number. ³Well Casing Diameter measures inside diameter. ⁴Length of well casing from top of casing to top of screen. ⁵Total length of well from top of casing to bottom of well. <i>Should equal sum of well casing length and screen length.</i>	⁶Identify Coordinate Reference System (only one system may be used per site): ☐ Lat/Long (Decimal Degrees) WGS84 (min. 8 digits total w/ 6 right of decimal, e.g., -89.123456) State Plane (min. 2 digits right of decimal) ☐ North ☐ Central ☒ South ☐ Wisc. Transverse Mercator WTM91 (min. 2 digits right of decimal) ☐ Local County Coord. Sys. (WISCRS) (min. digits vary by county)	⁷Identify Projection Datum and units* ☐ NAD83 ☐ NAD27 ☐ NAD83(91) ☒ NAD83(11) ☐ Other Describe: _____ Units used for State Plane, WTM or County Coord. Sys: ☐ meters ☒ feet *NOTE: A datum and units are not required for Lat/Long	⁸Identify the Method Used to Determine the Coordinates: ☒ GPS001-Survey grade ☐ GPS003-Mapping grade/real-time differential correction ☐ GPS004-Mapping grade/post processing ☐ SRV001-Classical terrestrial surveying techniques ☐ OTH001 (Other), Describe: _____ Remarks:	⁹Y / Lat / Northing describe the vertical axis. X / Long / Easting describe the horizontal axis. (include “-“ where needed, e.g., -89.123456)
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INSTRUCTIONS FOR COMPLETING THE GROUNDWATER MONITORING WELL AND POINT INFORMATION FORM (#4400-089)

When completed, this form provides a record of information for each well or sampling point that is part of a facility's environmental monitoring program. It provides the facility or consultant with a means of presenting point information required by the Department in a consistent format. This form should be updated as new points are added to the monitoring program or new information becomes available (e.g., re-surveyed elevation for existing points).

Complete the form with the necessary information as described below:

Facility Name: Enter the name of the site or landfill.

County: Enter the county the site or landfill is located.

Facility ID Number (FID): Enter the 9-digit Facility ID (FID) assigned to the site.

License/Permit/Monitoring Number: Enter the number assigned by the Department to the facility. If unknown, leave blank.

Date: Enter the date on which the form is completed (mm/dd/yyyy).

Completed By: Enter the name and firm of person completing the form.

DNR Point ID Number: Enter the 3-digit number assigned to the point by the Department, for use by the Department.

Point Name: Enter the common name given to the point by the facility or consultant; e.g. MW-2, GP-5. If the point had a previous name, please include and identify as such.

Wisconsin Unique Well Number (WUWN): Enter the Wisconsin Unique Well Number assigned to groundwater monitoring and private wells. WUWNs are available from the Department and are to be assigned to all newly installed monitoring and private wells.

Type: Enter the Numerical code describing the type of well or sampling point. Point type codes range from 11 to 99. *See list of Point Types beginning on page 4.*

Status: Enter the status of the well using the following codes:

A	–	<u>A</u> ctively monitored point
I	–	<u>I</u> nactive point (existing point not currently being monitored)
P	–	<u>P</u> ermanently abandoned point
L	-	<u>P</u> Lanned.

INSTRUCTIONS FOR COMPLETING THE GROUNDWATER MONITORING WELL AND POINT INFORMATION FORM (#4400-089)

Gradient Position: Enter the location of the well in the groundwater flow system relative to the disposal site, spill, etc. *Use one of the six letters designated below. If gradient position is not known or does not apply to the type of point, leave blank.*

U = Up gradient

D = Down gradient

Y = Side-to-down gradient

S = Side gradient

X = Side-to-up gradient

N = Not known

Enf. Stds. Apply: Enter "Y" if enforcement standards apply at this well. Enforcement standards apply to any well beyond the **Design Management Zone (DMZ)** or the property boundary of the facility or to a water supply well. For spills, enforcement standards apply at every point at which groundwater is monitored. (For more information, see s. NR 140.22, Wis. Adm. Code.) *If the application of enforcement standards is not relevant to the type of point entered, leave blank.*

Construction Date: Enter the installation date of the point.

Elevations:

Ground Surface: The elevation, in feet, of the ground surface adjacent to the well using mean sea level (MSL) based on national geodetic vertical survey (i.e., NAVD88).

Well Top (of casing): The elevation, of the top of the well casing (not top of protective pipe), in feet using MSL based on national geodetic vertical survey (i.e., NAVD88).

Well Casing:

Type: The type of pipe used: plastic (P), steel (S), or other (O).

Diam: The inside diameter of the pipe used in the well construction, in inches.

Length: The length of the well casing from the top of the casing to the top of the screen, measured in feet.

Well Screen Length: The length of the screen measured in feet.

Well (Point) Total Length: The total length of the well (or point) from the top of the casing to the bottom of the well, measured in feet. *Should equal sum of well casing length and screen length.*

Point Coordinate Reference Systems: Only one coordinate reference system may be used on the form. Allowable coordinate systems are Lat/Long (in decimal degrees [DD] only), State Plane and Wisconsin Transverse Mercator (WTM91). County coordinate systems (WISCRS) may also be used. Local grid coordinates are *not* accepted. The field named "Y / Lat / Northing" describe the vertical axis and the field "X / Long / Easting" describe the horizontal axis.

INSTRUCTIONS FOR COMPLETING THE GROUNDWATER MONITORING WELL AND POINT INFORMATION FORM (#4400-089)

Identify the coordinate reference system used:

- Latitude/Longitude WGS84 (Decimal Degrees, minimum 8 digits total w/ 6 right of decimal)
- State Plane (min. 2 digits right of decimal):
 - North
 - Central
 - South
- Wisc. Transverse Mercator (WTM91, min. 2 digits right of decimal)
- Local County Coordinate System (aka Wisconsin Coordinate Reference System (WISCRS), minimum digits vary by county)

Identify the projection datum used (listed below) by checking the appropriate box on the bottom of the form.

NOTE: A datum is not required for Lat/Long.

- NAD83
- NAD27
- NAD83(91)
- NAD83(11)
- Other

Identify the units used, meters or feet, for State Plane, WTM or Local County Coordinate System.

Identify the method used to determine the coordinates by checking the appropriate box on the bottom of the form.
The options are:

- GPS001-Survey grade GPS
- GPS003-Mapping grade GPS with real-time differential correction
- GPS004-Mapping grade GPS with post processing differential correction
- SRV001-Classical terrestrial surveying techniques
- OTH001 (Other)

Remarks: Include any comments applicable to the submittal (e.g., Re-surveyed top of well casing elevation).

List of Point Types

- 11 (mw) Water table observation well (monitoring well screen intersecting the water table) (non-Subtitle D well)
- 12 (pz) Piezometer (monitoring well with screen sealed below the water table (non-Subtitle D well)
- 13 (pw) Private well - potable water supply
- 14 (ly) Lysimeter
- 15 (sp) Spring
- 16 (rp) Resistivity probe
- 17 (gc) Gradient control
- 18 (at) Aquifer test well
- 19 (pn) Private well-non potable
- 21 (fs) Flow or seep
- 22 (sw) Surface water
- 23 (lc) Leachate collection system
- 24 (lh) Leachate head well
- 25 (lg) Leachate and gas combo
- 26 (ew) Groundwater extraction well
- 27 (he) Horizontal groundwater extraction well

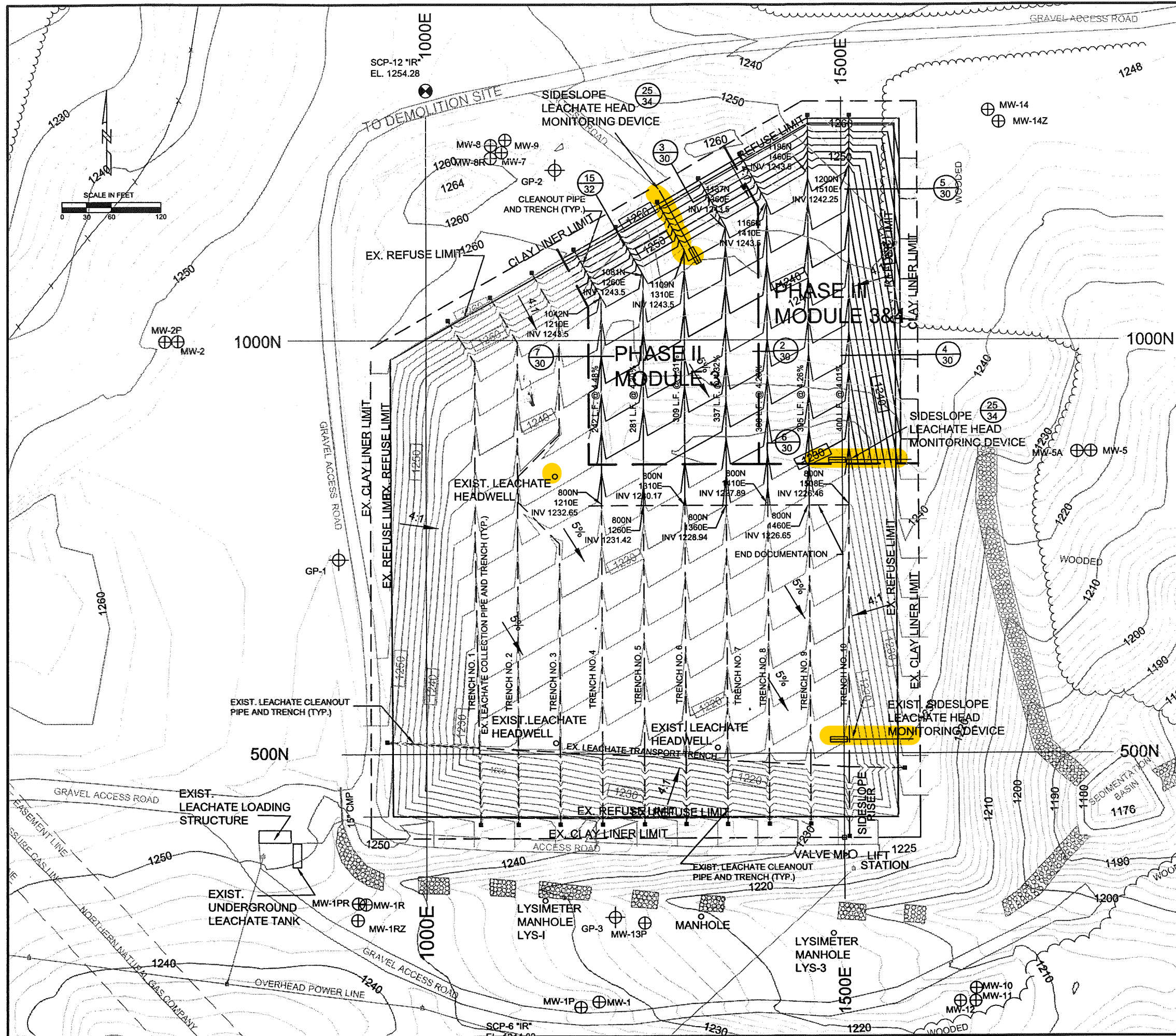
INSTRUCTIONS FOR COMPLETING THE GROUNDWATER MONITORING WELL AND POINT INFORMATION FORM (#4400-089)

- 28 (hw) Horizontal monitoring well
- 29 (ha) Horizontal vapor extraction well
- 31 (us) Upstream
- 32 (ms) Mid-site
- 33 (ds) Downstream
- 34 (ro) Run-off
- 35 (im) Impounded
- 36 (sg) Staff gauge
- 41 (tr) Treated
- 42 (pr) Pretreated
- 45 (pp) Private well primary treatment
- 46 (ps) Private well secondary treatment
- 49 (sh) Settlement hub
- 51 (gp) Gas probe
- 52 (nl) Non-landfill structure
- 53 (ge) Gas extraction system
- 54 (gu) Gas utilization or destruction
- 55 (gc) Gas condensate
- 56 (sc) Site conditions collection
- 57 (sv) Soil venting well (includes both soil vapor extraction and bioventing, includes both extraction and unsaturated zone gas phase injection wells installed in soil or fill, but not refuse)
- 58 (gm) Gas sample monitoring point
- 59 (sc) Stone column gas extraction well
- 61 (ij) Injection well (injection of liquids not gases)
- 62 (as) In situ air sparging well (injection well to inject gases into the aquifer)
- 63 (uv) Unterdruck Verdampfer Brunnen (UVB) wells (sparging wells where the gases remain in the well and are not injected into the aquifer)
- 64 (le) Groundwater and light non-aqueous phase liquid (LNAPL) extraction well
- 65 (de) Groundwater and dense non-aqueous phase liquid (DNAPL) extraction well
- 66 (ve) Vacuum enhanced groundwater extraction wells
- 67 (vi) Vacuum enhanced groundwater and LNAPL extraction well
- 68 (vd) Vacuum enhanced groundwater and DNAPL extraction well
- 71 (dw) Subtitle D water table observation well (see 11/mw)
- 72 (dp) Subtitle D piezometer (see 12/pz)
- 80 (mc) Municipal water supply well: cities, villages, and sanitary districts
- 81 (oc) Community-other-than-municipal (OTM) water supply well: mobile home parks, apartments, subdivisions, and condominium complexes
- 85 (nn) Noncommunity-Nontransient water supply well (schools, day care centers, and industries) A Noncommunity water system that regularly serves at least 25 of the same persons over 6 months per year
- 86 (tn) Noncommunity-Transient water supply well (motels, restaurants, parks, taverns, churches, and campgrounds) A Noncommunity water system that serves at least 25 people at least 60 days of the year
- 99 (ot) Other

Appendix B

Leachate Figures

J:\DRAFT\VERNON\PLAN OF OPERATION\TOTAL SITE.dwg, BASE GRADE, 2/3/2005 10:03:33 AM



LEGEND

- EXISTING EDGE OF WOODS
- EXISTING POWER POLE
- EXISTING RIPRAP
- EXISTING SURVEY CONTROL POINT
- SCP - 6
- GW - 1
- MW - 1
- EXISTING FENCE
- EXISTING CONTOURS INDEX (9/29/04)
- EXISTING CONTOURS INTERMEDIATE (9/29/04)
- EXISTING SUB-BASE CONTOURS INDEX
- EXISTING SUB-BASE CONTOURS INTERMEDIATE
- BASE CONTOURS INDEX
- BASE CONTOURS INTERMEDIATE
- PHASE LIMIT LINE AND CLAY LIMIT LINE

DETAIL REFERENCE NOTE

- 16 SEE DETAIL 16
- 32 ON PAGE 32

NOTE:
THIS BASE GRADE SHEET ILLUSTRATES:

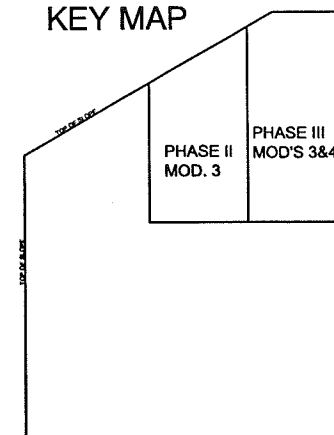
THE EXISTING BASE GRADES AND
SLOPE PERCENTS AND SIDESLOPE
SLOPE RATIOS CONSTRUCTED IN PRIOR
MODULE DOCUMENTATION REPORTS.

THE INSTALLED LEACHATE COLLECTION
SYSTEM CONSTRUCTED IN PRIOR
MODULE DOCUMENTATION REPORTS.

THE EXISTING WASTE LIMIT AND CLAY
LIMIT ESTABLISHED IN PRIOR MODULE
DOCUMENTATION REPORTS.

THE REMAINING PHASES II & III
CLAY LINER AREAS AND THEIR
PERCENT SLOPE AND SIDESLOPE
SLOPE RATIOS AND LEACHATE
COLLECTION SYSTEM TO BE
CONSTRUCTED IN THE NEW PLAN OF
OPERATION.

KEY MAP



BASE GRADES

PROJECT:

BASE GRADES AND LEACHATE COLLECTION SYSTEM
VERNON COUNTY SANITARY BAILEY
PLAN OF OPERATION FOR VERTICAL EXPANSION

REVISIONS:

PROJECT NO:
94602000

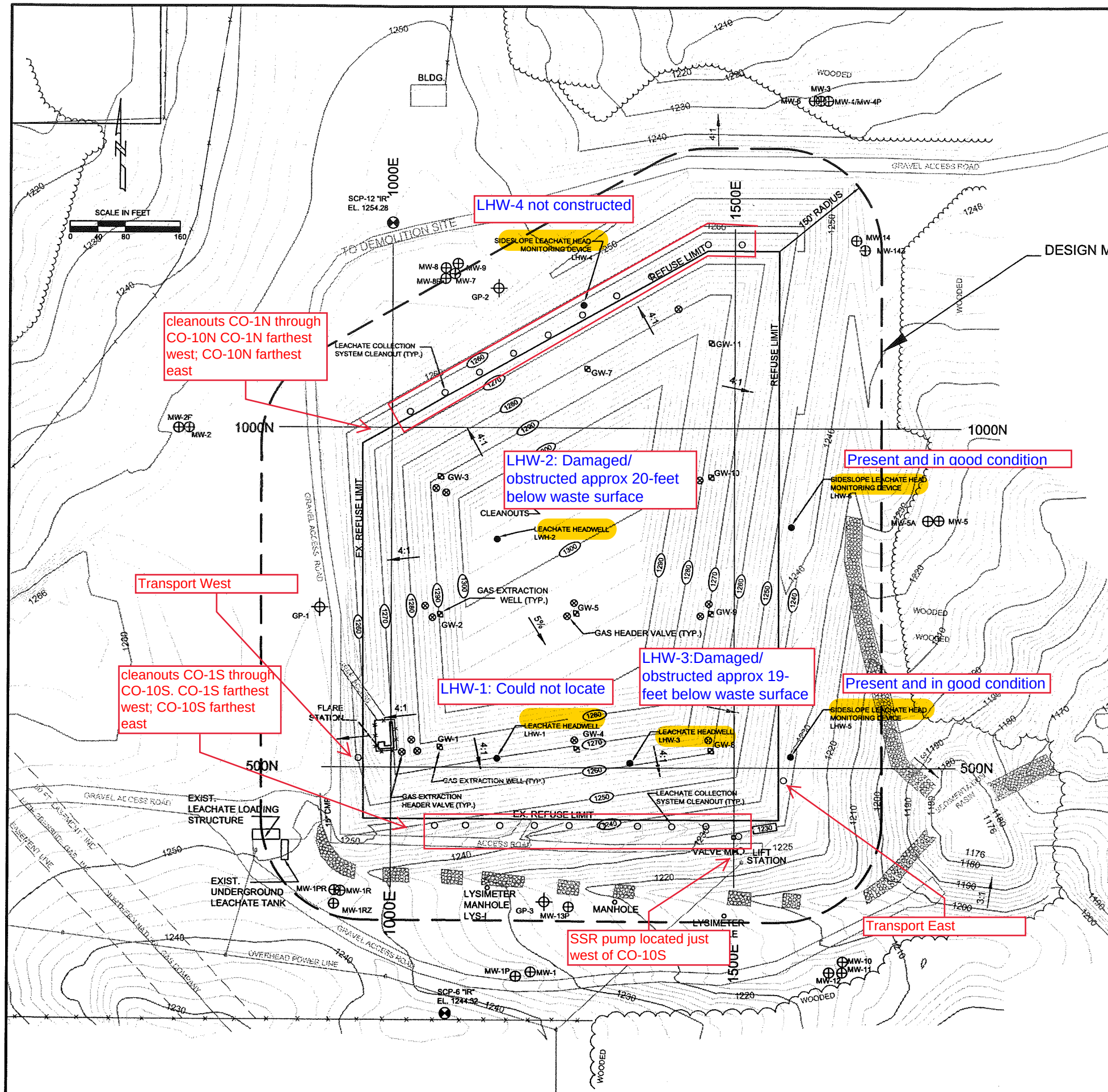
DRAWN BY:
D.H.

CHECKED BY:
P.A.

APPROVED BY:
H.Z.

DATE:
JAN 2005

SHEET:
6 OF 31



LEGEND

	EXISTING EDGE OF WOODS
	EXISTING POWER POLE
	EXISTING RIPRAP
	EXISTING SURVEY CONTROL POINT
	EXISTING GAS PROBE
	EXISTING MONITORING WELL
	EXISTING FENCE
	EXISTING CONTOURS INDEX
	EXISTING CONTOURS INTERMEDIATE
	FINAL CONTOURS INDEX
	FINAL CONTOURS INTERMEDIATE
	GAS EXTRACTION WELL

MONITORING DEVICES AND MONITORING FREQUENCY

Monitoring Device	Monitoring Frequency
Groundwater Monitoring Wells:	Semi-Annually
Water-Supply Wells	Semi-Annually
Gas Extraction Blower Station	Twice-monthly
Gas Extraction Wells	Monthly
Gas Probes	Semi-Annually
Gas System Condensate	Annually
Leachate Volume	Monthly
Leachate Chemistry	Semi-Annually
Leachate Head Well Volumes	Monthly
Leachate Line Cleaning	Annually
Lysimeters	Semi-Annually
Sedimentation Basin Chemistry	Semi-Annually
Sedimentation Basin Dredging	As Needed
Cover Vegetation Mowing	Annually
Inspections:	
Cover Vegetation	Semi-Annually
Runoff Control Structures	Semi-Annually
Cap Settlement	Semi-Annually
Roads	Semi-Annually
Leachate Collections System	Semi-Annually
Lysimeters	Semi-Annually
Gas Extraction System	Monthly

PROJECT:

FINAL CLOSURE & MONITORING PLAN
VERNON COUNTY SANITARY BAFFILL
PLAN OF OPERATION FOR VERTICAL EXPANSION

REVISIONS:

PROJECT NO:
94602000

DRAWN BY:
D.H.

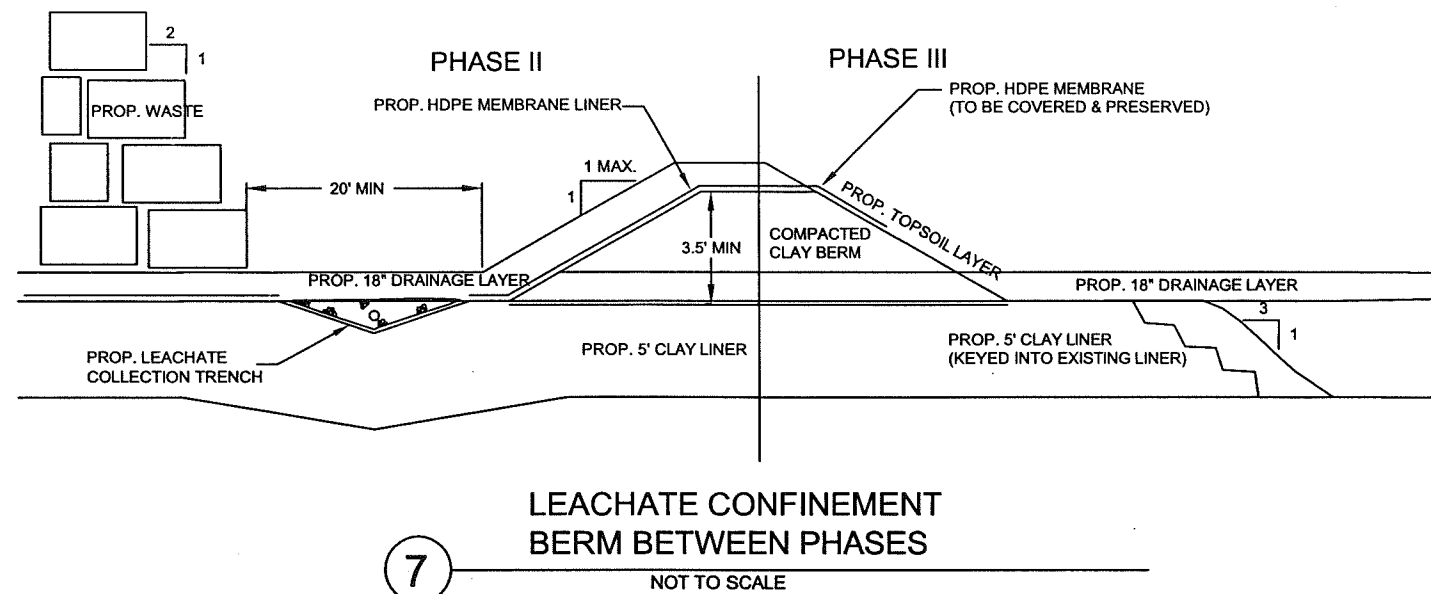
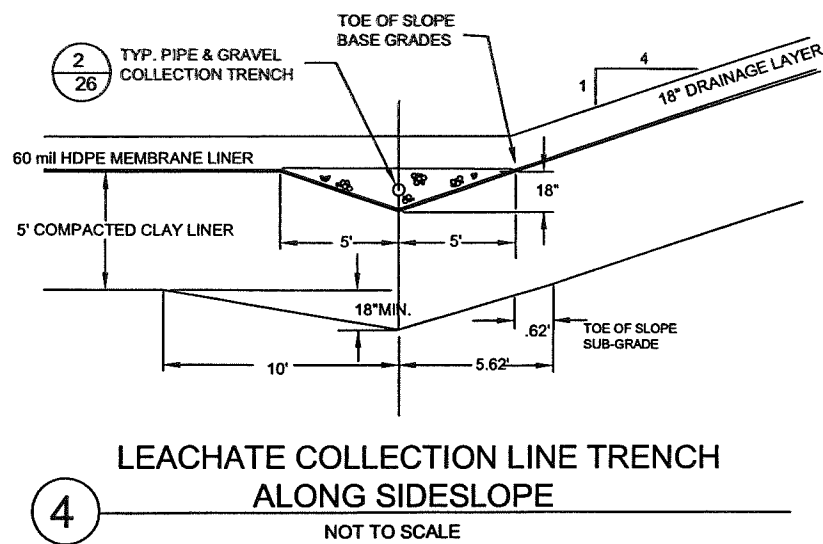
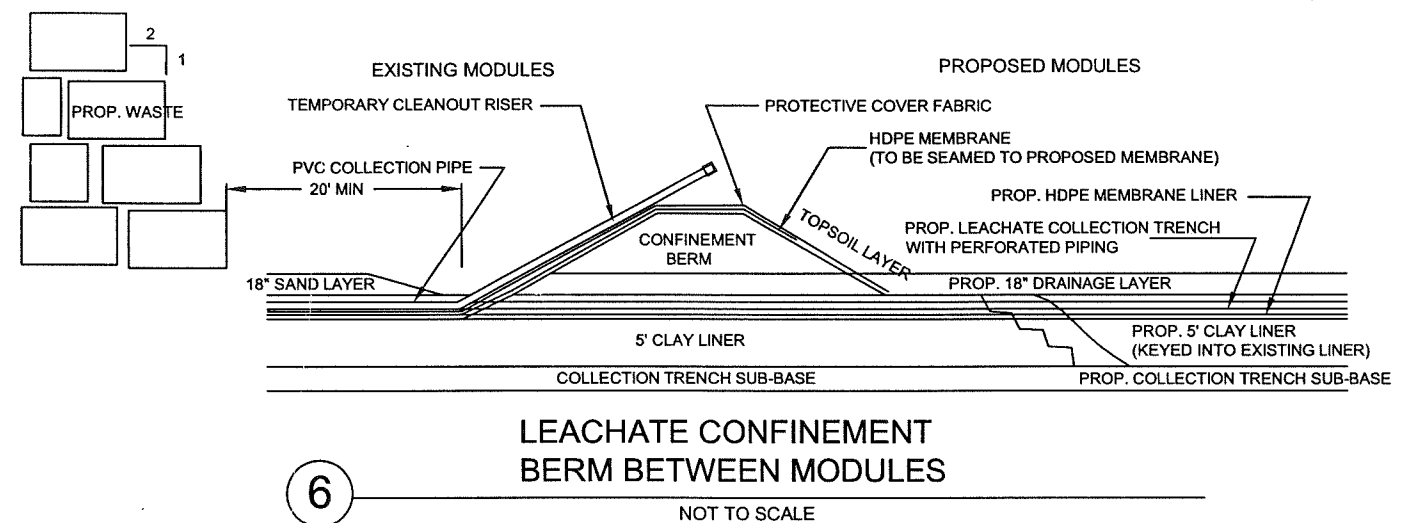
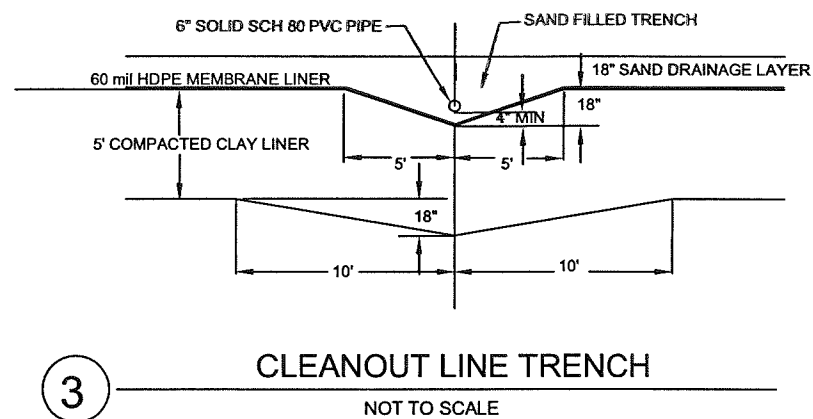
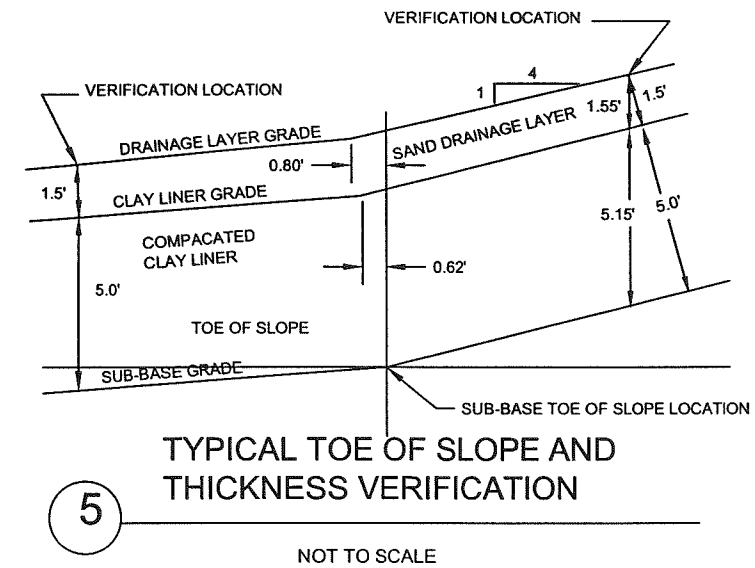
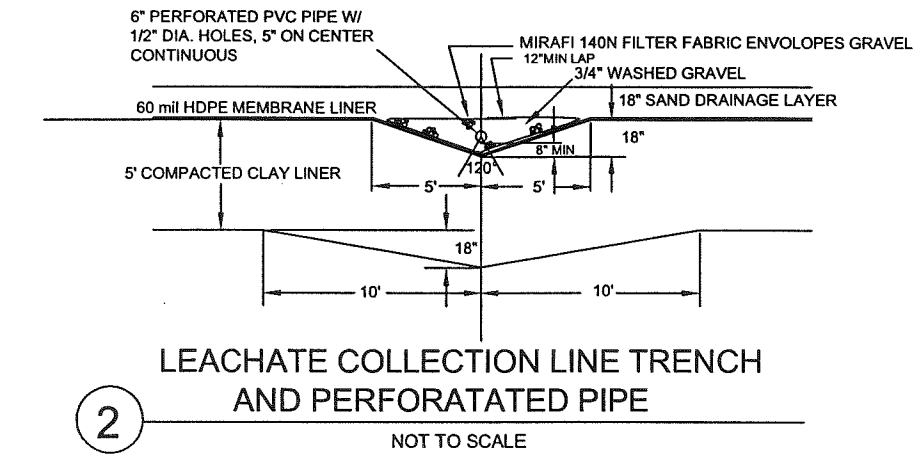
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APPROVED BY:
H.Z.

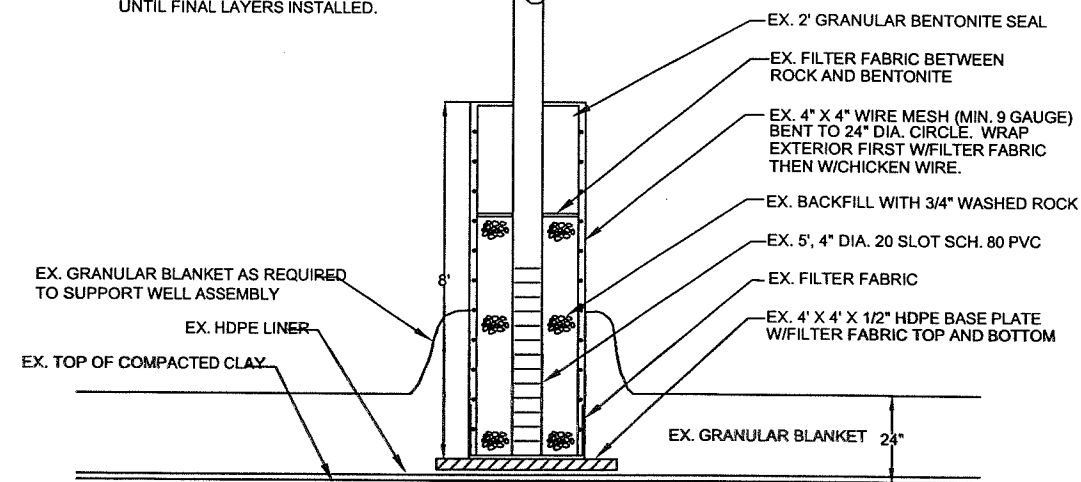
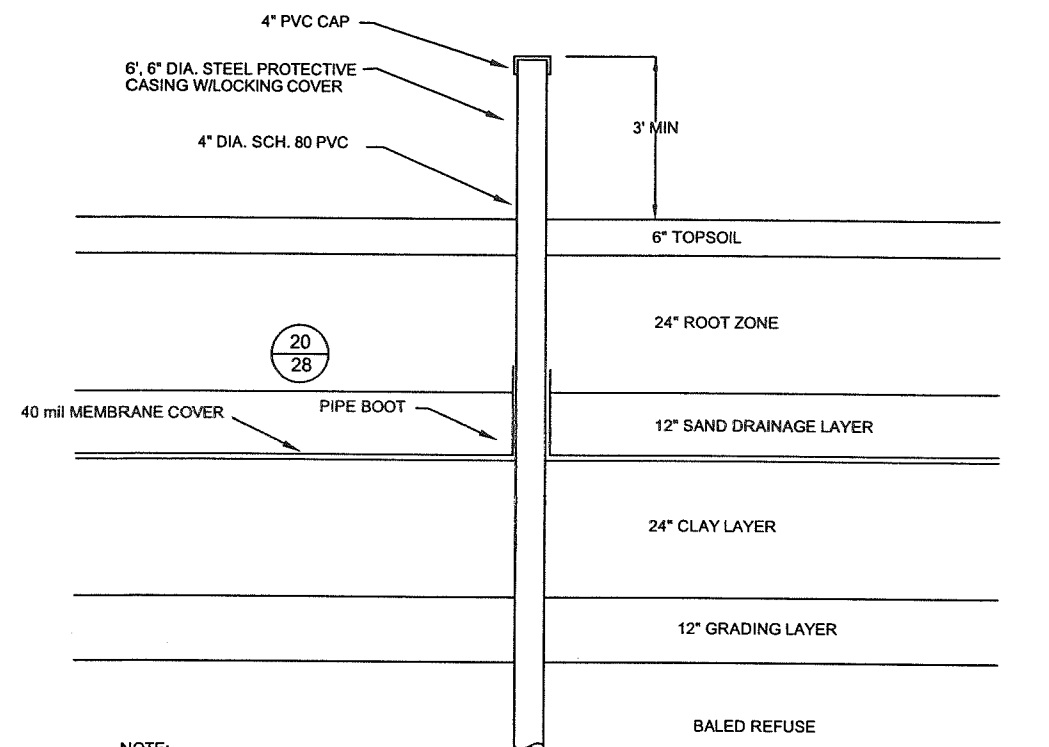
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JAN 2005

SHEET:
16 OF 31

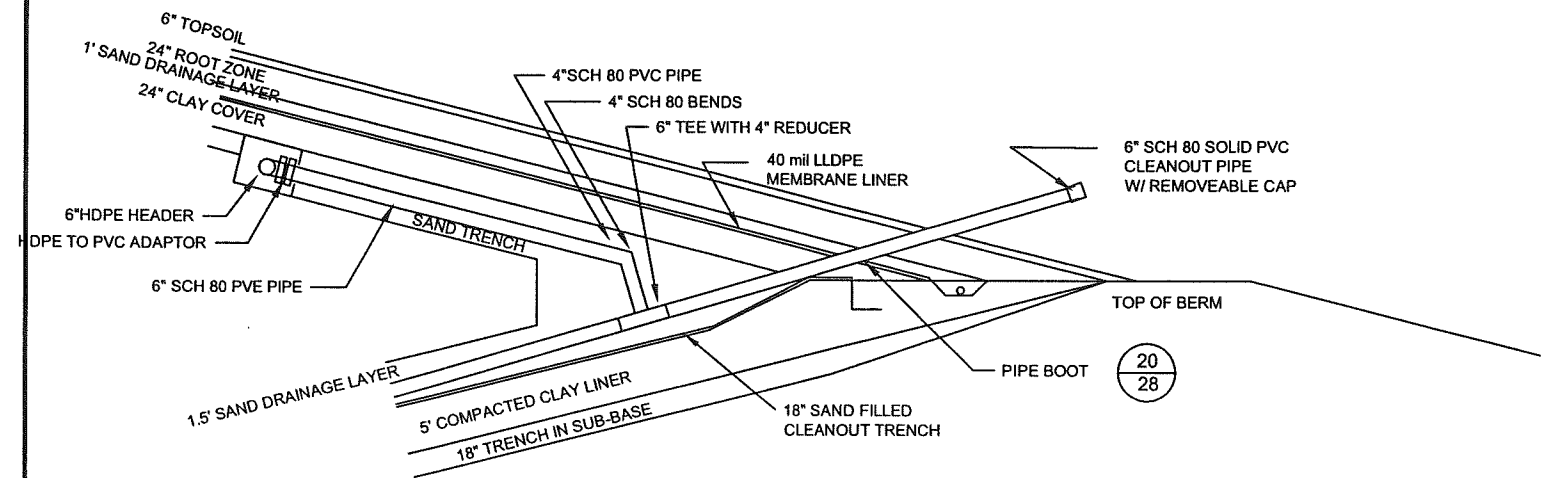
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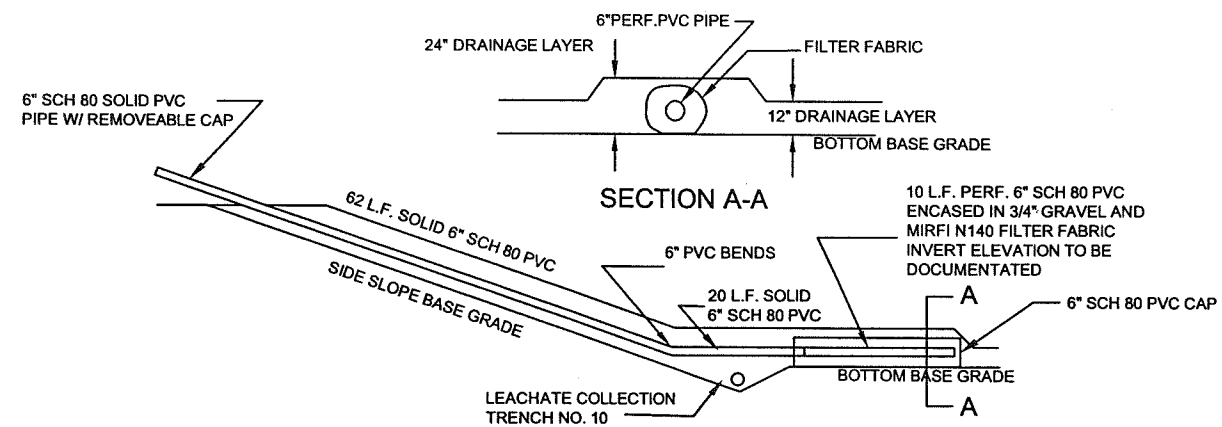
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23 LEACHATE HEADWELL
NOT TO SCALE



24 CONDENSATE PIPE TO CLEANOUT TIE-IN
NOT TO SCALE



25 SIDESLOPE LEACHATE HEAD MONITORING DEVICE
NOT TO SCALE

Building a Better World for All of Us[®]

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We're confident in our ability to balance these requirements.

JOIN OUR SOCIAL COMMUNITIES



Appendix S

Leachate Discharge Permit and Quality Report Summaries

S-1 – La Crosse County Landfill Industrial Wastewater Discharge Permit

S-2 – City of Viroqua Industrial Wastewater Discharge Permit

S-3 – Leachate Analytical Data Summary (2018-2022)

S-1 – La Crosse County Landfill Industrial Wastewater Discharge Permit

CONTRACT APPROVAL FORM

CONTRACT TITLE:		Delivery and Acceptance of Leachate Generated	
FULL VENDOR /PROVIDER NAME:		Vernon County Solid Waste Department	
VENDOR ACRONYM: (if applicable)			
COUNTY DEPARTMENT:		La Crosse County Solid Waste Department	
CONTRACT START DATE:	4/15/16	CONTRACT END DATE:	4/15/19
CONTRACT TYPE:		☒ ORIGINAL CONTRACT	
		☐ AMENDMENT/EXTENSION	DATE OF ORIGINAL (MM/DD/YYYY)
THE ATTACHED CONTRACT REQUIRES:			
		Approved By:	Date
☒	Department Head Approval	Henry A. Koch, P.E.	5/16/2016
☐	Committee Approval		
☐	County Board Approval		
☐	Finance Director		
☒	Board Chair Signature	Tara Johnson	
☐	County Administrator		
DEPARTMENT COMMENTS: _____			
FINANCIAL INFORMATION:		CORPORATION COUNSEL REVIEW:	
ORG#	_____	Date: _____	
ACCT#	_____	☐	Approved as to form/content
CURRENT REVISED BUDGET	_____	☐	Hold for County Board Approval
	_____	☐	Not Acceptable
CONTRACT AMOUNT	_____		
		Signature of Reviewing Attorney	
SOURCE OF FUNDING	_____		
CORPORATION COUNSEL COMMENTS:			

Memorandum of Understanding

between

La Crosse County Solid Waste Department (La Crosse County)

and

Vernon County Solid Waste Department (Vernon County)

I. Purpose and Scope

The purpose of this Memorandum of Understanding (MOU) is to clearly identify the roles and responsibilities of each party as they relate to the delivery and acceptance of leachate generated from Vernon County for recirculation at La Crosse County.

As part of La Crosse County's Organic Stability Plan, leachate is recirculated in specified areas of the active landfill filling operation to increase moisture content of waste in efforts to expedite decomposition of the organic fraction. The cost to re-circulate leachate generated at La Crosse County is much higher than the cost to direct discharge the leachate to the City of La Crosse's waste water treatment system (WWTS) due to handling of the liquid. Therefore, it is prudent for La Crosse County to identify more effective cost options to achieve the requirements of the Organic Stability Plan.

Vernon County experiences considerable costs to manage leachate generated at their facility. Vernon County is located in a rural area and does not have a direct connection to a WWTS. Therefore, leachate generation must be collected and transported to a WWTS that is capable of accepting and treating the volume and contaminant concentrations typical of leachate generated at Vernon County. Due to elevated levels of ammonia-nitrogen, many of the local WWTS charge an increased price to treat the leachate from Vernon County. In addition, the local WWTS often are not capable of receiving leachate from Vernon County during select times of year due to precipitation/run-off and capacity issues, or during times of system maintenance. This creates operational issues for Vernon County. It is necessary for Vernon County to identify additional cost effective leachate management options to provide stability for their system.

In accordance with regulatory requirements, La Crosse County has been granted approval from the Wisconsin Department of Natural Resources to utilize leachate generated at Vernon County for recirculation at La Crosse County. Approval has been granted via a Research, Development and Demonstration (RD&D) Plan approval dated April 15, 2016. The RD&D approval is effective for three years, and La Crosse County may apply for up to three, 3-year renewal periods.

La Crosse County and Vernon County endeavor to work collaboratively to manage leachate generated at Vernon County and recirculated at La Crosse County to the benefit of each system. The framework for this MOU is based on:

- A mutual understanding of the importance of each facility to the region and each other
- A mutual understanding of the importance of relationships and precedent of collaborative agreement
- The importance of fiscal accountability to each systems stakeholders
- The importance of environmental stewardship

II. MOU Term

The term of this MOU Agreement is the period within which the project responsibilities of this agreement shall be performed. The term commences on the date the WDNR issues approval of the RD&D Plan (April 15, 2016) and terminates the day the RD&D Plan approval expires (April 15, 2019). This MOU automatically renews should additional renewals be approved by the WDNR, unless La Crosse County and Vernon County mutually agree to terminate this Agreement in accordance with Section VII below.

III. La Crosse County Responsibilities

The La Crosse County Solid Waste Department shall undertake the following activities during the duration of the MOU term:

1. Provide advance direction and visual representation of the area to be utilized for leachate recirculation.
2. Provide reasonable access to Vernon County, or their contract hauler for ingress and egress
3. Provide access to the recirculation area during normal landfill business hours.
4. Assist, or provide assistance as necessary to efficiently off load leachate in areas specified.
5. Limit access to the recirculation area by the public during leachate recirculation operations.
6. Invoice Vernon County for disposal on a quarterly basis, or as otherwise agreed upon.
7. Review site conditions with respect to Organic Stability Plan and RD&D Plan to inspect and document compliance with warning and threshold alert symptoms.
8. Provide notice to Vernon County within 24-hours of any period in which leachate cannot be accepted at La Crosse County.
9. Review and approve all documentation evidencing Vernon County's performance of services as set forth in the Scope of Work and monitor their compliance with the MOU.

IV. Vernon County Responsibilities

The Vernon County Solid Waste Department shall undertake the following activities during the duration of the MOU term:

1. Provide 24-hour advanced notice of any load being transported to La Crosse County.
2. Notify La Crosse County of any change of operation, or waste acceptance practice that may affect "typical" leachate quality.
3. Provide laboratory analytical data for all leachate samples collected as part of permits and approvals, or as voluntary collected.
4. Deliver up to 26,400 gallons per week of leachate for leachate recirculation to La Crosse County. This is understood by both parties to be a goal, and not a requirement. Instances

may occur with both parties that may result in increasing, limiting or suspending leachate recirculation indefinitely due to precipitation, costs, convenience, or compliance with the RD&D Plan.

5. Conduct operations during normal landfill business hours. Afterhour's access and operations may be allowed on an "emergency" basis.
6. Conduct, or subcontract all leachate collection, transportation and disposal in compliance with all Local, State, and Federal Regulations and Permits.
7. Maintain and submit to La Crosse County records of volume of leachate transported to La Crosse County for the basis of invoicing
8. Compensate La Crosse County \$0.005 for each gallon of leachate delivered and recirculated. The payment shall be quarterly, or as applicable.
9. Review and approve all documentation evidencing La Crosse County's performance of services as set forth in the Scope of Work and monitor their compliance with the MOU.

VII. Modification and Termination

1. This Agreement may be cancelled or terminated without cause by either party by giving 90 calendar days advance written notice to the other party. Such notification shall state the effective date of termination or cancellation and include any final performance and/or payment invoicing instructions/requirements.
2. Any and all amendments must be made in writing and must be agreed to and executed by the parties before becoming effective.

VIII. Effective Date and Signature

This MOU shall be effective upon the signature of appropriate La Crosse County and Vernon County authorized officials. It shall be in force from the term specified in Section II. La Crosse County and Vernon County indicate agreement with this MOU by their signatures.

Signatures and dates

[Authorized signature from La Crosse County]	[Authorized signature from Vernon County]
Title	Title
Date	Date

S-2 – City of Viroqua Industrial Wastewater Discharge Permit

LEACHATE AGREEMENT
BETWEEN THE COUNTY OF VERNON AND THE CITY OF VIROQUA

This agreement is made by and between the County of Vernon, a body corporate, hereafter referred to as "County", and the City of Viroqua, a municipal corporation, hereafter referred to as "City".

WHEREAS, the County owns and proposes to operate a solid waste disposal facility located in Vernon County; and

WHEREAS, the City owns and operates a waste water treatment facility located in the City of Viroqua; and

WHEREAS, the County as part of the operation of the solid waste disposal facility will accumulate liquid waste at said facility, which liquid waste is hereafter referred to as "leachate"; and

WHEREAS, the parties hereto intend to contract for the treatment of said leachate at the City's waste water treatment facility, pursuant to the authority granted by section 66.30, Wisconsin Statutes;

NOW, THEREFOR, in consideration of the mutual covenants and obligations set forth herein, the County and the City mutually agree as follows.

1. Nature of Agreement: The City in this agreement and its obligations herein is acting in its proprietary capacity and is

not acting in its governmental capacity as a public utility with respect to the County or any of the citizens of the County for purposes of this agreement. No part of this agreement shall be construed as an undertaking or obligation of the City to extend the treatment of leachate or sewage to any territory or person other than those areas and persons now served, except the undertaking and obligation to accept leachate from the County strictly in accordance with the terms hereof.

2. Operation of the Leachate System: It is anticipated that the normal execution of this agreement shall be that the County will collect leachate at its solid waste disposal facility and transport the same at the County's cost, expense, and liability to the City's waste water treatment plant and discharge the same into a leachate holding tank or receptacle to be constructed at said sewage plant.

3. Operating Hours and Conditions: The City will allow the County access to the tank or receptacle during supervised hours of the City's waste water treatment plant, and at such other times as the parties may agree in writing.

4. Design, ownership of System, and Capital cost recovery: The City shall design and construct facilities at the City's waste water treatment plant to the extent necessary to accept leachate. The City shall be the owner of such system. The City

may charge the cost thereof to the County to be repaid over a period of years with an interest factor thereon to the extent, and at the same average rate, as the cost to the City for any debt incurred for the design and construction of said leachate facilities. It is understood and agreed that to the extent that the City is also one of the users of the County solid waste disposal facility, as is now intended by the City, and to the extent that the County's uniform charges to municipalities (including the City) for use of the solid waste disposal facility is based, in whole or in part, upon the total cost to the County of the County's solid waste disposal facility, that the City in effect will also be thus paying the City's proportionate part of the capital cost (as well as any operational expense charge as hereinafter provided) of the leachate facilities based upon the City's use of the County's solid waste disposal facility in proportion to such use by other municipalities. The design of the facilities shall be sufficient to accomodate leachate treatment capacity on the following basis (subject to restrictions upon use of such capacity as hereinafter provided):

	<u>Quantity:</u>	<u>BOD load:</u>
Phase I:	1,400 GPD	117 lbs/day
Phase II:	3,100 GPD	258 lbs/day

(Leachate BOD = 10,000 mg/L)

The capacity of the leachate receiving facilities will be 20,000 gallons. Hauling shall be scheduled so this capacity is not exceeded.

5. Use of the Leachate Facilities by others. The City shall have the right to utilize the leachate facilities for other users, but only on conditions that (a) such other users do not interfere with the County's primary right to use of the leachate facilities, and (b) the County shall be relieved of the cost of the leachate facilities in proportion to the use thereof by other users.

6. Repairs and Maintenance of the Leachate Facilities: The City shall be responsible for performing maintenance and repairs of the leachate facilities.

7. Testing: The City shall be responsible for controlling the rate of leachate discharged and for measuring the volumes and strength of leachate discharged into the waste water treatment plant and maintaining records of tests and results, which shall be available to the County at all times. Leachate sampling for strength shall be made as leachate is transferred to the treatment facilities, as the City determines necessary and convenient. Said tests shall be performed in accordance with standard laboratory procedures. The County may also have said leachate sampled.

8. Operating, maintenance and replacement expenses: The expenses for operation, maintenance and replacement of the leachate facilities, testing the leachate, and treatment of the leachate, shall be paid by the County. Expenses for treatment of the leachate will be based on the leachate flow BOD and suspended solids concentration and current user charge system. The City may bill the County quarterly for such expenses, unless the parties hereto agree to a fixed charge per gallon (or on any other method). Any such charge by the City shall conform to any applicable administrative rule or regulation, including any rule, regulation, or tariff within the jurisdiction of the Department of Natural Resources and/or Public Service Commission.

9. Acceptable Leachate: Leachate to be accepted by the City must not have any characteristic, or be of such volume or strength, that would cause, or threaten to cause, the City to be in violation of the City's Wisconsin Pollution Discharge Elimination System (WPDES) permit, or upset the treatment process. At such time as the leachate production reaches Phase II levels, the County will then utilize other acceptable disposal facilities, in order that the loading at the City's waste water treatment plant remains at or below Phase II levels.

10. Term of this Agreement: This agreement shall remain in

effect for the period of time that the County is required to dispose of leachate from the County's solid waste disposal facility, or for such longer period of time as may be required for the County to pay the City for the capital cost of the leachate facilites at the City's waste water treatment plant. This agreement may be terminated at any time by mutual consent of the parties hereto, in writing. This agreement may also be terminated by either party if there is a default by the other party in any term or condition to be performed by the other party which is not corrected within 60 days of written notice of default, unless within such period the defaulting party takes reasonable steps to correct such default and it is reasonable to expect that the defaulting party will be able to correct such default within a reasonable time. Any cost or expense to a party caused by the other party's default shall be paid by the defaulting party.

11. Indemnity: The City agrees to indemnify and hold the County harmless from any and all loss, cost, and liability caused by the City's breach of this agreement and because of any negligence of the City. The County agrees to indemnify and hold the City harmless from any and all loss, cost, and liability caused by the County's breach of this agreement and because of any negligence of the County.

12. Whole agreement: This instrument contains the whole agreement of the parties hereto with respect to acceptance of leachate at the City's waste water treatment plant and the payment for the capital and operational cost to the City because of said leachate facilities and the City's share of the County charges for the City's use of the County's solid waste disposal facility which is based upon leachate disposal.

IN WITNESS WHEREOF the parties have executed this Agreement, the County by authority of its Board of Supervisors, the City by authority of its Common Council.

VERNON COUNTY:

By: Jack Johnson (Seal)

Chairman, Board of Supervisors

By: [Signature] (Seal)

County Clerk

CITY OF VIROQUA:

By: Charles J. Wern (Seal)

Mayor

By: Patrick D. Giffon (Seal)

City Clerk

S-3 – Leachate Analytical Data Summary (2018-2022)

Appendix R-2
Leachate Analytical Data Summary
Vernon County Landfill

Parameters ⁽¹⁾	Units	03/15/2018	09/12/2018	03/13/2019	09/11/2019	03/11/2020	09/16/2020	03/17/2021	09/15/2021	03/16/2022	09/14/2022
TEMPERATURE, WATER (DEGREES CENTIGRADE)	C	16.73	19.95	8.96	21.38	12.02	16.8	10.11	19.85	11.95	15.89
SPECIFIC CONDUCTANCE, FIELD (UMHO/CM @ 25C)	umho/cm	14700	12150	9610	1211	11430	10360	10970	12910	13620	11990
SOLIDS, TOTAL SUSPENDED (MG/L)	mg/L	11	110	44	18	28	13	8.4	8.2	19	4
BIOCHEMICAL OXYGEN DEMAND (MG/L, 5 DAY - 20DEG C)	mg/L	110	440	74	73	65	79	120	96	85	92
CHEMICAL OXYGEN DEMAND, UNFILTERED (MG/L)	mg/L	2000	2200	1100	1600	770	1200	1500	1500	1700	1600
PH, FIELD (STANDARD UNITS)	SU	7.25	6.52	8.09	7.92	7.45	8.42	7.81	7.72	7.47	7.41
ALKALINITY, TOTAL (MG/L AS CaCO3)	mg/L	5900	5200	3600	4400	4200	4100	4000	4800	5400	4300
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	970	700	600	225	120	640	720	880	820	850
NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	mg/L	760	540	610	720	720	700	790	890	970	920
HARDNESS, TOTAL (MG/L AS CaCO3)	mg/L	768	356	621	877	479	733	639	612	859	669
SODIUM, TOTAL (MG/L NA)	mg/L	1420	496	996	1210	650	764	935	958	1515	863
CHLORIDE, TOTAL OR DISSOLVED IN WTR SMPL (MG/L CL)	mg/L	1900	1800	1000	1400	1300	1100	1100	1600	2300	1200
SULFATE, TOTAL (MG/L SO4)	mg/L	2.4 J	34	3.4	12	2.3 J	20	23	12	2 J	28
CADMIUM, TOTAL (UG/L CD)	ug/L	0.78 J	<0.3	<0.3	<0.3	<0.3	<0.3	<0.4	<0.42	<2.1	<0.42
LEAD, TOTAL (UG/L PB)	ug/L	<2.8	<1.4	<1.4	5.3	<1.4	5.3	<1.4	1.5 J	<7	3.5 J
MANGANESE, TOTAL (UG/L MN)	ug/L	1820	845	1320	1840	1030	1770	1610	1430	1820	1420
TOLUENE IN WHOLE WATER SAMPLE (UG/L)	ug/L	<3	<3	<3	3.7 J	<2.1	2.6 J	<2.1	<2.7	<2.7	<2.7
BENZENE IN WHOLE WATER SAMPLE (UG/L)	ug/L	3.7 J	5.7 J	3.1 J	4.7 J	4.3 J	<4	4.9 J	<4.7	4.7 J	<4.7
CHLOROBENZENE IN WHL WTR SAMPLE (UG/L)	ug/L	5.1 J	<5	<5	7.2 J	4.8 J	3.2 J	<3	<3.7	<3.7	<3.7
DIETHYL PHTHALATE IN WHOLE WATER SAMPLE (UG/L)	ug/L	NA	2.5 J	NA	3.2 J	NA	<0.3	NA	<0.3	NA	<0.28
BROMOMETHANE IN WHL WTR SAMPLE (UG/L)	ug/L	<7	<7	<7	<9	9.2 J	<9	<9	<7.2	<7.2	<7.2
DICHLOROMETHANE IN WHL WTR SAMPLE (UG/L)	ug/L	11 J	<5	6.8 J	<4	26	<4	<4	<12	<12	<12
M-DICHLOROBENZENE IN WHL WTR SAMPLE (UG/L)	ug/L	NA	<5	NA	<2.6	NA	<2.6	NA	4.5 J	NA	<0.23
P-DICHLOROBENZENE IN WHL WTR SAMPLE (UG/L)	ug/L	<6	8.6 J	<6	7.8 J	7.8 J	9.2 J	8.5 J	5.6 J	7.4 J	6.2 J
P-DICHLOROBENZENE IN WHL WTR SAMPLE (UG/L)	ug/L	NA	2.9 J	NA	4.1 J	NA	3.6	NA	3.4 J	NA	2.7
NAPHTHALENE IN WHOLE WATER SAMPLE (UG/L)	ug/L	NA	7.2 J	NA	5.8 J	NA	5.7 J	NA	6.9 J	NA	4.4 J
NAPHTHALENE IN WHOLE WATER SAMPLE (UG/L)	ug/L	<7	2.8 J	<7	4.4 J	6.9 J	2.7	5.4 J	4.4 J	7.1 J	2.6
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP) WHL WTR SMP (UG/L)	ug/L	NA	<1.8	NA	<1.7	NA	0.79 J	NA	<2.7	NA	1.1 J
DI-N-BUTYL PHTHALATE IN WHOLE WATER SAMPLE (UG/L)	ug/L	NA	<1.7	NA	<1.7	NA	<0.36	NA	<3.6	NA	0.81 J
VINYL CHLORIDE IN WHOLE WATER SAMPLE (UG/L)	ug/L	<1.9	2.6 J	<1.9	<1.4	<1.4	<1.4	<1.4	<1.5	<3.3	<1.5
CRESOLS IN WHOLE WATER SAMPLE (UG/L)	ug/L	NA	73	NA	<2.2	NA	<3.5	NA	<35	NA	<3.3
MERCURY, TOTAL (UG/L HG)	ug/L	<0.02	0.38	0.077	0.039 J	<0.1	<0.02	0.034 J	<0.1	<4.1	0.032 J
IRON, TOTAL (MG/L FE)	mg/L	<0.07	5.08	6.96	9.75	6.67	10.2	0	10	13	11.4
XYLENE, O-, IN WHOLE WATER SAMPLE (UG/L)	ug/L	6.9 J	13 J	6 J	11	10	10	11	8.6 J	9.4 J	7.8 J
O-CRESOL (2-METHYLPHENOL) IN WHL WTR SAMPLE (UG/L)	ug/L	NA	3.7 J	NA	<1.9	NA	<1.5	NA	<15	NA	<1.4
1,2,4-TRIMETHYLBENZENE IN WHOLE WATER SAMPLE (UG/L)	ug/L	<4	6.3 J	<4	<2.9	<2.9	<2.9	<2.9	<3.4	<3.4	<3.4
P-ISOPROPYLTOLUENE IN WHOLE WATER SAMPLE (UG/L)	ug/L	<5	6.7 J	<5	<3	<3	<3	<3	<2.9	<4.2	<2.9
2-METHYLNAPHTHALENE IN WHOLE WATER SAMPLE (UG/L)	ug/L	NA	<2.5	NA	<2.5	NA	0.35 J	NA	<2.5	NA	0.51 J
CARBAZOLE	ug/L	NA	<2.4	NA	<2.3	NA	<0.66	NA	<6.7	NA	1.5 J
ETHYLBENZENE IN WHOLE WATER SAMPLE (UG/L)	ug/L	<3	17	3 J	4.1 J	<3	<3	<3	<4.2	<7.4	<4.2
ACETONE IN WHL WTR SAMPLE (UG/L)	ug/L	<90	720	<90	<40	<40	<40	<40	<41	<40	<41
ACETOPHENONE IN WHL WTR SAMPLE (UG/L)	ug/L	NA	<2.4	NA	<2.3	NA	0.82 J	NA	<4.7	NA	0.88 J
METHYL ETHYL KETONE (MEK) IN WHL WTR SAMPLE (UG/L)	ug/L	<40	990	<40	<26	<26	<26	<26	<29	<26	<29
TETRAHYDROFURAN IN WHOLE WATER SAMPLE (UG/L)	ug/L	270	340	180	270	320	320	380	410	300	230
1-METHYLNAPHTHALENE IN WHOLE WATER SAMPLE (UG/L)	ug/L	NA	<2.3	NA	8.3 J	NA	0.64 J	NA	<2.6	NA	0.6 J
XYLENE, M & P-, IN WHOLE WATER SAMPLE (UG/L)	ug/L	<5	23	<5	7.1 J	<7	<7	<7	<7.4	<7	<7.4

Notes:

(1) - Any parameter analyte that consistently measured below the limit of detection was not included.

J - Values are between the laboratory limit of detection and limit of quantification.

NA - Parameter not analyzed.

< - Value was not detected at concentration at or above the method detection limit.