Sampling and Analysis Plan (SAP)
For the Michigan Operations Operating License

(Part 111 of ACT 451)

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1.0 Introduction and Scope

This Sampling and Analysis Plan (SAP) was created as a requirement for The Dow Chemical Company (Dow) Michigan Operations Operating License under Act 451, Part 111. This SAP describes and lists procedures for the following sampling programs at Michigan Operations:

Groundwater Monitoring Programs

- Glacial Till and Regional Aquifer
- Sludge Dewatering Facility (SDF)
- Poseyville Landfill (PLF)
- Tertiary Pond Slurry Wall
- Tertiary Pond Recovery Monitoring Well 3795
- Facility Shallow Groundwater Piezometers
- Overlook Park
- US-10 Tank Farm Sump Monitoring
- LEL I Hydraulic Monitoring
- LEL II Hydraulic Monitoring
- LEL III Hydraulic Monitoring

Surface Water Protection Monitoring Programs

- 7th Street Purge Wells Area Monitoring
- River Corrective Action Monitoring
- Revetment Groundwater Intercept Systems (RGIS)
- Northeast Perimeter Groundwater
- South Saginaw Road Tile Performance Monitoring
- Ash Pond Area
- 6 Pond Tile Areas
- West Plant Perimeter Along Poseyville Road
- Former 47 Building Area Surface Water Protection Monitoring
- 1925 Landfill

Leachate Monitoring Program

- Sludge Dewatering Facility (SDF)

Soil Monitoring Programs

- Midland Plant Soil Box Monitoring

2.0 General Procedures and Guidelines

The General Procedures and Guidelines section includes guidelines that apply to all sampling conducted under this Sampling and Analysis Plan. Guidelines that apply specifically to the groundwater, surface water protection, leachate and soil monitoring programs can be found in subsequent sections.

2.1 Pre-Sampling Procedures

1. Review Table 2 to determine when sampling event is to occur and what samples are required.
2. Notify team members and customers of planned sampling dates.
3. Prepare labels with facility ID and parameter(s).
4. Label chain-of-custody form(s) with facility ID and parameter(s).
5. Gather necessary bottles (reference Table 1).
6. Gather applicable sample collection equipment (examples shown below):

Bottle carriers	Blank water	Deionized water
Ice chests w/ice	Necessary preservatives	pH/Conductivity meter
Thermometer	Bucket with volume indicators	Filtering equipment
Carbon chambers	Extra bottles	Dedicated/disposable bailers
Field data sheet	Generators	Gas/oil for generators
Adapters for wells	Sampling Procedures	Life vests
Eye shower	Compass	Labeled bottles
Chains-of-custody	Static Water Level meter	Gas sampling equipment
Gloves	Goggles	2-way radio
Stainless steel spoon	Stainless steel cutting knife	Stainless steel scraper
Tweezers	0.25-inch stainless steel Sieve	Scrubbing brush
Ottawa sand standard	Resealable plastic bags	Laboratory grade detergent
Timing device	Pressure gauge and fittings	Pump tubing and clamp
Low-flow cell	Well Inspection Log	
Stainless steel bowl or disposable aluminum pan		
One-inch diameter stainless steel soil survey probe		

7. Field instruments will be calibrated, per manufacturer's instructions, prior to use each day and noted on a field data sheet. Pressure gauges will be calibrated in accordance with manufacturer's instructions.

2.2 Documentation/Chain-of-Custody Procedures

Appropriate documentation is essential to ensure the possession and handling of samples is traceable from the time of collection through analysis and final disposition. This documentation of the history of the sample is referred to as "chain-of-custody". Chain-of-custody documentation includes:

- Sample labeling;
- Field data sheet (example in Appendix F); and
- Chain-of-custody form (example in Appendix D).

A person who has samples in custody must comply with these Chain-of-Custody Procedures. During collection, analysis and final disposition, a sample is considered to be under a person's custody when:

- The samples are in a person's physical possession;
- Are in view of the person after taking possession;
- Are secured by that person so that no one can tamper with it; or
- Are secured by that person in an area that is restricted to authorized personnel.

Samples must be labeled to prevent mis-identification. Sample labels will be affixed to sample containers prior to or at the time of sampling. Sample labels will contain the following information:

- Sample number;
- Name or initials of sampler;
- Date and time of collection;
- Place of collection; and
- Analysis to be performed on the sample.

Information pertinent to a field survey or sampling will be documented in the field data sheet, (example included in Appendix F). Field parameters shall be taken immediately prior to collecting the sample and documented in the field data sheet. It is essential that all samples be collected properly and that actual conditions during each sample collection are completely documented. At a minimum, entries on the field data sheet will include the following:

- Location of sampling point;
- Sample number;
- Name or initials of the sampler;
- Date/time of purging and/or sampling;
- Number and volume of sample taken;
- Analyses to be performed on samples;
- Static Water Level (SWL) reading;
- Purge volume;
- Field parameters (such as temperature, pH, specific conductivity); and
- Additional field information determined by the sampler to be important (i.e. abnormal conditions, well damage, weather conditions, nearby construction/traffic).

Additional field documentation will include sufficient information to allow reconstruction of the sampling without reliance on the sampler's memory. A permanent writing instrument should be used to record all information on field data sheets. The proper correction technique is to draw one single line through the error and initial/date it at the point of error.

2.3 Equipment Decontamination Procedures

To minimize sample contamination problems, dedicated sampling (or well evacuation) equipment will be used whenever possible and new pre-cleaned containers are to be used. The use of dedicated equipment is not always possible; therefore, a procedure for cleaning of and sampling with non-dedicated equipment is critical in obtaining representative samples. If non-dedicated equipment is used, an equipment blank must be obtained according to the Quality Control Table in Appendix A. When non-dedicated sampling equipment is used, the equipment will be cleaned initially by the procedures described below. The wells will be sampled in order of cleanliness, if known (i.e., upgradient before downgradient). Between sampling points, the equipment will be rinsed with deionized water and rinsed with the well water before the sample is taken. Depending

on the piece of non-dedicated equipment used (e.g., submersible pumps, non-disposable bailers, stainless steel soil sampling tools, surface water dipper) non-phosphate detergent may be used to thoroughly clean equipment. See section 3.1.2 regarding the decontamination of the SWL meter between wells.

2.3.1 Pre-Sampling Decontamination of Non-Dedicated Sampling Equipment

1. Hot water and soap wash using non-phosphate detergent;
2. Hot tap water rinse;
3. Deionized water rinse and air dry;

2.3.2 Pre-Sampling Decontamination of Static Water Level Meter, pH/Temperature/Conductivity/or other Field Measurement Probe(s)

1. Hot water and soap wash using non-phosphate detergent;
2. Hot tap water rinse;
3. Deionized water rinse and air dry.

2.4 Purge Water Management Procedures

Purged water from wells where previous analyses have not identified chemical impact will be diverted away from the well and discharged onto the ground. Purged water from wells where there is no prior analyses or where prior analyses has identified chemical impact will be collected in a portable holding tank. All collected, purged water will be treated at the Dow Waste Water Treatment Plant via discharge to the on-site sewer, or an equivalent facility.

2.5 Sample Preservation

Sample preservation techniques are used to retard the chemical and biological changes that inevitably continue after the sample is removed from the parent media. Therefore, as a general rule, it is best to analyze the samples as soon as possible after collection within the prescribed hold times as outlined in Table 1. Sample preservation may be done prior to or immediately following collection of a sample. Preservatives added after sampling should be done in the field.

Methods of preservation are relatively limited and are intended generally to (1) retard biological action, (2) retard hydrolysis of chemical compounds and complexes, (3) reduce volatility of constituents, and (4) reduce absorption effects. Preservation methods are generally limited to pH

control, chemical addition, refrigeration, and freezing. Caution should be used while adding preservatives or filling pre-preserved bottles, as preservatives typically exhibit very high or very low pH and may cause burns. Constituent and media specific preservation methods are presented in Table 1.

2.6 Sampling Procedures

All samples shall be collected in appropriate bottles (see Table 1). If an open bottle is found in the manufacturer's box, this bottle will be discarded. All sample and blank bottles will have a label affixed that is readable and clear. In liquid volatile samples, no head space must occur in the 40-ml glass vials. If zero-head space is not possible, this must be documented in the field data sheet. Soil volatile and semi-volatile samples shall not be composited.

New gloves shall be used at each sampling location or anytime items other than the clean sampling tools/bottles are handled. Care must be used while handling sample containers and caps so that contamination is not introduced during the collection process.

Liquid dissolved metal samples will be filtered as soon as possible with a 0.45 µm pore size glass filter. Prior to filling bottles, allow liquid to discharge through filter briefly. Liquid dissolved metal samples collected using low flow groundwater purging procedures will not be filtered. Liquid total metal samples will not be filtered.

If a sample is unable to be collected due to icy/frozen condition or the sample location point is inaccessible for some reason, a sample should be collected as soon as the condition allows during that same quarter.

2.7 Sampling Sequence

Samples should be collected and containerized according to the volatility of the target analytes. The proper collection order is as follows:

1. Volatiles;
2. Semi-Volatiles (Extractables, EOAs);
3. Total Organic Carbons (TOC);
4. Metals and Cyanide; and
5. Any other parameters.

2.8 Post-Sampling Procedures

1. Prior to leaving the site, ensure all field data has been recorded in the field data sheet.
2. Transport samples on ice to appropriate locations.
3. Transfer samples along with chain-of-custody form(s) to analysts.
4. Clean all sample equipment as described in Equipment Decontamination Procedures.
5. Document any damaged wells, unsafe or abnormal conditions noted during sampling on the field data sheet and notify the environmental monitoring program coordinator.

2.9 Maintenance & Inspections

During each sampling event, all monitoring locations will be inspected for integrity, damage, and/or safety issues. Monitoring wells may be inspected for damaged well casings, protective covers, fittings, and pump heads; missing locks and labels; signs of corrosion or surface erosion; reduced well performance; malfunctioning equipment; standing water at the well; and/or leakage. This inspection will be documented on the well inspection sheet (see Appendix G). Other media will also be inspected and findings will be documented on the field data sheets. Lift stations and collection sumps may be inspected for damaged or missing manhole lids, locks, and/or labels (see attached Table 6, Inspection Schedule). Surface water outfalls may be inspected for evidence of erosion or sediment transport, outfall blockage, and/or missing labels. Ambient air monitoring stations may be inspected for damaged timers, gauges, and/or power supply. Soil boxes may be inspected for damaged and/or missing box markers, labels, or barricades.

Any deficiencies will be noted in the field data sheet and reported to the environmental monitoring program coordinator for appropriate corrective action(s).

2.10 Quality Control and Assurance

All samples collected and analyzed per this SAP will be maintained by good quality control and good laboratory practices. The Quality Control statement is located in Appendix A. In addition, the Dow Environmental Laboratory Quality Assurance Program is located in Appendix C.

2.11 Data Analysis and Reporting

All data collected per this SAP will be analyzed and reported according to the respective section of Table 2, Sample Collection Chart and Part X and Condition II.L.4.of the Operating License. All chemical monitoring data will be evaluated and reported using two significant figures.

Data for samples that are analyzed for the 17 International Toxic Equivalency Factor (ITEF) dioxin and furan isomers and for the total tetra- through octa- dioxin and furan congener groups, will be expressed as toxic equivalent concentrations (TEC) based on WHO-TEC factors (World Health Organization 2005 Toxic Equivalency Factors). For samples where a specific congener was not detected, one-half the detection limit (DL) of that congener will be used to calculate the WHO-TEC for that sample. If an Estimated Maximum Possible Concentration (EMPC) is indicated in place of the DL, the EMPC will be used as the DL and the data will be flagged to reflect the use of the EMPC.

2.12 Future Updates to SAP Procedure

This SAP may need to be updated periodically. For each update to this SAP, no matter how minor, the complete document is to be updated and given a revision number/revision date. Additionally, each revision will be recorded on Table 8.

3.0 Groundwater Monitoring and Surface Water Protection Monitoring Field Procedures

To comply with R 299.9611(2)(b) and R 299.9612, groundwater monitoring programs will be conducted at Michigan Operations. To comply with R 299.9521(3)(a) and (b) and R 299.9611(5)}, surface water protection monitoring programs will be conducted at Michigan Operations. The Groundwater Monitoring and Surface Water Protection Monitoring Field Procedures section includes guidelines for obtaining hydraulic reading/static water levels from groundwater wells, well purging, and sampling. General procedures and guidelines for all sampling media are discussed in the General Procedures and Guidelines section.

3.1 Hydraulic Readings / Static Water Levels (SWL)

All monitoring wells are protected by a locking protective casing with a Dow lock. Where necessary, collision protection is in place around wells. The wells will be inspected for physical damage and any problems that may have occurred will be documented on the well inspection sheet (see Appendix G).

Static water level (SWL) readings will be obtained prior to purging. SWLs from all wells used to generate contours or gradient calculation will be obtained during a single 24-hour period, according to the locations and frequency specified in Table 2, Sample Collection Chart. The SWL will be recorded on the field data sheet (see Appendix F). There are two techniques used to obtain static water level (SWL) readings: one for flowing wells (pressurized) and another for piezometers and monitoring wells.

3.1.1 Flowing Wells

For flowing wells, a SWL will be calculated from pressure readings taken from the valve stem on the top of the well head. A digital pressure gauge (typical gauge range is 0 to 500 inches of water) is attached to a valve stem and the water level will be read in inches of water. Pressure readings shall be obtained within a period not to exceed 24 hours prior to sampling, following the directions below:

1. Open valve on the well head to allow pressure to equalize behind the valve stem.
2. Turn on the pressure gauge by pushing the red button and checking the LED to make sure batteries are working.
3. Attach the air fitting on the pressure gauge to the valve stem on the well head.

4. Give the pressure gauge time to stabilize (approximately one minute).
5. Record the pressure reading in feet of head, recorded to the nearest hundredth of a foot.
6. The measured SWL (in feet) will be equal to Top of Casing (TOC) plus the measured pressure, according to the following equation: SWL (ft.) = TOC (ft.) + Pressure (ft.).

3.1.2 Piezometers and Monitoring Wells

Foreign substances other than the indicator probe will not be introduced into the well casing. A clean electric water level indicator will be used to determine the SWL. An indicator tape graduated in hundredths of feet will be used. Prior to use, clean the SWL indicator with deionized water and a clean paper towel, followed by another water rinse. This prevents cross contamination between wells. SWL indicators that are used in highly contaminated wells will be designated and not used to measure uncontaminated wells. Next, test the SWL indicator by turning it on and depressing the test button. There is an audible tone indicating the SWL indicator is working. Measure the SWL using the following steps:

1. Lower the SWL indicator probe into the well casing slowly until the tone is audible. At this point, the SWL has been reached.
2. Static water level readings should be taken consistently from the same location at the top of the well casing, which could be done by permanently marking the casing via placement of a mark or notch.
3. The SWL indicator probe should be lifted at least a few inches above the water level and then lowered for another SWL reading. Continue this until a consistent SWL reading has been confirmed.
4. Record the SWL to the nearest hundredth of a foot in the field data sheet.
5. Slowly remove the indicator probe from the well, and remove any liquids using paper towels. Dispose of waste towels appropriately.
6. The SWL indicator shall be triple rinsed with deionized water and wiped dry between rinsings after every SWL reading.
7. Store the SWL indicator in a clean dry place when not in use.

3.2 Well Reference Elevations

Well casings will be referenced to a USGS reference datum elevation. See Table 4 for monitoring well specifications. Wells will be surveyed after new installations, upgrades, repairs, or according to the schedule provided in Appendix E.

3.3 Well Purging

Purging and sampling should be completed as specified in Table 2 and Table 3. After collecting a SWL reading and before sampling a well, the stagnant water in the well casing needs to be removed to insure that a representative sample can be taken. This can be achieved using one of two methods of purging, fixed-volume purging or low flow purging. Refer to Table 3 for the method required for each monitoring program.

3.3.1 Fixed-volume Purging

If fixed-volume purging is required, the following steps should be used to remove three well casing volumes of water by either bailing, pumping, or by opening the valve on a flowing well. It is first necessary to determine the quantity of water contained within the well casing. This is done by subtracting the depth to standing water from the depth of the well. The depth of each well is listed on the field data sheet. The difference between the well depth and the water level depth is the height of water standing within the well. Multiply this height of water by the volume conversion factor, based on the diameter of the well, for a total volume of water in the well casing. The well diameters are listed in Table 4, Monitoring Well Specifications, and the corresponding volume conversion factors are listed on the field data sheet. Multiply this sum by 3 (the number of well volumes to be removed) which is the minimum recommended.

3.3.1.1 Equation for Purge Volumes

For non-flowing wells:

Well Depth – SWL = Feet of Water

Feet of Water x 0.163 = Total Water in Well Casing

Total Amount of Water x 3 = Purge Volume prior to sampling

For flowing wells (pressure reading):

Well Depth x 0.163 x 3 = Purge Volume prior to sampling

3.3.1.2 Flowing Wells

Flowing wells are positive pressure wells. The well volume is calculated using the equation in section 3.3.1.1. Flowing wells will be purged by opening the discharge valve. When purging flowing wells, the water flow shall be diverted away from the well so it does not gather around or seep back into the well. The well will be sampled when purging is complete.

3.3.1.3 Submersible Pump Wells

Each well has an electrical fitting on the well head that is to be connected to the appropriate pump controller (110 or 220 volt). Purge the well using the following steps:

1. Start the generator at a down-wind location and allow it to warm up.
2. Plug the controller into the generator, making sure the controller is turned off and at the lowest setting.
3. Attach the controller lead to the well head connector.
4. Turn on the controller with the red switch marked start.
5. Adjust the flow rate with the variable control dial to the desired flow rate. Maintain the lowest flow rate necessary to prevent the well from pumping dry.
6. Sampling will commence after purging is complete. If a well is effectively pumped dry, the well will be sampled within a 24 hour period.

3.3.1.4 Groundwater Collection Lift Stations and Purge Wells

Lift station and purge well control panels are equipped with “auto/off/manual” capability. If the lift station or purge well is not running at the time of sampling, the lift station/purge well should be toggled to “manual” control and the sample port should be opened to clear lines of any stagnant water.

3.3.1.5 Pumping Rates & Stabilization

Well purging is conducted to obtain samples from the wells that are as representative as possible of conditions in the formation. The rate at which wells are purged should be kept to a minimum to prevent dewatering the well filter pack to the greatest extent possible. Excessive purging rates and filter pack dewatering can result in increased turbidity of water samples which limits the quality of the samples. In cases where the well is fixed-

volume purged, purging can be considered complete if the well has been pumped to dryness. Sampling will commence after purging or within 24 hours if the well is pumped to dryness.

3.3.2 Low Flow Groundwater Purging

Low flow groundwater purging consists of purging a well at a rate slow enough to minimize turbidity, eliminate gas exchange between the sample and the atmosphere, and obtain groundwater from the surrounding soils instead of stagnant water in the well casing. Purging should be conducted with the pump intake at the middle or toward the top of the screened interval. While purging, record measurements of the following secondary parameter values using a multi-meter or flow-thru cell:

- Static water level;
- Flow rate;
- Dissolved oxygen;
- Temperature;
- Specific conductivity;
- pH;
- REDOX potential; and
- Turbidity.

This can assist in determining when formation water is being removed from a well. At the point when the secondary parameters are observed to stabilize, formation water is being obtained and sampling can proceed. Site specific stabilization criteria are typically determined when the previous three or more readings for each parameter (taken at regular time intervals) are within defined acceptable ranges. Default criteria applied to the last three readings are as follows:

Parameter	Default Stabilization Criterion
Dissolved Oxygen	+/- 10% or < 0.30 mg/L
Specific Conductivity	+/- 3%
pH	+/- 0.1 SU
REDOX potential	+/- 10 mV
Turbidity	< 20 NTU or +/- 10%

Sampling may commence after stabilization, provided the purging rate does not increase significantly. Turbidity is the most conservative indicator of stabilization as it is often the last

to stabilize. Turbidity in groundwater samples may be naturally occurring, caused by sampling disturbances or filter pack siltation. Knowledge of site geology, well design, and sampling methodology is helpful in determining the source of turbidity and the method of sampling. Turbidity due to sampling disturbances should be eliminated or minimized while naturally occurring turbidity or turbidity due to contamination should not. Deviations from the default stabilization criteria should be noted on the field data sheet. In some cases, the default stabilization criteria will need to be supplemented with well or site-specific criteria. If parameter stabilization criteria are too stringent, then minor fluctuations in indicator parameters may cause sampling to become unnecessarily delayed. If well or site-specific criteria are developed, they will be followed each time a well is sampled.

Static water levels in the well should be monitored periodically during purging to evaluate the level of drawdown in the well. Ideally, drawdown should be kept to <0.1m during purging. This goal may be difficult to achieve under some circumstances due to heterogeneities within the screened interval, and may require adjustment based on well or site-specific conditions and past sampling experience. If well or site-specific criteria are developed, they will be followed each time a well is sampled.

3.4 Sampling Procedures

Sampling should be performed in accordance with Section 2.0, General Procedures and Guidelines. Field data and samples shall be obtained according to the location, frequency, parameters, and analytical requirements as specified in Table 1, Environmental Analytical Sample Collection Specifications, and Table 2, Sample Collection Chart. The complete Dow Analytical Chemical Constituent, Analytical Method, and Reporting Limit List are referenced in Appendix B.

Sampling may commence after parameter stabilization. If wells are effectively purged dry, wells should be sampled within 24 hours and any sample for metals should be filtered during sample collection. Sampling will be done at the lowest continuous flow rate possible. If sampling does not immediately follow purging, the pump lines should be filled with fresh well water pumped at the lowest flow rate possible before sampling. Inspect each well and pump for damage or tampering and document any changes on the Well Inspection Sheet (see Appendix G).

For lift stations or purge wells, sampling can begin after lines have been purged of stagnant water. After sampling, close sample port and return lift station to “auto” control, as necessary. Inspect each lift station or purge well for damage or tampering and document any changes in the field data sheet/filed form.

3.5 Trip and Field Blanks

Trip blanks will be prepared according to the Quality Control Table in Appendix A, and remain unopened throughout the sampling day. Trip blanks are used to evaluate the potential for contamination during equipment and sample transport. Laboratory testing of trip blanks is optional, and may be conducted if field blank samples detect constituents of concern. Bottles shall be prepared according to Appendix A, and the time they were prepared will be recorded on the field data sheet. Preservatives (if necessary) will be added to the trip blanks at the time the bottles are filled, to prevent opening the bottles in the field. At the end of the sample event, trip blanks will remain with the samples collected and will be analyzed only if necessary. Trip blanks for liquid samples should be free of constituents in question. Untested Trip Blanks will be discarded.

Field blanks will be prepared according to the Quality Control Table in Appendix A and treated in the exact same manner as the rest of the samples. Field blanks are needed to evaluate the potential for contamination during sampling. The field blank media will be transported to the field in clean or new containers with the proper labeling. The field blank bottles may be filled at any time in the field during the sampling process. Field blanks for liquid samples should be free of constituents in question.

In the event that non-dedicated sampling equipment is used, an equipment blank will be submitted for each parameter and treated in the same manner as the rest of the samples (see Quality Control Table in Appendix A). An equipment blank will be collected by pouring deionized or distilled water over or through the sampling equipment and collecting the rinsate in the sample bottles. At the end of the sample event, equipment blanks will remain with the samples collected.

3.6 Duplicate Samples

Field duplicate samples will be obtained for environmental monitoring projects according to the Quality Control Table in Appendix A.

3.7 Well Installation Cross-Contamination Prevention Procedures

Additional or replacement wells should be installed in a manner which prevents cross-contamination, in accordance with Appendix K, or an approved plan. Soil boring equipment, tooling, and well materials should be thoroughly steam-cleaned prior to use at the site. All water used for steam cleaning should be obtained from a Regional Aquifer Well at Michigan Operations. When drilling monitoring wells, a surface casing should be set to isolate the borehole from the shallow surface sediments. Lubricants should not be used on equipment that enters the well bore.

New PVC, rubber, or nitrile gloves should be worn by workers contacting the well string during installation. Teflon tape may be used to seal threaded joints on the well string or surface casing. Clean, bagged filter sand, unopened buckets of bentonite pellets, and bagged bentonite for grout will be used during well installation.

4.0 Leachate Monitoring Field Procedures

The Leachate Monitoring Field Procedures section includes guidelines for sampling and inspecting leachate collection lift stations. General procedures and guidelines for all sampling media are discussed in the General Procedures and Guidelines section.

4.1 Sampling Procedures

Samples shall be obtained according to the location, frequency, parameters, and analytical requirements as specified in Table 1, Environmental Analytical Sample Collection Specifications, and Table 2, Sample Collection Chart. Leachate sampling will be dependent upon sufficient leachate flow. Each lift station must be visually inspected to determine if there is sufficient leachate for sampling to occur.

Lift stations are sampled with dedicated stainless steel bailers, or by sample port. To obtain a sample, the lift station cover is removed. The bailer will be slowly lowered into the lift station and allowed to fill with leachate. After filling, the bailer is retrieved through the opening. Sample bottles are filled directly from the bailer. The retrieval string shall be disposable nylon string that is discarded after each use. To obtain a sample from a lift station with a sample port, sampling can begin after the lines have been purged of stagnant water. Sample bottles are filled directly from the sample port. After sampling, close the sample port and return the lift station to “auto” control, as necessary.

Complete a field data sheet for each lift station, as described in Section 2.2. Inspect each lift station for damage or tampering and document any changes on the field data sheet.

4.2 Trip and Field Blanks

Trip blanks and field blanks are not required for leachate sampling events (see the Quality Control Table in Appendix A).

4.3 Duplicate Samples

Field duplicate samples will be obtained for environmental monitoring projects according to the Quality Control Table in Appendix A.

5.0 Soil Monitoring Field Procedures

The Soil Monitoring Field Procedures section includes guidelines for sampling surface soil and soil boxes. General procedures and guidelines for all sampling media are discussed in the General Procedures and Guidelines section.

5.1 Sampling Procedures

Soil samples will be obtained according to the location, frequency, parameters and analytical requirements as specified in Table 1, Environmental Analytical Sample Collection Specifications, and Table 2, Sample Collection Chart.

5.1.1 Surface Soil and Soil Box Composite Sampling

Non-volatile constituents will be collected using this composite sampling technique, which includes, clearing the site, obtaining the sample cores, homogenizing the sample cores, and containerizing the samples.

At each sample site, the vegetation will be trimmed to the surface and new sample gloves will be donned. Fifteen soil cores will be obtained from locations around an approximately three foot radius circle at fifteen inch intervals, using a one inch diameter soil survey probe. A 'hoop' template will be used to indicate the locations at which the individual cores are collected. If it is determined that more than 15 cores are needed, they will be obtained by continuing around the circle. Each soil core will be placed in on a 0.25-inch sieve inside a stainless steel bowl. Large roots or debris (stones, pebbles, roots, twigs, or other non-soil) will be removed with tweezers.

The composite sample with be made by homogenizing approximately the top one-inch of the fifteen soil cores. Samples will be transferred to pre-cleaned containers and will be appropriately labeled to uniquely identify each sample. An additional sample container will be filled at each location and maintained as a "contingency".

Soil samples will not be collected if the ground is frozen or during rain events.

5.1.2 Volatile Organic Compound Soil Sampling

Soil samples for volatile organic compounds will be preserved prior to analysis. Sample preservation may be accomplished in the field or in the laboratory.

If field preservation method is utilized, the preservation of volatiles is required after the sample has been collected. This can be completed in the field by weighing the soil sample to the nearest 0.1 grams and preserving with an equivalent volume of purge-and-trap grade methanol to the sample (example: 10 grams of soil are collected, 10 milliliters of methanol are used to preserve the sample). The preservatives will be added immediately after samples are collected. Required safety equipment are nitrile gloves and safety goggles.

Laboratory preservation may use soil coring devices such as Encore® samplers, or equivalent, are employed. Methanol will be added by the laboratory within 48 hours of sample collection. If soil coring samplers are used to collect soil samples for VOA analysis, one duplicate methanol preservation sampling will be performed for every ten samples or every event (if less than ten samples are obtained).

5.2 Trip and Field Blanks

Trip blanks will be prepared according to the Quality Control Table in Appendix A, by placing clean Ottawa sand in a clean sample bottle, prior to every sampling event. The trip blank will remain unopened throughout the sampling day. Trip blanks are used to evaluate the potential for contamination during equipment and sample transport. Laboratory testing of trip blanks is optional, and may be conducted if unusual or unexpected results are obtained during laboratory testing of soil samples. Sample bottles shall be prepared for all the parameters being sampled and the time they were prepared will be recorded on a field data sheet. Preservatives (if necessary) will be added to the trip blanks at the time the bottles are filled, to prevent opening the bottles in the field. At the end of the sample event, trip blanks will remain with the samples collected and will be analyzed only if necessary. Untested trip blanks will be discarded.

One blank sample will be collected for each sampling event to serve as both the field blank and equipment blank, according to the Quality Control Table of Appendix A. Field blanks will be submitted for each parameter and treated in the exact same manner as the rest of the samples. Field blanks are needed to evaluate the potential for contamination during sampling. The field

blank media will be transported to the field in clean or new containers with the proper labeling. The field blank bottles may be filled at any time in the field during the sampling process. Place a clean set of all the tools that would normally be used (spatula, core tool, tweezers, etc) into a clean compositing bowl. Pour Ottawa sand through a clean 0.25-inch sieve into a stainless steel compositing bowl, making sure the sand touches the tools in the bowl. Use a clean spoon to place sand into the clean bottle(s).

5.3 Duplicate Samples

Field duplicate samples will be obtained for environmental monitoring projects according to the Quality Control Table in Appendix A.

Table 1. Environmental Analytical Sample Collection Specification

Liquid Samples

Parameter	Description	Bottle Size	Bottle Type [(1)]	Preservation	Holding Time	Number of bottles per sample point
VOA	Volatile Organic Analysis	40 mL	Glass Vial	.25 mL Sulfuric or .5 mL HCL	14 days	*4
EOA	Extractable Organic Analysis	1 L	Amber Glass	None	7/40 days (extract/analyze)	2
PCBs	PCBs Analysis	1 L	Amber Glass	None	7/40 days (extract/analyze)	2
Pesticides	Pesticides Analysis	1 L	Amber Glass	None	7/40 days (extract/analyze)	2
TOC	Total Organic Carbon	250 mL 100 mL 40 mL	Amber Glass Poly Glass Vial	2 mL Sulfuric	28 days	1
Carbs	Bicarbonate/Carbonate Analysis	120 mL	Poly	None	14 days	1
Sulfide	Sulfide Analysis	250 or 500 mL	Amber Glass	ZnAC & NaOH	7 days	1
Cyan	Cyanide Analysis	250 mL	Poly	2 mL NaOH	14 days	1
Ammonia	Ammonia	500 mL	Poly	2 mL Sulfuric (pH<2)	28 days	1
Phosphorus	Determination of Phosphorus by Semi-Automated Colorimetry	500 mL 250 mL	Poly Poly	H2SO4	28 days	1
N/NO3	Nitrite/Nitrate Analysis	500 mL	Brown Plastic	2 mL Sulfuric	28 days	1
Phenols	Phenols Analysis	500 mL	Amber Glass	2 mL Sulfuric	7 days	1
Phosphate	Total / Hydrolyzable Phosphate Orhophosphate	500 mL 500 mL	Poly Poly	2mL Sulfuric None	28 days 48 Hours	1 1
FL	Fluoride Analysis	500 mL	Poly	None	28 days	1
Sulfate	Sulfate Analysis	120 mL	Poly	None	28 days	1
Chlorides	Chloride Analysis	120 mL	Poly	None	28 days	1
Metals	Inorganic Analysis	250 mL 1L	Poly Poly	2 mL Nitric	6 months	1
TOX	Total Organic Hologens	500 mL	Amber Glass	Sulfuric Acid to a pH of <2	7 days	*4
Turbidity	Turbidity Measurements	120 mL	Amber Glass	None	48 hours	1
D / F	**Dioxin / Furans Analysis	1 Liter	Amber Glass	None	1 Year	2
Ethane	Ethane Analysis	40 mL	Glass Vial	.25 mL Sulfuric or .5 mL HCL	14 days	*4
Ethene	Ethene Analysis	40 mL	Glass Vial	.25 mL Sulfuric or .5 mL HCL	14 days	*4
Ferrous iron	Ferrous Iron Analysis	500 mL	Brown Plastic	2 mL Sulfuric	6 months	1
Carbon Dioxide	Carbon Dioxide Analysis	40 mL	Glass Vial	None	7 days	2
TSS	Total Suspended Solids	500 mL	Poly	None	7 days	1

Notes:
(1) Equivalent Bottles may be submitted.
*=With Zero Headspace
**=Consult with analysts before sampling

Table 1. Environmental Analytical Sample Collection Specification

Solid Samples

Parameter	Description	Bottle Size	Bottle Type	Preservation	Holding Time	Number of bottles per sample point
D / F	***Dioxin / Furans Analysis for Ash or Soil	250 mL	Amber Glass (Wide-mouth)	None	1 Year	2
Metals	Inorganic Analysis	250 mL	Clear Glass (Wide-mouth)	None	6 Months	2
EOA	Extractable Organic Analysis	250 mL	Clear Glass (Wide-mouth)	None	14/40 days (extract/analyze)	2
VOA	Volatile Organic Analysis	60 mL 40 mL	Clear Glass	Methanol (Method 5035)	14 days	4
TCLP / VOA	TCLP for Volatiles	250 mL	Clear Glass (Wide-mouth)	None	14 days	2
TCLP / Metals	TCLP for Inorganics	250 mL	Clear Glass (Wide-mouth)	None	180 days	2
TCLP / EOA	TCLP for Extractables	250 mL	Clear Glass (Wide-mouth)	None	14 days	2

Notes:
***=Jars half full and threads wiped clean.

Field Measurements

The following measurements may be taken during any field sampling, following current and applicable SW-846 or ASTM Methods:

- Temperature
- pH
- Specific Conductance
- Turbidity
- Redox Potential
- Dissolved Oxygen

Table 2-A. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Glacial Till and Regional Aquifer Detection Monitoring							
3794	Well	Quarterly	Yes	Temp, pH, Conductivity, REDOX, DO, Turbidity	VOA, EOA, METALS (filtered), SULFATE, CHLORIDE, CARBS	Primary Constituents: benzene, chlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, methylene chloride, o-chlorophenol, 2,4-D, 2,4-dichlorophenol, pentachlorophenol, phenol, silvex, 2,4,5-T, 2,4,5-trichlorophenol, bromoform, 1,2-dibromoethane, dibromomethane, 1,2-dibromo-3-chloropropane Tracking Parameters: chloride, carbonate alkalinity(CO3), bicarbonate alkalinity, sulfate (SO4), calcium, magnesium, potassium, sodium, iron additional compounds for Cluster C-7: dichlorodiflouromethane, trichoroflouromethane	(See Figure 1) **QUARTERLY EVALUATIONS:** **Detection Monitoring Performance Criteria for Primary Constiuents** Concentrations of Primary Constituents in each well will be compared to the approved reporting limits specified in Appendix B of the SAP. -Performance criteria have been met if measured concentrations of all constituents in all wells are **less than** their respective reporting limit. -Performance criteria are not being met if the measured concentration of a constituent in any well is **equal to or greater than** the respective reporting limit. Resample the well for the Primary Constituent in question, as soon as practicable. The well will be resampled 4 times, repurging between each sampling. **Confirmation that Performance Criteria are not met for Primary Constituents** It is confirmed that performance criteria are not met for a Primary Constituent if 2 or more of the 4 replicates are detected at or above the reporting limit, or at least 1 of the 4 replicates is detected at 5x the reporting limit. **Determine Statistically Significant Increase for a Tracking Parameter** Temporal Stiff diagrams will evaluate relative percent difference for each of the compounds on the chart from previous monitoroing period to current. Statistically significant increases will be recognized by at least three consecutive quarterly temporal plots showing the same sequential pattern, or a long term change in concentration that is defined by a consistent 50% or more increase per year in annual average concentration over a period of two years for any individual Tracking Parameter. Note: for temporal Stiff diagram evaluations, non-detect values will be considered at the reporting limit. See Appendix H for description of using Stiff diagrams for chemical evaluation. **Statistically Significant Increase Confirmation for Tracking Parameter** The Tracking Parameter is confirmed if 2 or more of the 4 replicates result in the same temporal stiff plot sequenstial pattern or result in a 50% or more increase per year in annual average concentration over time over a period of two years. **ANNUAL EVALUATIONS:** - A narrative summary of groundwater Primary Constituent and Tracking Parameter results, including Tracking Parameter trends. *Note: SWLs measured as part of the chemical monitoring shall be used for quality control purposes only and not as part of the hydraulic monitoring program.
3796A	Well						
3856	Well						
3858	Well						
3860	Well						
3862	Well						
C7-231	Well						
C7-241	Well						
C7-251	Well						
C7-261	Well						
C7-271	Well						
C8-210	Well						
C9-239	Well						
C9-251	Well						
C9-278	Well						
C9-296	Well						
8614B	Well						
8264G	Well	Annually					
8264I	Well						
8265F	Well						
8265G	Well						

Table 2-A. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Glacial Till and Regional Aquifer Hydraulic Monitoring							
2708	Well	Quarterly	Yes	None	None	None	**ANNUAL EVALUATIONS:** **<u>Hydraulic Monitoring Evaluations:</u>** - Use SWL data to develop a contour map of the piezometric surface and determine the hydraulic gradient in the Regional Aquifer. - Calculate groundwater flow rate in the Regional Aquifer. - Confirm upward gradient from the Regional Aquifer to the sand subunits in the Glacial Till using the well groupings identified on Figure 1.
2745	Well						
3065	Well						
3066	Well						
3137	Well						
3138	Well						
3795	Well						
3859	Well						
3861	Well						
5220	Well						
5232	Well						
5266	Well						
3794	Well						
3796A	Well						
3856	Well						
3858	Well						
3860	Well						
3862	Well						
2438	Well						
3013	Well						
3011	Well						
C7 - 271	Well						
C8 - 210	Well						
C9 - 296	Well						
8614B	Well						
8264I	Well						
8265G	Well						

Table 2-B. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
East-Side RGIS - Chemical Monitoring							
LS-101	Sump	Target lists sampled annually. Every five years sample for 40 CFR 264, Appendix IX	No	Temp, pH, and Conductivity	VOA, EOA, METALS (filtered), D/F	benzene, bromochloromethane, chlorobenzene, chloroform, 1,2-dibromoethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, cis-1,2-dichloroethene, dibromomethane dichloromethane, 1,2-Dichloropropane, 1,4-dioxane, ethylbenzene, tetrachloroethene, 1,1,2-Trichloroethane 1,2,4-trichlorobenzene, trichloroethene, vinyl chloride, m- & p-xylene, bis(2-chloroethyl)ether, t-butyl phenol 2-chlorophenol, 2,4-dichlorophenol, 2,6-dichlorophenol, hexachlorobenzene, hexachlorobutadiene, naphthalene, pentachlorophenol, pentachlorobenzene, phenol, o-phenylphenol, 4-tert-butylphenol, 1,2,4,5-tetrachlorobenzene 2,3,4,6-tetrachlorophenol, 2,4,6-trichlorophenol, arsenic, lithium, (2,3,7,8-substituted dioxins and furans)17 isomers and 2,3,7,8-TCDD TEQ, using WHO-TEF	(See Figure 2) **ANNUAL EVALUTIONS:** Trend charts will be used to evaluate changes in groundwater quality over time. Performance Summary: The licensee shall submit a summary of maintenance activities from the previous year and a performance evaluation of the RGIS, including trend evaluation(s) of water quality over time, average monthly flow and volumes of water removed from each lift station as well as long-term trend evaluations of water levels from the RGIS piezometers. **TARGET LIST EVALUATIONS:** Every five years (beginning in 2006) sample lift stations for 40 CFR Part 264 Appendix IX list. Re-evaluate annual list by comparing with results of 40 CFR Part 264 Appendix IX testing. Results of chemical monitoring are submitted according to Condition II.I.3.
LS-102	Sump						
LS-3	Sump						
LS-4	Sump						
LS-5	Sump						
LS-6	Sump						
LS-7	Sump						
LS-8	Sump						
LS-13	Sump						
Deep Well 5964	Purge Well						

Table 2-B. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
East-Side RGIS - Hydraulic Monitoring							
Compare to Upper River Level							
9006	Cluster 101A Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)	Yes	None	None	None	**2-DAY EVALUATIONS:** **Automated Piezometer Static Water Levels** A flow sheet describing the data evaluation and reporting requirements for the RGIS is provided in Figure 4. 12-hour average and instantaneous (real-time) static water level data from the automated primary piezometers, which are collected and compiled by computer, shall be compared to the Upper River Level within two working days. **Pro-Active Response Performance Criteria** -Pro-Active Response Performance criteria are being met if the instantaneous (real-time) static water levels in the primary piezometers are below the instantaneous (real-time) Upper River Level by two feet or more. -Performance criteria are not being met if the instantaneous (real-time) water levels in the primary piezometer are below but within two feet of the instantaneous (real-time) Upper River Level. Immediately initiate Proactive Response activities defined in Condition IX.D.2.(a).(v). **Initial Response Performance Criteria** -Inital Response Performance criteria are being met if the 12-hour average static water levels in the primary piezometers are below the 12-hour average Upper River Level. -Performance criteria are not being met if the 12-hour average static water levels in the primary piezometers are equal to or greater than the 12-hour average Upper River Level. Immediately begin Initial Response activities defined in Condition IX.D.2.(a).(vii). **QUARTERLY EVALUATIONS:** Summarize the 12-hour average automated hydraulic data using trend charts. Summarize response information for the quarter. **Automated Piezometer Calibration** The licensee shall collect static water level measurements manually at each primary piezometer at the frequency specified in
9008	Cluster 101C Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
6002	Cluster AS Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
6533	Cluster AZ Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
6537	Cluster BA Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5995	Cluster AQ Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
6107	Cluster AW Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
6004	Cluster AS Deep Piezo	Manually once per quarter	Yes	None	None	None	**2-DAY EVALUATIONS:** **Manual Piezometer Static Water Levels** Manual static water level data from the deep piezometers shall be compared to the Upper River Level within two working days. **Initial Response Performance Criteria** -Inital Response Performance criteria are being met if the manual static water levels in the deep piezometers are below the instantaneous (real-time) Upper River Level. -Performance criteria are not being met if the manual static water levels in the deep piezometers are equal to or greater than the instantaneous (real-time) Upper River Level. Immediately begin Initial Response activities defined in Condition IX.D.2.(a).(vii). **QUARTERLY EVALUATIONS:** Summarize the manual static water level data using trend charts. Summarize response information for the quarter.
6535	Cluster AZ Deep Piezo	Manually once per quarter					

Table 2-B. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
East-Side RGIS - Hydraulic Monitoring (Continued)							
Compare to Lower River Level							
6110	Cluster AV Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)	Yes	None	None	None	**2-DAY EVALUATIONS:** **Automated Piezometer Static Water Levels** A flow sheet describing the data evaluation and reporting requirements for the RGIS is provided in Figure 4. 12-hour average and instantaneous (real-time) static water level data from the automated primary piezometers, which are collected and compiled by computer, shall be compared to the Lower River Level within two working days. **Pro-Active Response Performance Criteria** -Pro-Active Response Performance criteria are being met if the instantaneous (real-time) static water levels in the primary piezometers are below the instantaneous (real-time) Upper River Level by two feet or more. -Performance criteria are not being met if the instantaneous (real-time) water levels in the primary piezometer are below but within two feet of the instantaneous (real-time) Lower River Level. Immediately initiate Proactive Response activities defined in Condition IX.D.2.(a).(v). **Initial Response Performance Criteria** -Inital Response Performance criteria are being met if the 12-hour average static water levels in the primary piezometers are below the 12-hour average Lower River Level. -Performance criteria are not being met if the 12-hour average static water levels in the primary piezometers are equal to or greater than the 12-hour average Lower River Level. Immediately begin Initial Response activities defined in Condition IX.D.2.(a).(vii). **QUARTERLY EVALUATIONS:** Summarize the 12-hour average automated hydraulic data using trend charts. Summarize response information for the quarter. **Automated Piezometer Calibration** The licensee shall collect static water level measurements manually at each primary piezometer at the frequency specified in order to calibrate the automatically collected static water level. The automatically collected primary piezometer static water level is calibrated if the instantaneous static water level is within six inches of the corresponding manually collected static water level.
6113	Cluster AU Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5510	Cluster Y Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5992	Cluster AP Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5513	Cluster Z Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5516	Cluster AA Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5988	Cluster AO Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5984	Cluster AN Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5980	Cluster AM Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5977	Cluster AL Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5974	Cluster AK Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5971	Cluster AJ Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					

Table 2-B. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
East-Side RGIS - Hydraulic Monitoring (Continued)							
5682	Cluster AB Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)	Yes	None	None	None	(as above)
5771	Cluster AC Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5774	Cluster AD Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5951	Cluster AG Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5954	Cluster AH Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5957	Cluster AI Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5832	Cluster AE Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5835	Cluster AF Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
6197	Cluster AX Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					
5990	Cluster AO Deep Piezo	Manually once per quarter	Yes	None	None	None	**2-DAY EVALUATIONS:** **<u>Manual Piezometer Static Water Levels</u>** Manual static water level data from the deep piezometers shall be compared to the Lower River Level within two working days. **<u>Initial Response Performance Criteria</u>** -Inital Response Performance criteria are being met if the manual static water levels in the deep piezometers are below the instantaneous (real-time) Lower River Level. -Performance criteria are not being met if the manual static water levels in the deep piezometers are equal to or greater than the instantaneous (real-time) Lower River Level. Immediately begin Initial Response activities defined in Condition IX.D.2.(a).(vii). **QUARTERLY EVALUATIONS:** Summarize the manual static water level data using trend charts. Summarize response information for the quarter.
5985	Cluster AN Deep Piezo	Manually once per quarter					
5981	Cluster AM Deep Piezo	Manually once per quarter					

Table 2-B. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
East-Side RGIS - Hydraulic Monitoring (Continued)							
Cluster AT							
6005	Cluster AT Outboard Piezo (Automated)	Continuously (manually once per quarter for calibration)	Yes	None	None	None	**2-DAY EVALUATIONS:** **<u>Automated Piezometer Static Water Levels</u>** A flow sheet describing the data evaluation and reporting requirements for the RGIS is provided in Figure 4. Cluster AT is located along the southern portion of the RGIS that is parallel to Saginaw Road, and therefore cannot be compared to the river level. The 12-hour average static water level in the primary piezometer will be compared to the 12-hour average static water level in the corresponding outboard piezometer within *two working days. The instantaneous (real-time) static water level in the primary piezometer will be compared to the instantaneous (real-time) static water level in the corresponding outboard piezometer within two working days.* **<u>Pro-Active Response Performance Criteria</u>** -Pro-Active Response Performance criteria are being met if the instantaneous (real-time) static water level in the primary piezometer is below the instantaneous (real-time) static water level in the corresponding outboard piezometer by two feet or more. -Performance criteria are not being met if the instantaneous (real-time) static water level in the primary piezometer is below but within two feet of the instantaneous (real-time) static water level in the corresponding outboard piezometer. Immediatedly initiate Proactive Response activities defined in Condition IX.D.2.(a).(v). **<u>Initial Response Performance Criteria</u>** -Performance criteria are being met if the 12-hour average static water level in the primary piezometer is below the 12-hour average static water level in the corresponding outboard piezometer. -Performance criteria are not being met if the 12-hour average static water level in the primary piezometer is equal to or greater than the 12-hour average static water level in the corresponding outboard piezometer. Immediately begin Initial Response activities defined in Condition IX.D.2.(a).(vii). **QUARTERLY EVALUATION:** Summarize the 12-hour average automated hydraulic data using trend charts. Summarize response information for the quarter. **<u>Automated Piezometer Calibration</u>** The licensee shall collect static water level measurements manually at the primary and outboard piezometers at the frequency specified in order to calibrate the automatically collected static water levels. The automatically collected static water levels are calibrated if the instantaneous static water levels are within six inches of the manually collected static water levels.
6006	Cluster AT Primary Piezo (Automated)	Continuously (manually once per quarter for calibration)					

Table 2-C. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
West-Side RGIS Chemical Monitoring							
LS-109	Sump	Annually	No	Temp, pH, and Conductivity	VOA, METALS (filtered), SULFATE, D/F	1,2-dibromoethane, 1,2-dichloroethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, benzene, chlorobenzene, vinyl chloride, barium, nickel, sulfate, (2,3,7,8-substituted dioxins and furans) 17 isomers and 2,3,7,8-TCDD TEQ, using WHO-TEF for reporting)	(See Figure 3) **ANNUAL EVALUATIONS:** Trend charts will be used to evaluate changes in groundwater quality over time. Performance Summary: The licensee shall submit a summary of maintenance activities from the previous year and a performance evaluation of the RGIS, including trend evaluation(s) of water quality over time, average monthly flow and volumes of water removed from each lift station as well as long-term trend evaluations of water levels from the RGIS piezometers. **TARGET LIST EVALUATIONS:** Every five years (beginning in 2010) sample lift stations for 40 CFR Part 264 Appendix IX list. Re-evaluate annual list by comparing with results of 40 CFR Part 264 Appendix IX testing. Results of chemical monitoring are submitted according to Condition II.I.3.
LS-20	Sump						

Table 2-C. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
West-Side RGIS - Hydraulic Monitoring							
Compare Primary versus Outboard Piezometers							
5218	Cluster T-A Inboard Piezo	Once per month - manually	Yes	None	None	None	**7-DAY EVALUATIONS:** **<u>Hydraulic Evaluation</u>** Manually collected static water levels in primary piezometers shall be compared to the manual static water levels in the corresonding outboard piezometers within ***7 calendar days*** of the collection of the hydraulic data. **<u>Initial Response Performance Criteria</u>** -Performance criteria are being met if the manual static water levels in the primary piezometers are below the manual static water levels in the corresponding outboard piezometers (drawdown to primary), or if the corresponding outboard piezometer is in a "dry" condition. -Performance criteria are not being met if the manual static water levels in the primary piezometers are equal to or greater than the manual static water levels in the corresponding outboard piezometer. Immediately begin Initial Reponse activities defined in Condition X.D.3.(a).(ii).(3). **QUARTERLY EVALUATIONS:** Summarize manually collected hydraulic data a in table, including piezometer identification, identification of primary piezometers, date of data collection, USGS water elevation for each piezometer.
5219	Cluster T-A Primary Piezo	Once per month - manually					
5220	Cluster T-A Outboard Piezo	Once per month - manually					
5221	Cluster T-B Inboard Piezo	Once per month - manually					
5222	Cluster T-B Primary Piezo	Once per month - manually					
5224	Cluster T-B Outboard Piezo	Once per month - manually					
5225	Cluster T-C Inboard Piezo	Once per month - manually					
5226	Cluster T-C Primary Piezo	Once per month - manually					
5228	Cluster T-C Outboard Piezo	Once per month - manually					
5229	Cluster T-D Inboard Piezo	Once per month - manually					
5230	Cluster T-D Primary Piezo	Once per month - manually					
5232	Cluster T-D Outboard Piezo	Once per month - manually					
5236	Cluster T-F Inboard Piezo	Once per month - manually					
5238	Cluster T-F Primary Piezo	Once per month - manually					
5240	Cluster T-F Outboard Piezo	Once per month - manually					
5241	Cluster T-G Inboard Piezo	Once per month - manually					
5242	Cluster T-G Inboard Piezo	Once per month - manually					
5243	Cluster T-G Pirmary Piezo	Once per month - manually					
5245	Cluster T-G Outboard Piezo	Once per month - manually					

Table 2-C. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
West-Side RGIS - Hydraulic Monitoring (Continued)							
5246	Cluster T-H Inboard Piezo	Once per month - manually	Yes	None	None	None	(same as above)
5247	Cluster T-H Primary Piezo	Once per month - manually					
5249	Primary T-H Outboard Piezo	Once per month - manually					
5254	Cluster T-J Inboard Piezo	Once per month - manually					
5255	Cluster T-J Primary Piezo	Once per month - manually					
4823	Cluster T-J Outboard Piezo	Once per month - manually					
8572	Cluster BB Outboard Piezo	Once per month - manually					
8574	Cluster BB Inboard Piezo	Once per month - manually					
8573	Cluster BB Primary Piezo	Once per month - manually					
8575	Cluster BC Outboard Piezo	Once per month - manually					
8576	Cluster BC Primary Piezo	Once per month - manually					
8577	Cluster BC Inboard Piezo	Once per month - manually					
4013	Cluster U Inboard Piezo	Once per month - manually					
5253	Cluster U Inboard Piezo	Once per month - manually					
5258	Cluster U Primary Piezo (Automated)	Continuously (manually once per month)					
5259	Cluster U Outboard Piezo (Automated)	Once per month - manually					

Table 2-C. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
West-Side RGIS - Hydraulic Monitoring (Continued)							
4012	Cluster V Inboard Piezo	Once per month - manually	Yes	None	None	None	(same as above)
5260	Cluster V Primary Piezo (Automated)	Continuously (manually once per month)					
5262	Cluster V Outboard Piezo	Once per month - manually					
5263	Cluster W Inbaord Piezo	Once per month - manually					
5264	Cluster W Primary Piezo (Automated)	Continuously (manually once per month)					
5266	Cluster W Outboard Piezo	Once per month - manually					
5267	Cluster X Inboard Piezo	Once per month - manually					
5268	Cluster X Primary Piezo (Automated)	Continuously (manually once per month)					
5269	Cluster X Outboard Piezo	Once per month - manually					
3977	Cluster AY Outboard Piezo	Once per month - manually					
3978	Cluster AY Outboard Piezo	Once per month - manually					
6192	Cluster AY Primary Piezo	Once per month - manually					
3979	Cluster AY Inboard Piezo	Once per month - manually					
3980	Cluster AY Inboard Piezo	Once per month - manually					

Table 2-C. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
West-Side RGIS - Hydraulic Monitoring (Continued)							
Compare Primary Piezometer to Bullock Creek							
5233	Cluster T-E Inboard Piezo	Once per month - manually	Yes	None	None	None	**7-DAY EVALUATIONS:** **Hydraulic Evaluation** Compare manual static water levels in primary piezometers to the manual static water levels in the corresponding outboard piezometers and Bullock Creek water level within **7 calendar *days*** of the collection of the hydraulic data. **Initial Response Performance Criteria** -Performance Criteria are being met if the manual static water level in the primary piezometer is below the manual static water level in the corresponding outboard piezometer or the manual static water level in the primary piezometer is lower than Bullock Creek. -Performance criteria are not being met if the manual static water level in the primary piezometer is equal to or greater than the manual static water level in the corresponding outboard piezometer and Bullock Creek. Immediately begin Initial Reponse activities defined in Condition IX.D.3.(a).(ii).(3). **QUARTERLY EVALUATIONS:** Same as page 2 of this table.
5234	Cluster T-E Primary Piezo	Once per month - manually					
5235	Cluster T-E Outboard Piezo	Once per month - manually					
Compare Inboard and Outboard Piezometers							
4965	Cluster T-I Inboard Piezo	Once per month - manually	Yes	None	None	None	**7-DAY EVALUATIONS:** **Hydraulic Evaluation** Compare manual static water levels in corresponding outboard and inboard piezometers within ***7 calendar days*** of the collection of the hydraulic data. **Initial Response Performance Criteria** -Performance criteria are being met if the manual static water level in 5252 (outside of sheet piling) is below the manual static water level in 5257 (inside of sheet piling). -Performance criteria are not being met if the manual static water level in 5252 is greater than or equal to the manual static water level in 5257. Immediately begin Initial Reponse activities defined in Condition X.D.3(a)(ii)(3). **QUARTERLY EVALUATIONS:** Same as page 2 of this table.
4965A	Cluster T-I Inboard Piezo	Once per month - manually					
5250	Cluster T-I Inboard Piezo	Once per month - manually					
5252	Cluster T-I Outboard Piezo	Once per month - manually					
5257	Cluster T-I Outboard Piezo	Once per month - manually					
Lift Station 109 Piezos - Compare to Lower River Level							
8862	Cluster 109A Primary Piezo	Once per month - manually	Yes	None	None	None	**7-DAY EVALUATIONS:** **Hydraulic Evaluation** Compare manual static water levels in the primary piezometers and the outboard piezometer to the Lower River Level within ***7 calendar days*** of the collection of the hydraulic data. **Initial Response Performance Criteria** -Performance criteria are being met if the manual static water levels in the primary and outboard piezometers are below the instantaneous (real-time) Lower River Level. -Performance criteria are not being met if the manual static water levels in the primary and outboard piezometers are greater than or equal to the instantaneous (real-time) Lower River Level. Immediately begin Initial Reponse activities defined in Condition IX.D.3.(a).(ii).(3). **QUARTERLY EVALUATIONS:** Same as page 2 of this table.
6170	Cluster 109A Outboard Piezo	Once per month - manually					

Table 2-C. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
West-Side RGIS - Hydraulic Monitoring (Continued)							
Lift Station 109 Piezos - Compare Inboard and Outboard Piezometers							
8864	Cluster 109B Primary Piezo	Once per month - manually	Yes	None	None	None	**7-DAY EVALUATIONS:** **Hydraulic Evaluation** Compare manual static water levels in corresponding outboard and inboard piezometers within ***7 calendar days*** of the collection of the hydraulic data. **Initial Response Performance Criteria** -Performance criteria are being met if the manual static water level in the primary pieozometer is below the manual static water level in the corresponding outboard piezometer (drawdown to primary), or if the corresponding outboard piezometer is in a "dry" condition. -Performance criteria are not being met if the manual static water level in the primary piezometer is equal to or greater than the manual static water level in the corresponding outboard piezometer. Immediately begin Initial Reponse activities defined in Condition IX.D.3.(a).(ii).(3). **QUARTERLY EVALUATIONS:** Same as page 2 of this table.
8863	Cluster 109B Outboard Piezo	Once per month - manually					
8866	Cluster 109D Primary Piezo	Once per month - manually	Yes	None	None	None	
8865	Cluster 109D Outboard Piezo	Once per month - manually					

Table 2-D. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
6 Pond Collection Tile System - LS-11 Chemical Monitoring							
LS-11	Sump	Annually	No	Temp, pH, and Conductivity	VOA, METALS (filtered), SULFATE, D/F	1,2-dibromoethane, 1,2-dichloroethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, benzene, chlorobenzene, vinyl chloride, barium, nickel, sulfate, (2,3,7,8-substituted dioxins and furans) 17 isomers and 2,3,7,8-TCDD TEQ, using WHO-TEF for reporting)	(See Figure 3) **ANNUAL EVALUATIONS:** Groundwater quality over time will be evaluated by creating trend charts. Performance Summary: The licensee shall submit a summary of maintenance activities from the previous year and a performance evaluation of the RGIS, including the trend evaluation(s) of water quality over time, average monthly flow and volumes of water removed from each lift station as well as long-term trend evaluations of water levels from the piezometers. **TARGET LIST EVALUATIONS:** Every five years (beginning in 2010) sample lift stations for 40 CFR Part 264 Appendix IX list. Re-evaluate annual list by comparing with results of 40 CFR Part 264 Appendix IX testing. Results of chemical monitoring are submitted according to Condition II.I.3.
6 Pond Collection Tile System- LS 11 Area Hydraulic Monitoring							
3975	Cluster R Outboard Piezo	Monthly	Yes	None	None	None	(See Figure 5a) **7-DAY EVALUATIONS:** **<u>Hydraulic Evaluation</u>** Manually collected static water levels in primary piezometers shall be compared to the manual static water levels in the corresponding outboard piezometers within ***7 calendar days*** of the collection of the hydraulic data. **<u>Initial Response Performance Criteria</u>** -Performance criteria are being met if the manual static water levels in the primary piezometers are below the manual static water levels in the corresponding outboard piezometers (drawdown to primary), or if the outboard piezometer is in a "dry" condition. -Performance criteria are not being met if the manual static water levels in the primary piezometers are equal to or greater than the manual static water levels in the corresponding outboard piezometers. Immediately begin Initial Reponse activities defined in Condition IX.D.4.(a).(ii).(3). **QUARTERLY EVALUATIONS:** Summarize manually collected hydraulic data in a table, including piezometer identification, indentification of primary piezometers, date of data collection, USGS water elevation for each piezometer.
6194	Cluster R Primary Piezo	Monthly					
4787	Cluster R Inboard Piezo	Monthly					
3983	Cluster S Outboard Piezo	Monthly					
6193	Cluster S Primary Piezo	Monthly					
3985A	Cluster S Inboard Piezo	Monthly					
3985B	Cluster S Inboard Piezo	Monthly					
3986A	Cluster S Inboard Piezo	Monthly					
3986B	Cluster S Inboard Piezo	Monthly					

Table 2-D. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
6 Pond Collection Tile System - LS 12 Area Hydraulic Monitoring							
8579	Cluster BD Primary Piezo	Monthly	Yes	None	None	None	(See Figure 3) **7-DAY EVALUATIONS:** **<u>Hydraulic Evaluation</u>** Manually collected static water levels in primary piezometers shall be compared to the manual static water levels in the corresponding outboard piezometers within ***7 calendar days*** of the collection of the hydraulic data. **<u>Initial Response Performance Criteria</u>** -Performance criteria are being met if the manual static water levels in the primary piezometers are below the manual static water levels in the corresponding outboard piezometers (drawdown to primary), or if the corresponding outboard piezometer is in a "dry" condition. -Performance criteria are not being met if the manual static water levels in the primary piezometesr are equal to or greater than the manual static water levels in the corresponding outboard piezometers. Immediately begin Initial Reponse activities defined in Condition IX.D.4.(a).(ii).(3). **QUARTERLY EVALUATIONS:** Summarize manually collected hydraulic data in a table, including piezometer identification, indentification of primary piezometers, date of data collection, USGS wate elevation for each piezometer.
8599	Cluster BD Outboard Piezo	Monthly					
8580	Cluster BE Primary Piezo	Monthly					
4586	Cluster BE Outboard Piezo	Monthly					
8578	Cluster BF Primary Piezo	Monthly					
8598	Cluster BF Outboard Piezo	Monthly					

Table 2-D. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
6 Pond Collection Tile System- LS14 Area Hydraulic Monitoring							
8721	Cluster BG Primary Piezo	Monthly	Yes	None	None	None	(See Figure 3) **7-DAY EVALUATIONS:** **<u>Hydraulic Evaluation</u>** Manually collected static water levels in primary piezometers shall be compared to the manual static water levels in the corresponding outboard piezometers within ***7 calendar days*** of the collection of the hydraulic data. **<u>Initial Response Performance Criteria</u>** -Performance criteria are being met if the manual static water levels in the primary piezometers are below the manual static water levels in the the corresponding outboard piezometers (drawdown to primary), or if the outboard piezometer is in a "dry" condition. -Performance criteria are not being met if the manual static water levels in the primary piezometers are equal to or greater than the manual static water levels in the corresponding outboard piezometers. Immediately begin Initial Reponse activities defined in Condition IX.D.4.(a).(ii).(3). **QUARTERLY EVALUATIONS:** Summarize manually collected hydraulic data in a table, including piezometer identification, indentification of primary piezometers, date of data collection, USGS wate elevation for each piezometer.
8722	Cluster BG Outboard Piezo	Monthly					
8723	Cluster BH Primary Piezo	Monthly					
8724	Cluster BH Outboard Piezo	Monthly					
8725	Cluster BI Primary Piezo	Monthly					
8726	Cluster BI Outboard Piezo	Monthly					
8727	Cluster BJ Primary Piezo	Monthly					
8728	Cluster BJ Outboard Piezo	Monthly					
8729	Cluster BK Primary Piezo	Monthly					
8730	Cluster BK Outboard Piezo	Monthly					

Table 2-E. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
River Corrective Action Chemical Monitoring							
Sand Bar Lift Station	Horizontal Well	Annually	No	Temp, PH & Cond	VOA	Primary Constituents: benzene, chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene	(See Figure 5) **ANNUAL EVALUATIONS:** Trend charts will be used to evaluate changes in groundwater quality over time. Performance Summary: The licensee shall submit a summary of maintenance activities from the previous year and a performance evaluation of the lift station, including trend evaluation(s) of water quality over time, total monthly flow and volumes of water removed from the lift station as well as long-term trend evaluations of water levels from the piezometer (5678). Results of chemical monitoring are submitted according to Condition II.I.3.
River Corrective Action Hydraulic Monitoring							
MW-8 (5678)	Automated Piezo	Continuously (manually once per quarter)	Yes	None	None	None	(See Figure 5) **2-DAY EVALUATIONS:** **Automated Piezometer Static Water Levels** 12-hour average and instantaneous (real-time) static water level data from the automated piezometer, which are collected and compiled by computer, shall be compared to the Upper River Level within two working days. **Initial Response Performance Criteria (normal river level conditions)** - Initial Response Performance criteria are being met under normal river level conditions if the 12-hour average static water levels in the primary piezometers are below the 12-hour average Upper River Level. - Initial Response Performance criteria are not being met under normal river level conditions if the 12-hour average static water levels in the primary piezometers are above the 12-hour average Upper River Level. Immediately begin Initial Response activities defined in Condition IX.D.5.(a).(iv). **Initial Response Performance Criteria (high river level conditions)** A high river level condition is occurring when a portion of the Sand Bar surrounded by the sheet piling is partially or completely submerged by river water. During and immediately following high river level conditions, the instantaneous water level in the monitoring well may exceed or be equal to the river level. -Performance criteria are being met during or immediately following a high river level event if the instantaneous water levels in the piezometer are consistently decreasing, after the river level has receded below the down river edge of the sheet piling. -Performance criteria are not being met during or immediately following a high river level event if the instantaneous water levels in the piezometer do not decrease after the river level has receded below the down river edge of the sheet piling. Immediately begin Initial Response activities defined in Condition IX.D.5.(a).(iv). **QUARTERLY EVALUATIONS:** Summarize the 12-hour average automated hydraulic data using trend charts. Summarize response information for the quarter. The licensee shall develop typical hydraulic profiles of the static water elevations on a quarterly basis comparing the water level elevation in Monitoring Well 5678 to the Upper River level. **Automated Piezometer Calibration** The licensee shall collect static water level measurements manually at each primary piezometer at the frequency specified in order to calibrate the automatically collected static water level. The automatically collected primary piezometer static water level is calibrated if the instantaneous static water level is within six inches of the manually collected static water level.

Table 2-F. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
7th Street Purge Well Area Hydraulic Monitoring Program							
4175A	Piezo	Monthly, or in response to a problem identified via inspection or automated alarm	Yes	None	None	None	(See Figure 7) **7-DAY EVALUATIONS:** **<u>Hydraulic Evaluation</u>** Static water level data will be converted to U.S.G.S. datum elevations and a contour of the potentiometric surface elevation will be produced. The contour map will be evaluated within seven calendar days of taking the manual readings to determine if groundwater at the site is being captured by the purge wells (preventing upland groundwater from flowing to the Tittabawassee River). **<u>Initial Response Criteria</u>** -Performance Criteria are being met if water levels indicate gradient toward the purge wells. -Performance criteria are not being met if water levels do not indicate that the gradient is toward the purge wells, and the effective operation of the purge wells cannot be confirmed (preventing upland groundwater from flowing to the river). Begin Initial Reponse activities defined in Condition IX.D.6(a). **QUARTERLY EVALUATION:** Summarize manually collected hydraulic data in table, including piezometer identification, date of data collection, USGS water elevation for river and each piezometer. Include contour map in quarterly report. **ANNUAL EVALUATION:** Summarize the year's data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph).
3863A	Piezo						
3706	Piezo						
4179A	Piezo						
3708	Piezo						
3549A	Piezo						
3693	Piezo						
4181	Piezo						
6170	Piezo						
4183	Piezo						

Table 2-F. Sample Collection Chart

	Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
7th Street Purge Well Area Chemical Monitoring Program								
	PW-1	Purge Well	Annually	No	Temp, pH, Conductivity, RED/OX, DO, Turbidity	VOA, EOA, CYAN, METALS (filtered), CARBS, CHLORIDE	Primary Constituents: VOAs: 1,1,1-trichloroethane 1,1-dichloroethene 1,1-dichloroethane 1,2,4-trimethylbenzene 1,2-dichlorobenzene 1,2-dichloropropane 1,3,5-trimethylbenzene 1,4-dichlorobenzene benzene bromodichloromethane bromomethane 2-butanone carbon disulfide chlorobenzene chloroethane chloromethane cis-1,2-dichloroethene dichlorodifluoromethane ethylbenzene isopropylbenzene n-propylbenzene sec-butylbenzene tetrachloroethene tetrahydrofuran toluene trichloroethene m-xylene o-xylene p-xylene vinyl chloride EOAs: 1-methylnaphthalene 2-methylnaphthalene acenaphthene anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(ghi)perylene chrysene fluoranthene fluorene naphthalene phenanthrene pyrene DRO total METALS/OTHER: cadmium chromium lead bicarbonate alkalinity carbonate alkalinity chloride arsenic cyanide, total *(Reevaluate every 5 years with a 40 CFR Part 264 Appendix IX analysis of purge wells)*	(See Figure 7) **QUARTERLY EVALUATION:** **Initial Response Performance Criteria** -Inital Response Performance criteria are being met if the static water levels in the monitoring wells indicate that the gradient reversal is maintained, and there is no other indication that the purge well system is not functioning properly. -Initial Response Performance criteria are not being met if the static water levels in the monitoring wells indicate a loss of gradient reversal, or other information indicates that the purge well system is not functioning property. Immediately begin Initial Response activities defined in Condition IX.D.6(a). **ANNUAL EVALUATION:** Trend charts will be used to evaluate changes in groundwater quality over time. -Include in Operational Summary Report **TARGET LIST EVALUATION:** Every five years (beginning in 2015) sample purge wells for 40 CFR Part 264 Appendix IX list. Re-evaluate annual list by comparing with results of 40 CFR Part 264 Appendix IX testing. Results of chemical monitoring are submitted according to Condition II.I.3.
	PW-2	Purge Well						
	PW-3	Purge Well						
	PW-4	Purge Well						
	PW-5	Purge Well						
	PW-6	Purge Well						
	PW-7	Purge Well						

Table 2-F. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
7th Street Purge Well Area Corrective Action Monitoring Program (Formerly known as "Six" Purge Wells)							
MW-1	Monitoring Well	Quarterly	Yes	pH, Conductivity, Temperature, RED/OX, DO, Turbidity	VOA, EOA, CYAN, METALS (filtered), CARBS, CHLORIDE	**Primary Constituents**: VOAs: 1,1,1-trichloroethane 1,1-dichloroethene 1,1-dichloroethane 1,2,4-trimethylbenzene 1,2-dichlorobenzene 1,2-dichloropropane 1,3,5-trimethylbenzene 1,4-dichlorobenzene benzene bromodichloromethane bromomethane 2-butanone carbon disulfide chlorobenzene chloroethane chloromethane cis-1,2-dichloroethene dichlorodifluoromethane ethylbenzene isopropylbenzene n-propylbenzene sec-butylbenzene tetrachloroethene tetrahydrofuran toluene trichloroethene m-xylene o-xylene p-xylene vinyl chloride EOAs: 1-methylnaphthalene 2-methylnaphthalene acenaphthene anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(ghi)perylene chrysene fluoranthene fluorene naphthalene phenanthrene pyrene DRO total **METALS/OTHER:** cadmium chromium lead bicarbonate alkalinity carbonate alkalinity chloride arsenic cyanide, total (Reevaluate every 5 years with a 40 CFR Part 264 Appendix IX analysis of purge wells)	(See Figure 7) **QUARTERLY EVALUATION:** **Compliance Well Corrective Action Monitoring Performance Criteria:** Concentration of constituents in compliance wells will be compared to the performance criteria values specified in Appendix J of the SAP. -Performance criteria are being met if the detected concentrations in all compliance wells are less or equal to their respective performance criteria value. -Performance criteria are not being met if the measured concentration of a constituent in any compliance well is greater than the respective performance criteria value. Resample the affected well for the constituent in question, as soon as practicable.The well will be resampled 4 times, repurging between each sampling. **Confirmation that Performance Criteria are not being met;** It is confirmed that the performance criteria are not being met if 2 or more of the 4 replicates are greater than the respective performance criteria value, or at least 1 of the 4 replicates is detected at 5x the performance criteria value. **Initial Response Performance Criteria** -Inital Response Performance criteria are being met if the static water levels in the monitoring wells indicate that the gradient reversal is maintained, and there is no other indication that the purge well system is not functioning properly. -Initial Response Performance criteria are not being met if the static water levels in the monitoring wells indicate a loss of gradient reversal, or other information indicates that the purge well system is not functioning property. Immediately begin Initial Response activities defined in Condition IX.D.6(a). **TARGET LIST EVALUATION:** Every five years (beginning in 2015) sample purge wells for 40 CFR Part 264 Appendix IX list. Re-evaluate annual list by comparing with results of 40 CFR Part 264 Appendix IX testing.
MW-6	Monitoring Well						
MW-12	Monitoring Well						
MW-14S	Compliance Monitoring Well						
MW-15S	Compliance Monitoring Well						
MW-16	Monitoring Well						
MW-17	Compliance Monitoring Well						
MW-18	Compliance Monitoring Well						

Table 2-G. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Ash Pond Area Corrective Action Monitoring							
6165	Well	Quarterly	Yes	pH, Conductivity, Temperature, RED/OX, DO, Turbidity	VOA, METALS (not filtered)	VOAs: acetone, benzene, chlorobenzene, chloroform, dibromomethane, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, tran-1,2-dichloroethene, ethylbenzene, isopropyl benzene, n-propylbenzene, tetrachloroethene, toluene, 1,2,4-trichlorobenzene, 1,1,1-trichloroethane, trichloroethene, 1,2,3-trichloropropane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, vinyl chloride, xylenes METALS: boron, arsenic	(See Figure 8) **QUARTERLY EVALUATION:** **Corrective Action Monitoring Performance Criteria for Primary Constiuents** Concentrations of Primary Constituents in each well will be compared to their performance criteria values, specified in Appendix J of the SAP. -Performance criteria have been met if measured concentrations of all constituents in all wells are less than their respective performance criteria values. -Performance criteria are not being met if the measured concentration of a constituent in any well is equal to or greater than the respective performance criteria value. Resample the well for the Primary Constituent in question as soon as practicable. The well will be resampled 4 times, repurging between each sampling. **Confirmation that Performance Criteria are not met for Primary Constituents** It is confirmed that performance criteria are not met for a Primary Constituent if 2 or more of the 4 replicates are detected at or above the performance criteria value, or at least 1 of the 4 replicates is detected at 5x the performance criteria value. **ANNUAL EVALUATIONS:** A summary of groundwater quality data results, including a narrative summary of results and trends, data graphs, and isochems (if appropriate).
6166	Well						
6167	Well						
6168	Well						
6169	Well						

Table 2-H. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Former 47 Building Area Monitoring							
F47-MW-10	Well	Quarterly hydraulic monitoring	Yes	None	None		(See Figure 11) **QUARTERLY EVALUATIONS:** **Hydraulic Monitoring Program Performance Criteria** Static water level data will be converted to U.S.G.S. datum elevations and a contour of the water table elevation will be produced. Evaluate the contour map quarterly to determine if there are any areas of potential off-site groundwater migration. -Performance criteria are being met if hydraulic data confirm that the direction of flow indicates that groundwater is being captured by northernmost leg of the RGIS. -Performance criteria are not being met if hydraulic data indicate a potential for off-site groundwater migration. **ANNUAL EVALUATIONS:** Summarize the year's hydraulic data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph). **Chemical Monitoring Performance Criteria** Concentrations of Primary Constituents in each well sampled during that quarter will be compared to their performance criteria values, specified in Appendix J of the SAP. -Performance criteria are being met if measured concentrations of all constituents are less than their respective performance criteria values. -Performance criteria are not being met if a measured concentrations of a Primary Constituent is equal to or greater than the respective performance criteria value. As soon as practicable, schedule and perform confirmation re-sample of the affected well for the constituent in question. The well will be resampled 4 times, repurging the well between each sampling. **Confirmation that Chemical Monitoring Performance Criteria are not being met** It is confirmed that performance criteria are not being met if the concentrations in 2 or more of the 4 replicates are greater than the respective performance criteria value, or at least 1 of the 4 replicates is detected at 5x the performance criteria value.
F47-MW-11	Well	Quarterly hydraulic monitoring/ Annual chemical monitoring		pH, Conductivity, Temperature, RED/OX, DO, Turbidity	VOA	Primary Constituents dichlorodifluoromethane 1,2-dichloroethane 1,2-dichloropropane tetrachloroethene	
F47-MW-12	Well						
F47-MW-13	Well	Quarterly hydraulic monitoring		None	None		
F47-MW-14	Well	Quarterly hydraulic monitoring		None	None		

Table 2-I. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Northeast Perimeter Corrective Action Monitoring							
5385	Well	Semiannual (2nd and 4th Quarters)	Yes	pH, Conductivity, Temperature, RED/OX, DO, Turbidity	VOA	**Primary Constituents:** benzene, chlorobenzene, cis-1,2-dichloroethene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, dichlorodifluoromethane, 1,1-dichloroethene, trichlorofluoromethane, vinyl chloride	(See Figure 9) **SEMIANNUAL EVALUATIONS:** **<u>Corrective Action Monitoring Performance Criteria for Primary Constiuents</u>** Concentrations of Primary Constituents in each well will be compared to the approved reporting limits specified in Appendix B of the SAP. -Performance criteria have been met if measured concentrations of all constituents in all wells are less than their respective reporting limit. -Performance criteria are not being met if the measured concentration of a constituent in any well is equal to or greater than the respective reporting limit. Resample the well for the Primary Constituent in question, as soon as practicable. The well will be resampled 4 times, repurging between each sampling. **<u>Confirmation that Performance Criteria are not met for Primary Constituents</u>** It is confirmed that performance criteria are not met for a Primary Constituent if 2 or more of the 4 replicates are detected at or above the reporting limit, or at least 1 of the 4 replicates is detected at 5x the reporting limit. **ANNUAL EVALUATIONS:** A summary of groundwater quality data results, including a narrative summary of results and trends, data graphs, and isochems (if appropriate).
6176	Well						
6177	Well						
4355	Well						
4363	Well						
Northeast Perimeter Groundwater Compliance Monitoring							
4358	Well	Semiannual (2nd and 4th Quarters)	Yes	pH, Conductivity, Temperature, RED/OX, DO, Turbidity	VOA	benzene, chlorobenzene, cis-1,2-dichloroethene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, dichlorodifluoromethane, 1,1-dichloroethene, trichlorofluoromethane, vinyl chloride	(See Figure 9) **ANNUAL EVALUATIONS:** A summary of groundwater quality data results, including a narrative summary of results and trends, data graphs, and isochems (if appropriate). Results are evaluated to confirm that detected concentrations of primary constituents are stable or decreasing over time.
3540A	Well						

Table 2-I. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Northeast Perimeter Corrective Action Natural Attenuation Monitoring							
(MW-A)	Well	Semiannual (2nd and 4th Quarters)	Yes	pH, Conductivity, Temperature, RED/OX, DO, Turbidity	VOA, N/NO3, CHLORIDE, SULFATE, METALS (not filtered), SULFIDE, AMMONIA/ TOTAL PHOSPHORUS, TOC, ETHANE, ETHENE, CARBON DIOXIDE	1,1,1-trichloroethane, 1,1-dichloroethane, dichlorodifluoromethane, trichlorofluoromethane, chlorobenzene, cis-1,2-dichloroethene, tetrachloroethene, trichloroethene, vinyl chloride, manganese, sodium, zinc, ammonia, carbon dioxide, chloride, ethane, ethene, ferrous iron, nitrate, nitrite, phosphorus, sulfate, sulfides, total organic carbon	(See Figure 9) **SEMI-ANNUAL EVALUATION:** **<u>Corrective Action Chemical Monitoring Evaluation:</u>** Concentrations will be evaluated for evidence of on-going natural attenuation. - If results indicate natural attentuation is not sufficient, Dow will evaluate if additional corrective actions are needed. **ANNUAL EVALUATIONS:** A summary of groundwater quality data results, including a narrative summary of results and trends, data graphs, and isochems (if appropriate).
(MW-B)	Well						
(MW-C)	Well						
(MW-D)	Well						
(MW-F)	Well						
(MW-G)	Well						
(MW-I)	Well						
(MW-J)	Well						
(MW-K)	Well						
(MW-1)	Well						
(MW-2)	Well						
(MW-2B)	Well						
(MW-3)	Well						
(MW-3B)	Well						
(MW-4)	Well						
(MW-4B)	Well						
(MW-5)	Well						
(MW-6)	Well						
(MW-7)	Well						
(MW-8)	Well						
(MW-9)	Well						

Table 2-I. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Plume Sentinel Monitoring							
MW-H	Well	Semiannual (2nd and 4th Quarters)	Yes	Same as above	Same as above	Same as above	**SEMI-ANNUAL EVALUATION:** **<u>Plume Sentinel Well Performance Criteria:</u>** Concentrations of constituents in each well sampled during the quarter will be compared to their performance criteria values, specified in Appendix J of the SAP. - Performance criteria are being met if measured concentrations of all constituents are equal to or less than their respective performance criteria values. -Performance criteria are not being met if the measured concentration of a constituent in any well is greater than the respective performance criteria value. Resample the well for the constiteunt in question, as soon as practiable. The well will be resampled 4 times, repurging between each sampling. **<u>Confirmation that Performance Criteria are not met:</u>** It is confirmed that performance criteria are not met if 2 or more of the 4 replicates are detected above the performance criteria value, or at least 1 of the 4 replicates is detected at 5x the performance criteria value. **ANNUAL EVALUATIONS:** A summary of groundwater quality data results, including a narrative summary of results and trends, data graphs, and isochems (if appropriate).
(MW-10)	Well						

Table 2-I. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Northeast Perimeter Groundwater Monitoring							
6175	Well	Semiannual (2nd and 4th Quarters)	Yes	pH, Conductivity, Temperature, RED/OX, DO, Turbidity	VOA, N/NO3, CHLORIDE, SULFATE, METALS (not filtered), SULFIDE, AMMONIA/TOTAL PHOSPHORUS, TOC, ETHANE, ETHENE, CARBON DIOXIDE	benzene, chlorobenzene, cis-1,2-dichloroethene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, dichlorodifluoromethane, 1,1-dichloroethene, trichlorofluoromethane, vinyl chloride 1,1,1-trichloroethane, 1,1-dichloroethane, chlorobenzene, cis-1,2-dichloroethene, tetrachloroethene, trichloroethene, vinyl chloride, manganese, sodium, zinc, ammonia, carbon dioxide, chloride, ethane, ethene, ferrous iron, nitrate, nitrite, phosphorus, sulfate, sulfides, total organic carbon	(See Figure 9) **ANNUAL EVALUATIONS:** A summary of groundwater quality data results, including a narrative summary of results and trends, data graphs, and isochems (if appropriate).
6178	Well						

Table 2-J. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
West Plant Perimeter Along Poseyville Road Detection Monitoring							
4581	Well	Quarterly (SWL only)/ Annual (Analysis)	Yes	Temp, pH, Conductivity, REDOX, DO, Turbidity	VOA	Primary Constituents: Carbon tetrachloride, Chloroform	(See Figure 10) **QUARTERLY EVALUATION:** **Compliance Monitoring Performance Criteria:** Concentrations of primary constituents in each well sampled during that quarter will be compared to their performance criteria values, specified in Appendix J of the SAP. -Performance criteria are being met if the measured concentrations are less than or equal to the respective performance criteria value. -Performance criteria are not being met if the measured concentration of a constituent in any well is greater than the respective performance criteria value. As soon as practicable, re-sample of the affected well for the constituent in question. The well will be resampled 4 times, repurging between each sampling. **Confirmation that Performance Criteria are not being met:** It is confirmed that the performance criteria are not being met if 2 or more of the 4 replicates are greater than the performance criteria value, or at least 1 of the 4 replicates is detected at 5x the performance criteria value. Hydraulic Evaluation is conducted as part of the Facility Shallow Groundwater Hydraulic Monitoring Program.
4585	Well						
6278	Well						
6280	Well						
6518	Well						
6520	Well						
6545	Well						
6546	Well						
6552	Well						

Table 2-K. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Facility Shallow Groundwater - Hydraulic Monitoring							
3081	Piezo[5]	Quarterly	Yes	None	None	None	(See Figure 11) **QUARTERLY EVALUATION:** **<u>Hydraulic Performance Criteria</u>** Develop quarterly contour maps of the water elevations to assess groundwater flow conditions. Evaluate the hydraulic data quarterly to determine if there are any areas of potential off-site groundwater migration. -Performance criteria are being met hydraulic data show no potential for off-site groundwater migration. -Performance criteria are not being met if potential for grounwater flow beyond the facility boundary is identified. **ANNUAL EVALUATION:** Summarize the year's data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph).
3082	Piezo						
3083	Piezo[5]						
3538A	Piezo						
3538B	Piezo						
3539A	Piezo						
3539B	Piezo						
3540A	Well[1]						
3540B	Piezo						
3541C	Piezo						
3542A	Piezo						
3543A	Piezo						
3557	Piezo						
3558	Piezo						
3653	Piezo						
3654	Piezo						
3655	Piezo						
3656	Piezo						
3657	Piezo						
3658	Piezo						
3661	Piezo						
3666	Piezo						

[1] indicates well/piezo that is chemically monitored under the NEP program

[2] indicates well/piezo that is also included in the GTRA and RGIS West hydraulic monitoring programs

[3] indicates well/piezo that is also included in a PLF monitoring program

[4] indicates piezo that is also included in the 7th Street Purge Wells Area monitoring program

[5] indicates well/piezo that is chemically monitored under the RGIS East program

[6] indicates well/piezo that is also included in the LEL III hydraulic monitoring program

Table 2-K. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Facility Shallow Groundwater - Hydraulic Monitoring (continued)							
3668	Piezo	Quarterly	Yes	None	None	None	(same as evaluation on page 1)
3669	Piezo						
3670	Piezo						
3671	Piezo						
3673	Piezo						
3675	Piezo						
5040A	Piezo						
5040B	Piezo						
5040C	Piezo						
5040D	Piezo						
2931	Piezo						
2931A	Piezo						
3549A	Piezo[4]						
3706	Piezo						
3706A	Piezo[4]						
4175	Piezo						
4175A	Piezo[4]						
4176	Piezo						
4179A	Piezo[4]						
4180	Piezo						
4181	Piezo						
4182	Piezo						

see page 1 for footnote definitions

Table 2-K. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Facility Shallow Groundwater - Hydraulic Monitoring (continued)							
4183	Piezo	Quarterly	Yes	None	None	None	(same as evaluation on page 1)
4184	Piezo						
5220	Piezo[2]						
5232	Piezo[2]						
5266	Piezo[2]						
2790	Piezo						
2964	Piezo						
3297	Piezo						
3299	Piezo						
3331	Piezo						
3337	Piezo						
3339	Piezo						
3355	Piezo						
3356	Piezo						
3360	Piezo						
3361	Piezo						
3362	Piezo						
3366	Piezo[6]						
3368	Piezo						
3370	Piezo						
3391	Piezo						
3392	Piezo						

see page 1 for footnote definitions

Table 2-K. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Facility Shallow Groundwater - Hydraulic Monitoring (continued)							
3544A1	Piezo	Quarterly	Yes	None	None	None	(same as evaluation on page 1)
3544B1	Piezo						
3544C1	Piezo						
3587	Piezo[6]						
3592	Piezo						
3674	Piezo						
3676	Piezo						
3682	Piezo						
4293	Piezo[5]						
6532	Piezo[5]						
6533	Piezo[5]						
6534	Piezo[5]						
6535	Piezo[5]						
5137	Piezo						
5981	Piezo[5]						
5985	Piezo[5]						
5990	Piezo[5]						
6004	Piezo[5]						
2927A	CD-3 Area Piezo						
2925	CD-3 Area Piezo						
3285	Piezo						
5386	Piezo						
5385	Well[1]						
5384	Piezo						
5383	Piezo						
5387	Piezo						
5434	Piezo						
5433	Piezo						
5432	Piezo						
5435	Piezo						

see page 1 for footnote definitions

Table 2-K. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Facility Shallow Groundwater - Hydraulic Monitoring (continued)							
6175	Well[1]	Quarterly	Yes	None	None	None	(same as evaluation on page 1)
6176	Well[1]						
6177	Well[1]						
6178	Well[1]						
4355	Well[1]						
4358	Well[1]						
4359	Piezo						
3539C	Piezo						
3660	Piezo						
4363	Well[1]						
3543C1	Piezo						
3543B1	Piezo						
4348	Piezo						
5388	Piezo						
5630	Piezo						
5793	Piezo						
5794	Piezo						
5795	Piezo						

Table 2-K. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Facility Shallow - Hydraulic Monitoring (Continued)							
2790	Piezo (Top of Riverbank)	Quarterly	Yes	None	None	None	(same as evaluation on page 1)
2790A	Piezo (Top of Riverbank)	Quarterly					
2962	Piezo (Top of Riverbank)	Quarterly					
2963	Piezo (Top of Riverbank)	Quarterly					
2964	Piezo (Top of Riverbank)	Quarterly					
2965	Piezo (Top of Riverbank)	Quarterly					
3081	Piezo[1] (Top of Riverbank)	Quarterly					
3664	Piezo (Top of Riverbank)	Quarterly					

[1] indicates well/piezo that is chemically monitored under the NEP program

Table 2-K. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Facility Shallow Groundwater Monitoring							
2929A	Piezo[3]	Quarterly	Yes	None	None	None	(same as evaluation on page 1)
2930	Piezo						
2930A	Piezo[3]						
3278	Piezo[3]						
3870	Piezo						
4573	Piezo						
4574A	Piezo						
4574B	Piezo						
4575	Piezo						
4576	Piezo						
4577	Piezo						
4578	Piezo						
4579A	Piezo						
4580	Piezo						
4584	Piezo						
6277	Piezo						
6279	Piezo						
6281	Piezo						
6282	Piezo						

see page 1 for footnote definitions

Table 2-K. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Facility Shallow Groundwater Monitoring							
6519	Piezo	Quarterly	Yes	None	None	None	
6544	Piezo						
6550	Piezo						
6551	Piezo						
6553	Piezo						
6547A	Piezo						
6547B	Piezo						
6548	Piezo						
6549	Piezo						
4581	Well						
4585[1]	Piezo						
6278[1]	Well						
6280[1]	Well						
6518[1]	Well						
4582[1]	Well						
6520[1]	Well						
6545[1]	Well						
6546[1]	Well						
6552[1]	Well						

Table 2-L. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
South Saginaw Road Tile Performance Monitoring							
SA	Piezo	Quarterly	Yes	Not Required	None	None	(See Figure 12) **QUARTERLY EVALUATIONS:** **<u>Hydraulic Monitoring Performance Criteria:</u>** Water elevations will be compared to the tile invert at each piezometer location to determine if water is building up in the tile system. -Performance criteria are being met if the static water levels in the piezometers are less than 12" above the corresponding tile invert, indicating drawdown to the tile. -Performance criteria are not being met if the static water levels in the piezometers are greater than or equal to 12" above the corresponding tile invert, indicating that water is building up in the tile system. If high water levels in either the piezometers or the manholes are determined to be accurate and representative of conditions, the frequency of maintenance will be evaluated. Jetting or other maintenance will be completed to restore performance of tile system. **ANNUAL EVALUATION:** Summarize the year's data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph).
SB	Piezo						
SC	Piezo						
SD	Piezo						
SE	Piezo						
SF	RGIS Extension Piezo						
SG	RGIS Extension Piezo						
LS-S9	Sump	Monthly	No				Monthly total and average flows will be tracked over time to assess performance

Table 2-M. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Sludge Dewatering Facility (SDF) Groundwater Detection Monitoring							
4506	Detection Monitoring Well	Quarterly	Yes	Temp, pH, Conductivity, REDOX, DO, Turbidity	VOA	**Primary Constituents**: benzene, chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, *(Reevaluate every 5 years with a 40 CFR Part 264 Appendix IX analysis of the leachate.)*	(See Figure 13) **QUARTERLY EVALUATIONS:** **Detection Monitoring Performance Criteria for Primary Constiuents** Concentrations of Primary Constituents in each well will be compared to the reporting limits specified in Appendix B of the SAP. -Performance criteria have been met if measured concentrations of all constituents in all wells are less than their respective reporting limit. -If the measured concentration of a constituent in any well is equal to or greater than the respective reporting limit, performance criteria have not been met: resample the well for the Primary Constituent in question, as soon as practicable. The well will be resampled 4 times, repurging between each sampling. **Confirmation that Performance Criteria are not met for Primary Constituents** It is confirmed that performance criteria are not met for a Primary Constituent if 2 or more of the 4 replicates are detected at or above the reporting limit, or at least 1 of the 4 replicates is detected at 5x the reporting limit. **Hydraulic Monitoring Performance Criteria** Water elevations will be evaluated to ensure an inward gradient using hydrographs. -Performance criteria are being met if hydraulic data indicate an inward gradient. -Performance criteria are not being met if hydraulic data indicate a lack of inward gradient at all paired wells. Initiate perimeter chemical monitoring. **ANNUAL EVALUATIONS:** -A summary of groundwater quality data results, including a narrative summary of results and trends, data graphs, and isochems (if appropriate). -Summarize the year's hydrualic data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph). T**ARGET LIST EVALUATION:** Target list will be reevaluated and adjusted based on results of the LS-50 Appendix IX sampling every 5 years.
4507	Detection Monitoring Well						
3775	Perimeter Well	Quarterly (SWL only)/ Chemical Analysis (as described in Data Evaluation)	Yes	None	VOA, METALS (not filtered), SULFATE, CHLORIDE, CARBS	Primary Constituents: benzene, chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, Tracking Parameters: sodium, potassium, iron, magnesium, calcium, chloride, bicarbonate alkalinity (HCO3), carbonate alkalinity(CO3), sulfate (SO4) *(Reevaluate every 5 years with a 40 CFR Part 264 Appendix IX analysis of the leachate.)*	**QUARTERLY EVALUATIONS:** **Hydraulic Monitoring Performance Criteria** Water elevations will be evaluated to ensure an inward gradient using hydrographs. -Performance criteria are being met if hydraulic data indicate an inward gradient. -Performance criteria are not being met if hydraulic data indicate a lack of inward gradient along the perimeter of the SDF. Initiate chemical monitoring of perimeter wells (described below). **ANNUAL EVALUATIONS:** Summarize the year's hydrualic data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph). **4-YEAR EVALUATIONS:** **Chemical Monitoring of Perimeter Wells** Perimeter Wells will be sampled and chemically analyzed every 4 years, or in response to a lack of inward hydraulic gradient (described above). Summarize groundwater Primary Constituent and Tracking Parameter results, including Tracking Parameter trends. **Determine Statistically Significant Increase for a Tracking Parameter** Temporal Stiff diagrams will evaluate relative percent difference for each of the compounds on the chart from previous monitoring period to current. Statistically significant increases will be recognized by at least three consecutive temporal plots showing the same sequential pattern, or a long term change in concentration that is defined by a consistent 50% or more increase average concentration over a period of four monitoring events for any individual Tracking Parameter. Note: for temporal Stiff diagram evaluations, non-detect values will be considered at the reporting limit. See Appendix H for description of using Stiff diagrams for chemical evaluation. **Statistically Significant Increase Confirmation for Tracking Parameter** The Tracking Parameter is confirmed if 2 or more of the 4 replicates result in the same temporal stiff plot sequenstial pattern or result in a 50% or more increase per year in average concentration over time over a period of four monitoring events.
3776	Perimeter Well						
3777	Perimeter Well						
3778	Perimeter Well						
3779	Perimeter Well						
5487	Perimeter Well						
3916	Perimeter Well						
3922	Perimeter Well						
6143	Internal Cell Piezo	Quarterly (SWL only)		None	None	None	
6144	Internal Cell Piezo						
6145	Internal Cell Piezo						
6146	Internal Cell Piezo						
6147	Internal Cell Piezo						
6148	Internal Cell Piezo						
6149	Internal Cell Piezo						
4506A	Internal Cell Piezo						

Table 2-M. Sample Collection Chart

	Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
	LS-50	Lift Station	Once Every Five Years	No	Temp, pH & Cond	VOA, EOA, METALS (not filtered), PESTICIDE/PCB, CYAN, D/F, SULFIDE	40 CFR Part 264 Appendix IX list and (2,3,7,8-substituted dioxins and furans) 17 isomers and 2,3,7,8-TCDD TEQ, using WHO-TEF for reporting.	**Chemical Evaluation:** Every five years (beginning in 2006, continued in 2010) sample lift station 50 for 40 CFR 264 Appendix IX list. Re-evaluate groundwater monitoring Primary Constituents by comparing with results of 40 CFR 264 Appendix IX testing. **Leachate Volumes:** Quantities of leachate pumped will be recorded, tabulated by month and year, and compared graphically to quantities generated during the reported year and previous years. If there is an increase in leachate quantities, the source shall be indicated in the annual report.

Table 2-N. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Poseyville Landfill Groundwater Leak Detection Chemical Monitoring							
2438	Monitoring Well (flowing)	Semi-annually	Yes	Temp, pH, Conductivity, REDOX, DO, Turbidity	VOA	**Primary Constituents**: benzene, chlorobenzene, chloroform, ethylbenzene	(See Figure 14) **QUARTERLY EVALUATIONS:** **Compliance Monitoring Performance Criteria** Concentrations of constituents in each well sampled during that quarter will be compared to their performance criteria values, specified in Appendix J of the SAP. -Performance criteria are being met if the measured concentrations are less than the respective performance criteria value. -Performance criteria are not being met if the measured concentration of a constituent in any well is equal to or greater than the respective performance criteria value. As soon as practicable, re-sample of the affected well for the constituent in question. The well will be sampled 4 times, repurging between each sampling. **Confirmation that Performance Criteria are not being met** It is confirmed that performance criteria are not met for a Primary Constituent if 2 or more of the 4 replicates are detected at or above the performance criteria value, or at least 1 of the 4 replicates is detected at 5x the performance criteria value. **ANNUAL EVALUATIONS:** - Use SWL data to develop hydraulic cross sections around the landfill perimeter - Use SWL data to develop hydrographs - Evaluate changes in vertical hydraulic gradient
2684	Monitoring Well	Semi-annually					
2686	Monitoring Well	Semi-annually					
2688	Piezo / Well	Quarterly					
2691	Piezo / Well	Quarterly					
2692	Monitoring Well (flowing)	Annually					
2693	Monitoring Well (flowing)	Annually					
2968	Monitoring Well	Semi-annually					
2969	Monitoring Well	Annually					
2985	Monitoring Well (flowing)	Annually					
2986	Monitoring Well	Semi-annually					
2991	Monitoring Well (flowing)	Annually					
2992	Monitoring Well (flowing)	Annually					
2994	Monitoring Well (flowing)	Annually					
2995	Monitoring Well	Semi-annually					
2996	Monitoring Well	Semi-annually					
2998	Monitoring Well	Semi-annually					
2999	Monitoring Well	Semi-annually					
3004	Monitoring Well (flowing)	Annually					
4505	Monitoring Well	Semi-annually					

Table 2-N. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Poseyville Landfill Corrective Action Hydraulic Monitoring							
2690-A	Purge Well	Quarterly	Yes	Not Required	None	None	(See Figure 14) **QUARTERLY EVALUATIONS:** **Corrective Action Hydraulic Monitoring Program Performance Criteria** Static water level data will be converted to U.S.G.S. datum elevations and a contour of the potentiometric surface elevation will be produced. The contour map will be evaluated to determine if contaminated groundwater at the site is being contained by the purge wells. -Performance criteria are being met if the evaluation of the groundwater elevations indicates that contaminated groundwater at the site is being contained by the purge wells. -Performance criteria are not being met if hydraulic data indicate a potential that contaminated groundwater is not being contained by the purge wells. **ANNUAL EVALUATIONS:** - Use SWL data to develop hydrographs - Evaluate hydrographs for changes in horizontal gradient
2917	Purge Well						
2960	Purge Well						
2961	Purge Well						
2549	Piezo						
2550	Piezo						
2688	Piezo / Well						
2907	Piezo / Well						
6174	Piezo / Well						
2691	Piezo / Well						
2902	Piezo						
2903	Piezo						
2904	Piezo						
2906	Piezo						
2908	Piezo						
2915	Piezo						
2917A	Piezo						
2922	Piezo						
2929A	Piezo[1]						
2930	Piezo[1]						
3278	Piezo[1]						
3280	Piezo						
3282	Piezo						
3283	Piezo						
5923	Piezo						
5924	Piezo						
5925	Piezo						

[1] indicates pieozo is also included in Facility Shallow Hydraulic Monitoring Program
[2] indicates pieozo is also included in the PLF Corrective Action Chemical Monitoring Program
[3] indicates well is included in both the PLF Corrective Action Chemical Monitoring Program and Hydraulic Monitoring Program

Table 2-N. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Poseyville Landfill Corrective Action Chemical Monitoring							
3283	Piezo / Well	Quarterly	Yes	Temp, pH, Conductivity, REDOX, DO, Turbidity	VOA	**Primary Constituents**: benzene, chlorobenzene, chloroform, ethylbenzene	(See Figure 14) **QUARTERLY EVALUATIONS:** **Corrective Action Chemical Monitoring Program Performance Criteria** Develop background in accordance with Condition IX.B.3.(b) of this license. Performance Criteria will be submitted to DEQ for review and approval. **ANNUAL EVALUATIONS:** A summary of groundwater quality data results, including a narrative summary of results and trends, data graphs, and isochems (if appropriate).
2907	Piezo / Well						
2902	Piezo / Well						
5925	Piezo / Well						
6174	Piezo / Well						
2691	Piezo / Well						
2688	Piezo / Well						
2690-A	Purge Well	Quarterly	Yes	Temp, pH, Conductivity, REDOX, DO, Turbidity	VOA	**Primary Constituents**: benzene, chlorobenzene, chloroform, ethylbenzene	(see Figure 14) **ANNUAL EVALUATIONS:** A summary of groundwater quality data results, including a narrative summary of results and trends, data graphs, and isochems (if appropriate).
2917	Purge Well						
2960	Purge Well						
2961	Purge Well						

Table 2-O. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
LEL I Hydraulic Monitoring Program							
8415	Well	Quarterly	Yes	None	None	None	(See Figure 15) **QUARTERLY EVALUATIONS:** **<u>Slurry Wall Monitoring Performance Criteria</u>** Evaluation of LEL I slurry wall integrity will be made by a review of hydrographs. -Performance criteria are being met if hydrograph analysis indicate the slurry wall is successfully isolating the interior area of the slurry wall from the exterior. -If performance criteria are not being met, then further corrective measures will be proposed. A work plan will be submitted to the MDEQ for the implementation of additional corrective action as appropriate should monitoring suggest a deficiency with the slurry wall. ANNUAL EVALUATION: Summarize the year's data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph).
8414	Well						
8412	Well						
8413A	Well						
8413B	Well						
3393	Well	Quarterly basis, or after a rain event sufficient to result in ponding of water for 24 to 48 hours.	Yes	None	None	None	**QUARTERLY EVALUATION (PRIOR TO DECEMBER 2016):** **<u>Storm Water Detention Monitoring</u>** Evaluation of LEL I storm detention will include a review of hydrographs. If hydraulic evaluations suggest a significant groundwater elevation response to stormwater detention then further corrective measures will be proposed. Monitoring may be discontinued if no evidence of increased recharge from detention has been identified after three years (by December of 2016). **ANNUAL EVALUATION:** Summarize the year's data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph).
3347	Well						
8608	Well						
3351	Well						
8417	Well						
3101	Well						
8609	Well						
8610	Well						
8416	Well						
3354	Well						

Table 2-P. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
LEL II Hydraulic Monitoring Program							
3590	Well	Quarterly	Yes	None	None	None	(See Figure 16) **QUARTERLY EVALUATIONS:** **<u>Slurry Wall Monitoring Performance Criteria</u>** Evaluation of LEL II slurry wall integrity will be made by a review of hydrographs. -Performance criteria are being met if hydrograph analysis indicate the slurry wall is successfully isolating the interior area of the slurry wall from the exterior. -If performance criteria are not being met, then further corrective measures will be proposed. A work plan will be submitted to the MDEQ for the implementation of additional corrective action as appropriate should monitoring suggest a deficiency with the slurry wall. **ANNUAL EVALUATION:** Summarize the year's data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph).
3368	Well						
3369	Well						
3370	Well						
3371	Well						
3358	Well						
3359	Well						
3588	Well						
3360	Well						
3600	Well						
3361	Well						
3362	Well						
3363	Well						

Table 2-Q. Sample Collection Chart

	Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
LEL III Hydraulic Monitoring Program								
	8334	Well	Quarterly	Yes	None	None	None	(See Figure 16) **QUARTERLY EVALUATIONS:** **<u>Slurry Wall Monitoring Performance Criteria</u>** Evaluation of LEL III slurry wall integrity will be made by a review of hydrographs. -Performance criteria are being met if hydrograph analysis indicate the slurry wall is successfully isolating the interior area of the slurry wall from the exterior. -If performance criteria are not being met, then further corrective measures will be proposed. A work plan will be submitted to the MDEQ for the implementation of additional corrective action as appropriate should monitoring suggest a deficiency with the slurry wall. **ANNUAL EVALUATION:** Summarize the year's data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph).
	3592	Well						
	8335	Well						
	8336	Well						
	8337	Well						
	8338	Well						
	8339	Well						
	8340	Well						
	8343	Well						
	8344	Well						
	8345	Well						
	8346	Well						
	3367	Well						
	3366	Well[1]						
	3587	Well[1]						
	3365	Well						
	3364	Well						

[1] indicates well that is also included in the Facility Shallow Groundwater hydraulic monitoring program

Table 2-R. Sample Collection Chart

	Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
1925 Landfill Hydraulic Monitoring Program								
	MW-1	Well	Quarterly basis and monthly May thru August	Yes	None	None	None	(See Figure 17) **QUARTERLY EVALUATION:** **<u>Hydraulic Monitoring Performance Criteria</u>** Evaluation of 1925 Landfill will be made by a review of hydrographs. -Performance criteria are being met if hydraulic evaluations indicate that the potentiometric surface within the landfill is not increasing and remain below ground level. -Performance criteria are not being met if hydraulic evaluations suggest that the potentiometric surface within the landfill is consistently increasing or remaining above ground level. If performance criteria are not being met, a cap inspection shall be confirmed to verify seepage is not occurring. Further corrective measures will be proposed as required by Condition IX.B.3.(d). **ANNUAL EVALUATION:** Summarize the year's data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph).
	MW-3s	Well						
	MW-3d	Well						
	MW-3i	Well						
	PZ-1s	Well						
	PZ-1d	Well						
	PZ-2	Well						
	PZ-6 (new)	Well						
	PZ-9i	Well						
	PZ-10i	Well						
	PZ-12s	Well						
	PZ-12i	Well						
	PZ-12d	Well						
	PZ-13s	Well						
	PZ-13i	Well						
	PZ-14i	Well						
	PZ-14d	Well						

Table 2-S. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Tertiary Pond Recovery Monitoring							
3795	Well[1]	Semiannually	Yes	Temp, pH, Conductivity, REDOX, DO, Turbidity	VOA	**Primary Constituents:** benzene, chlorbenzene,	(See Figures 1 & 18) **SEMI-ANNUAL EVALUATION:** **Compliance Monitoring Performance Criteria** Concentrations of constituents in each well sampled during that quarter will be compared to their performance criteria values, specified in Appendix J of the SAP. -Performance criteria are being met if the measured concentrations are less or equal to the respective performance criteria value. -Performance criteria are not being met if the measured concentration of a constituent in any well is or greater than the respective performance criteria value. As soon as practicable, re-sample of the affected well for the constituent in question. **Confirmation that Performance Criteria are not being met** It is confirmed that performance criteria are not met for a Primary Constituent if 2 or more of the 4 replicates are detected above the performance criteria value, or at least 1 of the 4 replicates is detected at 5x the performance criteria value. **ANNUAL EVALUATIONS:** A summary of groundwater quality data results, including a narrative summary of results and trends, data graphs, and isochems (if appropriate).
Tertiary Pond Slurry Wall Hydraulic Monitoring							
3795	Well[1]	Quarterly	Yes	None	None	None	See Figure 2 **QUARTERLY EVALUATION:** **Hydraulic Monitoring Performance Criteria** Evaluation of the T-Pond slurry wall integrity will be made by a review of hydrographs, as described below: Compare 3795 SWL to Piezo 4300 SWL (3795 should be lower) Compare 4163 SWL to Piezo 4164 SWL (4163 should be lower) Compare 4157 SWL to Piezo 4158 SWL (4157 should be lower) Compare 4152 SWL to Piezo 4299 SWL (4299 should be lower) -Performance criteria are being met if the hydrograph analysis indicate that the groundwater elevation on the interior of the slurry wall is significantly higher than the water elevation on the exterior of the slurry wall. -Performance criteria are not being met if a significant differential head across the slurry wall is not present, and shall result in further investigation on a schedule approved by the DEQ. **ANNUAL EVALUATION:** Summarize the year's data, any anomolous readings, and develop diagrams of representative horizontal and vertical flow components (hydrograph).
4300	Piezo						
4163	Piezo						
4164	Piezo						
4157	Piezo						
4158	Piezo						
4299	Piezo						
4152	Piezo						

[1] 3795 is also inlcuded in the GTRA hydraulic monitoring program

Table 2-T. Sample Collection Chart

	Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Develop Overlook Park Corrective Action Groundwater Monitoring Program								
								(See Figure 19) Develop a corrective action groundwater monitoring program for Overlook Park, in accordance with the schedule provided in the 2016 Midland Plant Corrective Action Work Plan to be implemented during 2016.

Table 2-U. Sample Collection Chart

	Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
US-10 Tank Farm Monitoring Program								
	US-10 TF	Sump	Annually	No	None	VOA	sytrene	**ANNUAL EVALUATION:** Trend charts will be used to evaluate styrene concentration over time. Results are evaluated to verify that detected concentrations of specific constituents are stable or decreasing over time.

Table 2-V. Sample Collection Chart

Identifier	Site Info.	Frequency	SWL?	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response
Soil Box Monitoring							
19 Gate	Soil Box	Semiannual (unless otherwise directed by the revised Soil Box Evaluation Plan)	No	None	D/F (Report on dry weight basis)	The 17 World Health OrganizationToxicity Equivalence Factor (WHO-TEF) dioxin and furan isomers and for the total tetra through octa dioxin and furan congener groups.	(See Figure 20) Results will be evaluated according to the Soil Box Data Evaluation Plan included as Appendix I to the SAP.
1791 Gate							
608 Gate							
SR-A							
SR-B							
NEP-A							
NEP-B							
NEP-C							

Table 3. Well Purging Information

Identifier	Pump Type	Purge Method	Containerize Purge Water?	Min. Volume	Equipment Needs
Glacial Till and Reginal Aquifer Detection Monitoring					
3794	Submersible Centrifugal	Fixed-Volume	No	3 Well Volumes	Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
3796A	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
3856	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
3858	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
3860	Submersible Centrifugal				Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
3862	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
C7-231	*Westbay System©	*Westbay System©		Zero Purge	*Westbay System©
C7-241	*Westbay System©	*Westbay System©			*Westbay System©
C7-251	*Westbay System©	*Westbay System©			*Westbay System©
C7-261	*Westbay System©	*Westbay System©			*Westbay System©
C7-271	*Westbay System©	*Westbay System©			*Westbay System©
C8-210	*Westbay System©	*Westbay System©			*Westbay System©
C9-239	Bladder pump	Fixed-Volume		3 Well Volumes	Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
C9-251	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
C9-278	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
C9-296	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
8614B	Peristaltic				Pump, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter
8264G	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
8264I	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
8265F	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
8265G	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell

*Groundwater samples collected from monitoring wells using the Schlumberger Westbay Multilevel MP-38 Groundwater Monitoring System (Westbay System©) are collected using a zero purge method.

Table 3. Well Purging Information

	Identifier	Pump Type	Purge Method	Containerize Purge Water?	Min. Volume	Equipment Needs
Sludge Dewatering Facility (SDF) Groundwater Monitoring						
	4506	Peristaltic	Low Flow Purge	No	Field Parameter Stabilization	Pump, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter
	4507					
	3775					
	3776					
	3777					
	3778					
	3779					
	5487					
	3916					
	3922					

Table 3. Well Purging Information

	Identifier	Pump Type	Purge Method	Containerize Purge Water?	Min. Volume	Equipment Needs
Poseyville Landfill Detection Monitoring						
	2438	None (Flowing)	Fixed-Volume	No	3 Well Volumes	Pressure Transducer, Multi-Probe Meter, Flow Through Cell
	2684	Submersible Centrifugal				Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
	2686	Submersible Centrifugal				Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
	2692	None (Flowing)	Fixed-Volume			Pressure Transducer, Multi-Probe Meter, Flow Through Cell
	2693	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
	2969	Submersible Centrifugal				Controller, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter
	2968	Peristaltic	Low Flow Purge		Field Parameter Stabilization	Pump, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter
	2985	Submersible Centrifugal	Fixed-Volume		3 Well Volumes	Controller, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter
	2986	Submersible Centrifugal				Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
	2991	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
	2992	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
	2994	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
	2995	Submersible Centrifugal				Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
	2996	Submersible Centrifugal				Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
	2998	Submersible Centrifugal				Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
	2999	Submersible Centrifugal				Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
	3004	None (Flowing)				Pressure Transducer, Multi-Probe Meter, Flow Through Cell
	4505	Submersible Centrifugal				Controller, Generator, SWL Meter, Muli-Probe Meter, Flow Through Cell
Poseyville Landfill Corrective Action Monitoring						
	2690-A	Submersible Centrifugal	Purge Lines Only	Yes	N/A	SWL Meter
	2917					
	2960					
	2961					

Table 3. Well Purging Information

	Identifier	Pump Type	Purge Method	Containerize Purge Water?	Min. Volume	Equipment Needs
Poseyville Landfill Corrective Action Monitoring Plume Perimeter						
	3283	Peristaltic	Low Flow Purge	Yes	Field Parameter Stabilization	Pump, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter
	2907					
	2902					
	5925					
	6174					
	2691					Controller, Generator, SWL Meter, Multi-Probe Meter, Flow Through Cell
	2688					
7th Street Purge Well Area Chemical Monitoring						
	PW-1	Submersible Centrifugal	Purge Lines Only	Yes	N/A	SWL Meter
	PW-2					
	PW-3					
	PW-4					
	PW-5					
	PW-6					
	PW-7					
7th Street Purge Well Area Corrective Action Monitoring						
	MW-1	Peristaltic	Low Flow Purge	Yes	Field Parameter Stabilization	Pump, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter
	MW-6					
	MW-12					
	MW-14S					
	MW-15S					
	MW-16					
	MW-17					
	MW-18					
T-Pond Recovery Monitoring						
	3795	Peristaltic	Low Flow Purge	Yes	Field Parameter Stabilization	Pump, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter

Table 3. Well Purging Information

	Identifier	Pump Type	Purge Method	Containerize Purge Water?	Min. Volume	Equipment Needs
Northeast Perimeter Groundwater Monitoring						
	5383	Peristaltic	Low Flow Purge	Yes	Field Parameter Stabilization	
	6176					
	6177					
	4355					
	4358					
	4363					
	3540A					
	6175					
	6178					
	(MW-A)					
	(MW-B)					
	(MW-C)					
	(MW-D)					
	(MW-F)					
	(MW-G)					
	(MW-H)					
	(MW-I)					
	(MW-J)					
	(MW-K)					
	(MW-1)					
	(MW-2)					
	(MW-2B)					
	(MW-3)					
	(MW-3B)					
	(MW-4)					
	(MW-4B)					
	(MW-5)					
	(MW-6)					
	(MW-7)					
	(MW-8)					
	(MW-9)					
	(MW-10)					

Table 3. Well Purging Information

Identifier	Pump Type	Purge Method	Containerize Purge Water?	Min. Volume	Equipment Needs
Ash Pond Area Groundwater Detection Monitoring					
6165	Peristaltic	Low Flow Purge	No	Field Parameter Stabilization	Pump, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter
6166					
6167					
6168					
6169					
West Plant Perimeter Along Poseyville Road					
6278	Peristaltic	Low Flow Purge	Yes	Field Parameter Stabilization	Pump, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter
6280					
6518					
6582					
6520					
6545					
6546					
6552					
Former 47 Building Surface Water Protection Monitoring					
F47-MW-11	Peristaltic	Low Flow Purge	Yes	Field Parameter Stabilization	Pump, Power Supply, Multi-Probe Meter, Flow Through Cell, SWL Meter
F47-MW-12					

Table 4. Monitoring Well Specifications

Glacial Till and Regional Aquifer Detection Monitoring Wells

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Top of Casing (TOC)	Dow Coordinates	Aquifer Intercepted
3794	2"	Stainless Steel	5'	56' - 61'	618.60	W 5570.1 S 4339.9	Till Sand
3796	2"	Stainless Steel	5'	82' - 87'	621.33	W 5658.0 S 3444.5	Till Sand
3856	2"	Stainless Steel	5'	163'- 168'	618.71	W 3655.4 S 5901.5	Glacial Till
3858	2"	Stainless Steel	5'	183' - 188'	616.14	W 2864.7 S 1026.4	Regional
3860	2"	Stainless Steel	5'	178' - 183'	627.56	W 66.4 S 680.4	Regional
3862	2"	Stainless Steel	5'	198' - 203'	625.19	E 2967.4 S 3676.6	Regional
C7-231	4"	PVC	4'	227'-232'	630.41	E 2618 N 2240	Regional
C7-241	4"	PVC	4'	236'-242'	630.41	E 2618 N 2240	Regional
C7-251	4"	PVC	4'	247'-252'	630.41	E 2618 N 2240	Regional
C7-261	4"	PVC	4'	257'-262'	630.41	E 2618 N 2240	Regional
C7-271	4"	PVC	4'	267'-272'	630.41	E 2618 N 2240	Regional
C8-210	4"	PVC	4'	206'-211'	631.96	E 4421 S 1081	Regional
C9-239	1"	PVC	5'	234'-239'	620.22	E 4375 S 5447	Regional
C9-251	1"	PVC	5'	246'-251'	620.55	E 4375 S 5447	Regional
C9-278	1"	PVC	5'	273'-278'	620.48	E 4375 S 5447	Regional
C9-296	1"	PVC	5'	291'-296'	620.57	E 4375 S 5447	Regional
8614B	1"	Stainless Steel	5'	264'-269'	632.50	W 3146 N 2480	Regional
8264G	1"	PVC	5'	205'-210'	624.19	W 1442 N 371	Regional
8264I	1"	PVC	5'	250'-255'	624.19	W 1442 N 371	Regional
8265F	1"	Stainless Steel	5'	196'-201'	625.91	W 1096 S 363	Regional
8265G	1"	Stainless Steel	5'	215'-220'	625.52	W 1096 S 363	Regional

Top of Casing surveyed in 2011.

Table 4. Monitoring Well Specifications

Sludge Dewatering Facility Groundwater Monitoring

1. Perimeter Wells

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Top of Casing (TOC)	Dow Coordinates	Aquifer Intercepted
3775	2"	Stainless Steel	5'	14.0' - 19.0'	619.98	E 5386.4 S 6198.3	Lakebed Clay
3776	2"	Stainless Steel	5'	16.9' - 21.9'	625.67	E 6046.9 S 6672.7	Lakebed Clay
3777	2"	Stainless Steel	5'	16.5' - 21.5'	627.58	E 6701.0 S 7312.6	Lakebed Clay
3778	2"	Stainless Steel	5'	11.0' - 16.0'	621.35	E 5793.5 S 7445.7	Lakebed Clay
3779	2"	Stainless Steel	5'	13.0' - 18.0'	622.55	E 4948.55 S 7194.72	Lakebed Clay
5487	2"	Stainless Steel	5'	12.0'- 17.0'	621.08	E 4929.6 S 6596.4	Lakebed Clay
3916	2"	Stainless Steel	5'	7.5' - 12.5'	618.97	E 4998.4 S 6194.2	Lakebed Clay
3922	2"	Stainless Steel	5'	14.0'- 19.0'	623.62	E 5094.3 S 7167.8	Lakebed Clay

Top of Casing surveyed in 2009.

2. Detection Wells

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Top of Casing (TOC)	Dow Coordinates	Aquifer Intercepted
4506	2"	Stainless Steel	5'	30' - 35'	623.38	E 5330.9 S 6577.8	Glacial Till
4507	2"	Stainless Steel	5'	30' - 35'	622.9	E 5639.9 S 6892.4	Glacial Till

Top of Casing surveyed in 2009.

Table 4. Monitoring Well Specifications

Poseyville Landfill Monitoring

1. Detection Wells

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Top of Casing (TOC)	Dow Coordinates	Aquifer Intercepted
2438	2"	unknown	unknown	7.75'	610.24	W 6548.4 S 1074.9	Till Sand
2684	2"	Stainless Steel	2'	23.0'- 25.0'	610.34	W 6623.7 S 2173.2	Glacial Till
2686	2"	Stainless Steel	2'	18.5' - 20.5'	612.62	W 7809.8 S2201.9	Glacial Till
2688	2"	Stainless Steel	2'	20.0'-22.0'	620.78*	W 6463.5 S 1370.7	Till Sand
2691	2"	Stainless Steel	2'	22.5'-24.5'	610.33*	W 7307 S 805.5	Till Sand
2692	2"	Stainless Steel	2'	19.5'- 21.5'	612.98	W 8428.1 S 834.2	Till Sand
2693	2"	Stainless Steel	2'	19.5' - 21.5'	612.29	W 9835.1 S 865.6	Till Sand
2968	2"	Stainless Steel	2'	71.5' - 73.0'	635.89	W 11329.4 S 1415.3	Till Sand
2969	2"	Stainless Steel	2'	58.0'-60.0'	614.36	W 9081.8 S 844.02	Clay Till
2985	2"	Stainless Steel	2'	37.0'-39.0'	613.74	W 10315.5 S 857.8	Clay Till
2986	2"	Stainless Steel	2'	56.0'-58.0'	633.66	W 11320.6 S 1957.3	Clay Till
2991	2"	Stainless Steel	2'	19.25'-21.25'	613.39	W 9065 S 860.2	Till Sand
2992	2"	Stainless Steel	3'	123.3'-126.3'	612.52	W 9822.6 S 860.8	Till Sand
2994	2"	Stainless Steel	3'	86.0'-89.0'	615.91	W 11156.7 S 739.1	Till Sand
2995	2"	Stainless Steel	2'	63.0'-65.0'	624.31	W 11596.8 S 860.2	Clay Till
2996	2"	Stainless Steel	2'	58.5'-60.5'	611.76	W 7636.6 S 2166.8	Clay Till
2998	2"	Stainless Steel	3'	47.0'-50.0'	628.79	W 10282.1 S 2103.6	Clay Till
2999	2"	Stainless Steel	3'	43.0'-46.0'	624.73	W 8795.1 S 2091.2	Clay Till
3004	2"	Stainless Steel	2'	59.0'-61.0'	612.51	W 9815 S 867.1	Till Sand
4505	2"	Stainless Steel	5'	31.0'-36.0'	627.59	W 9409 S 2077	Till Sand

Detection Well Top of Casings surveyed in 2011

* 2688 and 2691 are part of the Detection and Corrective Action Monitoring Programs

Table 4. Monitoring Well Specifications

Poseyville Landfill Monitoring

2. Corrective Action Monitoring Wells

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Top of Casing (TOC)	Dow Coordinates	Aquifer Intercepted
2690A	4"	Stainless Steel	4'	21'-24'	609.1	W 6823.8 S 803.1	Till Sand
2917	8"	PVC	10'	13'-23'	606.99**	W 6651.1 S 807.3	Till Sand
2960	12"	Stainless Steel	6'	18'-24'	608.8	W 6916.4 S 709.8	Till Sand
2961	12"	Stainless Steel	4'6"	16.5'-21.0'	610.42	W 6457.2 S 1031.8	Till Sand
3283	1.25"	PVC	3'	13.3'	608.76	W 7319.1 S 413.7	Till Sand
2907	1.25"	Galvanized Steel	2'6"	24.0'	609.08	W 6815.6 S 454.6	Till Sand
2902	1.25"	Galvanized Steel	1'6"	17.0'	607.2	W 6448.4 S 670.4	Till Sand
5925	2'	PVC	3'	23.6'	608.64	W 6461.58 S 857.11	Till Sand
6174	2'	Stainless Steel	3'	21.0'	614.18	W 6555.7 N 1206.3	Till Sand
2691	2'	Stainless Steel	2'	22.5'-24.5'	610.33*	W 7307 S 805.5	Till Sand
2688	2'	Stainless Steel	2'	20.0'-22.0'	620.78*	W 6463.5 S 1370.7	Till Sand

Corrective Action Well Top of Casings surveyed in 2011

* 2688 and 2691 are part of the Detection and Corrective Action Monitoring Programs

** Well surveyed in 2010

Table 4. Monitoring Well Specifications

7th Street Purge Wells Area

1. Purge Wells

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Aquifer Intercepted
PW-1	12"	Stainless Steel	23'	61.0'	Till Sand
PW-2	12"	Stainless Steel	35'	74.0'	Till Sand
PW-3	12"	Stainless Steel	25'	68.0'	Till Sand
PW-4	12"	Stainless Steel	25'	73.0'	Till Sand
PW-5	12"	Stainless Steel	25'	54.0'	Till Sand
PW-6	12"	Stainless Steel	25'	54.0'	Till Sand
PW-7	8"	Stainless Steel	30'	36.0'	Till Sand

2. Shallow Monitoring Wells

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Top of Casing (TOC)	Dow Coordinates	Aquifer Intercepted
MW-1	2"	PVC	5'	15.3'	619.39	W 4373.2 N 870.7	Surface Sand
MW-6	2"	PVC	5'	14.3'	615.92*	W 4308.8 N 719.7	Surface Sand
MW-12	2"	PVC	10'	15.8'	617.33	W 4365.0 N 809.5	Surface Sand
MW-14S	2"	PVC	3'	6.4'	607.87	W 4314.99 N 768.8	Surface Sand
MW-15S	2"	PVC	3'	6.8'	607.72	W 4325.7 N 792.4	Surface Sand
MW-16	2"	PVC	5.6'	20.6'	623.54	W 4310.7 N 586.3	Surface Sand
MW-17	2"	PVC	5'	16.0'	616.79	W 4343.4 N 420.6	Surface Sand
MW-18	2"	PVC	5'	20.0'	618.13	W 4302.9 N 484.2	Surface Sand

Top of Casing surveyed in 2011
*Top of Casinsgs surveyed 2009

Teritiary Pond Recovery Monitoring

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Top of Casing (TOC)	Dow Coordinates	Aquifer Intercepted
3795	2"	Stainless Steel	5'	10.2' - 15.2'	621.45	W 5667.4 S 3629.9	Surficial Sand

Top of Casing surveyed in 2010.

Table 4. Monitoring Well Specifications

Northeast Perimeter Monitoring Wells

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Top of Casing (TOC)	Dow Coordinates	Aquifer Intercepted
5385	2"	Stainless Steel	3'	10.5'	630.13*	E 1060.4 N 3350.5	Surface Sand
6175	2"	Stainless Steel	3'	8.7'	628.22	E 1646.8 N 2781.3	Surface Sand
6176	2"	Stainless Steel	3'	8.6'	632.43*	E 4004.5 N 900.1	Surface Sand
6177	2"	Stainless Steel	3'	14.0'	632.81	E 1406.1 N 1968.9	Surface Sand
6178	2"	Stainless Steel	3'	16.5'	635.41	E 1683 N 1658	Surface Sand
4355	2"	PVC	5'	13.0'	636.12*	E 2242 N 1659	Surface Sand
4358	2"	PVC	5'	6.0'	628.97*	E 3393 N 1647	Surface Sand
4363	2"	PVC	5'	6.5'	630.86*	E 4139.4 N 161.9	Surface Sand
3540A	2"	Stainless Steel	3'	7.0'	634.4*	E 3792.7 N 1328.7	Surface Sand
(MW-A)	2"	Stainless Steel	3'	18.0'	637.5	E 1582.1 N 1628.2	Surface Sand
(MW-B)	2"	Stainless Steel	3'	16.0'	637.38	E 1632.9 N 1628.4	Surface Sand
(MW-C)	2"	Stainless Steel	3'	16.0'	637.62	E 1511.8 N 1634.3	Surface Sand
(MW-D)	2"	Stainless Steel	3'	16.0'	637.53	E 1483.9 N 1634.5	Surface Sand
(MW-F)	2"	Stainless Steel	3'	16.0'	636.39	E 1572.0 N 1661.1	Surface Sand
(MW-G)	2"	Stainless Steel	3'	16.0'	633.6*	E 1523.2 N 1661.8	Surface Sand
(MW-H)	2"	Stainless Steel	3'	16.0'	634.34	E 1592.1 N 1706.5	Surface Sand
(MW-I)	2"	Stainless Steel	3'	16.0'	637.14	E 1547.7 N 1588.2	Surface Sand
(MW-J)	2"	Stainless Steel	3'	16.0'	636.74	E 1550.8 N 1547.1	Surface Sand
(MW-K)	2"	Stainless Steel	3'	16.0'	636.82	E 1553.5 N 1509.9	Surface Sand
(MW-1)	1"	PVC	5'	7.8'	626.47	E 2900.7 N 1656.2	Surface Sand
(MW-2)	1"	PVC	5'	8.1'	627.8	E 2830.2 N 1660.9	Surface Sand
(MW-2B)	2"	PVC	3'	6.0'	629.36	E 2829.9 N 1682.5	Surface Sand
(MW-3)	1"	PVC	5'	9.8'	628.09	E 2720.1 N 1668.2	Surface Sand
(MW-3B)	2"	PVC	3'	6.0'	629.24	E 2730.5 N 1682.7	Surface Sand
(MW-4)	1"	PVC	5'	12.5	629.9*	E 2649.2 N 1661.2	Surface Sand
(MW-4B)	2"	PVC	3'	6.0'	632.2	E 2650.5 N 1684.7	Surface Sand
(MW-5)	2"	PVC	3'	11.63	630.94	E 2527.2 N 1670.7	Surface Sand
(MW-6)	1"	PVC	5'	12.3'	630.5*	E 2685.2 N 1611.9	Surface Sand
(MW-7)	1"	PVC	5'	12.1'	631.55*	E 2525.3 N 1587.2	Surface Sand
(MW-8)	2"	PVC	3'	13.9'	632.77*	E 2477.1 N 1545.4	Surface Sand
(MW-9)	2"	PVC	3'	10.0'	630.56	E 2859.2 N 1534.7	Surface Sand

Top Casings surveyed in 2011
*Top of Casinsgs surveyed 2009

Table 4. Monitoring Well Specifications

Ash Pond Area Monitoring Wells

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Aquifer Intercepted
6165	2"	PVC	5'	20.0'	Surface Sand
6166	2"	PVC	5'	18.5'	Surface Sand
6167	2"	PVC	5'	18.0'	Surface Sand
6168	2"	PVC	5'	14.0'	Surface Sand
6169	2"	PVC	5'	10.0'	Surface Sand

Former 47 Building Area Surface Water Protection Monitoring Wells

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Top of Casing (TOC)	Dow Coordinates	Aquifer Intercepted
F47-MW-11	2"	PVC	5'	10'	620.5	W 4066.12 N 3006.38	Surface Sand
F47-MW-12	2"	PVC	5'	17'	625.91*	W 3960.39 N 2769.99	Surface Sand

Top of Casings surveyed in 2009
*F47-MW-12 was replaced in 2012 and surveyed

RGIS East Deep Well 5964
1. Purge Well

Well	Diameter	Screen Mat'l	Length of Screen	Depth	Aquifer Intercepted
5964	8"	PVC	20'	93.3'	Till Sand

Table 5. RGIS Piezometer Specification Table

Cluster	Piezo	Piezo Location	Elevation TOC*	Top of Screen	Bottom of Screen	Y coord	X coord
AZ	6532	O	600.53	588.6	585.6	918.9	-3983.0
	6533	P	600.24	587.7	584.7	918.6	-3979.0
	6534	I	600.40	589.4	586.4	918.2	-3973.1
	6535	D	600.40	564.2	561.2	918.2	-3973.1
BA	6536	O	600.11	588.4	585.4	417.6	-3992.1
	6537	P	599.87	588.2	585.2	419.5	-3987.2
	6538	I	600.16	588.4	585.4	421.6	-3972.8
BB	8572	O	601.73	597.3	594.3	-2449.1	-2629.1
	8574	I	605.71	597.2	594.2	-2578.8	-2741.1
	8573	P	603.89	595.0	592.0	-2486.3	-2659.2
BC	8575	O	597.17	590.4	587.4	-2934.0	-1905.3
	8577	I	597.38	593.0	590.0	-2988.1	-1948.1
	8576	P	596.92	589.8	586.8	-2981.5	-1938.6
U	4013	I	600.79	585.9	582.9	-3339.6	-1634.0
	5253	I	597.77	561.9	558.9	-3178.2	-1665.3
	5258	P	595.17	583.0	580.0	-3174.8	-1662.8
	5259	O	598.13	580.2	577.2	-3151.3	-1613.2
V	4012	I	603.81	596.8	593.8	-3407.7	-1364.0
	5260	P	599.15	584.1	581.1	-3400.6	-1348.3
	5262	O	603.07	589.7	586.7	-3383.4	-1337.2
W	5263	I	600.83	589.9	586.9	-3709.9	950.1
	5264	P	596.48	585.8	582.8	-3964.6	-939.7
	5266**	O	599.03	586.6	583.6	-3670.9	-922.7
X	5267	I	604.08	587.5	584.5	-4047.5	-422.8
	5268	P	600.73	588.2	585.2	-4034.2	-417.8
	5269	O	602.93	590.2	587.2	-4019.8	-409.4
Y	5509	O	594.29	585.4	582.4	-1244.3	-3554.3
	5510	P	595.39	583.2	580.2	-1238.4	-3550.7
	5511	I	594.69	587.8	584.8	-1236.7	-3546.1
Z	5512	O	594.05	582.7	579.7	-1899.8	-2701.6
	5513	P	595.25	583.4	580.4	-1895.1	-2699.5
	5514	I	594.45	583.2	580.2	-1888.5	-2965.4
AA	5515	O	593.97	583.7	580.7	-2229.3	-2190.1
	5516	P	595.12	582.3	579.3	-2223.3	-2188.3
	5517	I	594.59	584.9	581.9	-2219.8	-2184.8
AB	5681	O	594.33	583.8	580.8	-3965.8	236.6
	5682	P	594.38	581.0	578.0	-3954.2	239.2
	5683	I	594.70	583.1	580.1	-3948.2	241.1

Table 5. RGIS Piezometer Specification Table

Cluster	Piezo	Piezo Location	Elevation TOC*	Top of Screen	Bottom of Screen	Y coord	X coord
AC	5770	O	593.78	586.0	583.0	-4076.3	725.8
	5771	P	593.91	581.5	578.5	-4071.6	725.8
	5772	I	593.79	583.0	580.0	-4066.3	726.2
AD	5773	O	594.29	584.0	581.0	-4129.2	1218.3
	5774	P	594.65	592.1	579.1	-4124.1	1219.0
	5775	I	594.21	584.5	581.5	-4118.7	1219.5
AE	5831	O	593.88	583.3	580.3	-5060.0	2795.5
	5832	P	593.99	581.8	578.8	-5056.1	2801.4
	5833	I	593.98	580.2	577.2	-5053.1	2805.3
AF	5834	O	593.78	581.0	578.0	-5356.9	3158.1
	5835	P	594.13	580.0	577.0	-5349.9	3162.8
	5836	I	593.97	581.1	578.1	-5346.3	3165.1
AG	5950	O	594.51	585.8	592.8	-4189.1	1772.7
	5951	P	594.49	582.3	579.3	-4182.8	1773.5
	5952	I	594.69	587.3	584.3	-4177.6	1775.2
AH	5953	O	594.59	585.8	582.8	-4420.6	2187.3
	5954	P	594.60	585.4	582.4	-4414.8	2189.9
	5955	I	594.60	586.2	583.2	-4410.4	2192.3
AI	5956	O	594.39	588.7	585.7	-4690.5	2485.9
	5957	P	594.45	588.1	585.1	-4686.8	2490.3
	5958	I	594.52	589.1	586.1	-4683.7	2494.0
AJ	5970	O	594.36	582.8	579.8	-3667.7	-364.5
	5971	P	594.38	581.0	578.0	-3662.7	-361.2
	5972	I	594.43	582.3	579.3	-3658.8	-358.5
AK	5973	O	594.48	584.3	581.3	-3266.4	-881.3
	5974	P	594.52	583.3	580.3	-3261.7	-877.4
	5975	I	594.06	583.4	580.4	-3257.9	-875.0
AL	5976	O	595.16	587.7	584.7	-2915.2	-1338.6
	5977	P	595.12	588.1	579.5	-2911.5	-1335.0
	5978	I	595.28	588.2	585.2	-2906.8	-1330.2
AM	5979	O	594.88	581.4	578.4	-2547.6	-1742.7
	5980	P	594.38	580.8	577.8	-2544.1	-1738.9
	5981	D	594.15	537.1	534.1	-2541.3	-1737.4
	5982	I	594.83	581.7	578.7	-2540.9	-1737.0
AN	5983	O	596.22	581.8	578.8	-2387.7	-1950.2
	5984	P	596.22	581.1	578.1	-2383.3	-1947.5
	5985	D	596.32	553.5	550.5	-2378.8	-1944.4
	5986	I	596.34	581.8	578.8	-2378.6	-1944.0
AO	5987	O	595.69	581.3	578.3	-2306.5	-2096.3
	5988	P	595.45	582.2	579.2	-2304.1	-2067.7
	5989	I	595.91	582.9	579.9	-2300.6	-2065.3
	5990	D	595.88	574.7	571.7	-2300.4	-2065.1

Table 5. RGIS Piezometer Specification Table

Cluster	Piezo	Piezo Location	Elevation TOC*	Top of Screen	Bottom of Screen	Y coord	X coord
AP	5991	O	595.05	585.2	582.2	-1647.4	-3100.7
	5992	P	594.98	585.6	582.6	-1642.3	-3099.3
	5993	I	595.28	587.5	584.5	-1638.8	-3097.5
AQ	5995	P	600.51	594.2	591.2	354.1	-3985.2
	5996	I	599.98	593.2	590.2	353.8	-3979.9
BA	6536	O	600.11	588.4	585.4	417.6	-3992.1
	6537	P	599.87	588.2	585.2	419.5	-3987.2
	6538	I	600.16	588.4	585.4	421.6	-3972.8
AS	6001	O	600.43	586.8	583.8	1280.0	-3982.2
	6002	P	600.58	589.7	586.7	1278.3	-3974.7
	6003	I	598.36	587.7	584.7	1281.7	-3969.5
	6004	D	599.42	543.9	540.9	1281.6	-3969.3
AT	6005	O	609.93	597.4	594.4	-5272.7	4098.9
	6006	P	608.43	594.9	591.9	-5270.0	4079.7
	6207	I	609.62	595.7	592.7	-5274.0	4062.9
AU	6112	O	596.87	579.8	576.8	-758.1	-3846.0
	6113	P	596.71	583.1	580.1	-755.4	-3840.4
	6114	I	596.40	584.8	581.8	-754.6	-3836.0
AV	6109	O	597.50	584.4	581.4	-477.5	-3926.4
	6110	P	597.58	584.1	581.1	-476.4	-3920.3
	6111	I	597.49	584.7	581.7	-475.3	-3916.8
AW	6106	O	603.21	587.9	584.9	-96.6	-3993.8
	6107	P	603.07	588.7	585.7	-95.4	-3989.3
	6108	O	603.06	589.0	586.0	-94.9	-3984.0
AX	6196	O	598.37	583.8	580.8	-5564.5	3723.7
	6197	P	598.37	579.8	576.8	-5569.5	3725.2
	6198	I	598.08	582.4	579.4	-5575.1	3726.1
AY	3977	O	601.4	597.8	594.8	-2019.8	-2997.3
	3978	O	604.63	597.1	594.1	-2081.1	-3052.6
	6192	P	603.73	595.6	592.6	-2246.4	-2919.2
	3979	I	605.15	595.8	592.8	-2187.6	-3158.0
	3980	I	605.54	596.5	593.5	-2199.7	-3165.5
TA	5218	O	619.52	604.5	601.5	-4404.1	-5468.7
	5219	P	618.31	603.6	600.6	-4409.8	-5477.2
	5220**	O	616.35	606.0	603.0	-4514.2	-5527.4

Table 5. RGIS Piezometer Specification Table

Cluster	Piezo	Piezo Location	Elevation TOC*	Top of Screen	Bottom of Screen	Y coord	X coord
TB	5221	I	619.22	604.2	601.2	-4895.4	-4891.9
	5222	P	615.93	---	---	-4906.9	-4900.3
	5224	O	613.71	605.0	602.0	-4928.1	-4913.0
TC	5225**	I	614.01	603.9	600.9	-5097.2	-4435.6
	5226**	P	614.28	---	---	-5121.9	-4446.5
	5228	O	613.47	606.0	603.0	-5145.6	-4455.9
TD	5229	I	619.93	607.1	604.1	-5809.9	-3736.7
	5230	P	620.29	605.0	602.0	-5826.7	-3752.5
	5232**	O	618.13	604.3	601.3	-5835.1	-3758.4
TE	5233	I	619.09	603.3	600.3	-5959.1	-3369.0
	5234	P	607.71	---	---	-5986.7	-3367.4
	5235	O	606.33	596.3	593.3	-6009.4	-3372.2
TF	5236	I	618.46	609.4	606.4	-5954.6	-2791.8
	5238	P	613.45	---	---	-5968.3	-2791.1
	5240	O	611.85	608.9	605.9	-5973.5	-2791.0
TG	5241	I	618.84	608.9	605.9	-5947.4	-2293.9
	5242	I	619.32	604.5	601.5	-5946.4	-2294.0
	5243	P	613.14	605.8	602.8	-5964.7	-2295.1
	5245	O	610.27	607.1	604.1	-5971.7	-2294.2
TH	5246	I	619.75	608.2	605.2	-5629.9	-1513.8
	5247	P	614.48	603.4	600.4	-5640.6	-1499.8
	5249	O	611.3	608.2	605.2	-5645.8	-1492.5
TI	4965	I	618.3	603.3	600.3	-4812.2	-892.6
	4965A	I	618.36	595.3	592.3	-4811.7	-891.4
	5250	I	613.09	---	---	-4814.5	-871.4
	5252	O	609.29	590.4	587.4	-4825.4	-865.6
	5257	O	612.35	596.6	593.6	-4820.8	-871.7
TJ	5254	I	614.66	609.6	606.6	-4362.9	-725.5
	5255	P	520.51	601.3	598.3	-4376.8	-707.6
	4823	O	620.63	601.6	598.6	-4403.4	-701.6
101A	9006	P	601.24	592.81	589.81	-4143.56	2602.2
	9007	O	installation in 4Q2015 with LS 101 upgrade project				
101C	9008	P	installation in 4Q2015 with LS 101 upgrade project				
	9009	O	installation in 4Q2015 with LS 101 upgrade project				
109A	8862***	P	608.07	589.32	586.32	-129.1	-4448.0
	6170***	O	609.52	584.97	581.97	-115.5	-4422.8
109B	8864***	P	602.93	588.86	585.86	-709.4	-4186.4
	8863***	O	600.49	590.39	587.39	-700.43	-4167.42
109D	8866***	P	601.59	590.79	587.79	-1214.6	-3896.4
	8865***	O	600.53	589.88	586.88	-1214.2	-3882.5

*Top of Casing (TOC) Elevations surveyed 2010

**Top of Casing (TOC) Elevation Surveyed 2011

***Top of Casing (TOC) Elevation Surveyed 2013

O= Piezometer located outside of tile

P= Primary Piezometer located nearest tile

I= piezometer located inside of tile

Table 6. Inspection Schedule for Environmental Monitoring Programs

Inspected Item	Frequency	Inspection Items
Monitoring Wells:	Inspect when sampled:	Intact (not bent or broken)
Glacial Till and Regional Aquifer	Semi-annually	No excessive silting
Poseyville Landfill	Quarterly/Annually	No pooling around base
Well 3795	Semi-annually	Secured/Labeled
Northeast Perimeter	Semi-annually	Pump operational (if present)
Ash Pond Area	Quarterly	
7th Street Purge Well Area	Quarterly	
Piezometers:	Inspect when measured:	Intact (not bent or broken)
Poseyville Landfill	Quarterly	No excessive silting
Plant	Quarterly	No pooling around base
River Corrective Action (MW-8)	Quarterly	Secured/Labeled
SDF	Quarterly	
LEL I, II, and III	Quarterly	
1925 Landfill	Monthly (May-August) Quarterly (Jan.-April, Sept.-Dec.)	
Automated Piezometer Data	Daily	Functionality of system
	Quarterly	Validation/calibration
Purge Wells:	Inspect when monitored:	Well intact
Wells 5964, PW-1, PW-2, PW-3, PW-4, PW-5, PW-6 AND PW-7	Twice per week	Pump operational Maintaining adequate purge rates
Poseyville Landfill	Twice per week	
Collection Tile System: East-Side RGIS River Corrective Action (Sand Bar Lift Station) T-Pond RGIS 6-Pond Tile	Daily	Lift Sation high level Lights/Problems Lift Stations secure Piezometer/cleanout protective casings intact
	Semi-weekly	Lift Stations levels Catch basin observation Lift Station pump operation and flow rate
	Weekly (East-Side) Monthy (T-Pond) (when accessible)	No groundwater seepage on bank or around piezometers or cleanouts No distressed vegetation (indicating groundwater seepage) Cap integrity No visible piezometer/cleanout damage
	Annually (post-flooding)	Cap integrity

Table 7. 6-Pond Tile Piezometer Specification Table

Cluster	Piezo	Piezo Location	Elevation TOC*	Top of Screen	Bottom of Screen	Y coord	X coord
BD[1]	8579	P	605.88	596.7	593.7	-1254.6	-4352.8
	8599	O	608.08	598.5	595.5	-1193.5	-4247.7
BE[1]	8580	P	606.78	598.5	595.5	-1232.2	-5296.5
	4586[3]	O	607.45	---	---	-1188.7	-5293.8
BF[1]	8578	P	607.28	600.3	597.3	-1201.5	-5904.4
	8598	O	609.15	601.5	598.5	-1171.6	-5896.4
R[2]	3975	O	603.88	600.5	598.0	-1318.4	-3823.9
	6194	P	605.29	596.1	593.1	-1383.8	-3909.1
	4787	I	605.64	596.4	593.4	-1434.0	-3958.1
S[2]	3983	O	604.29	594.3	591.8	-1785.6	-3337.0
	6193	P	604.55	595.3	592.3	-1839.3	-3411.0
	3985A	I	606.17	596.2	593.7	-1877.5	-3484.1
	3985B	I	605.81	590.9	575.4	-1878.1	-3480.3
	3986A	I	608.51	593.7	591.2	-1910.8	-3514.4
	3986B	I	607.64	584.9	582.4	-1913.8	-3510.5
6 Pond Tile System[3]	CO A In	I	620.07	---	---	-6265.6	-4071.2
	CO A Out	O	620.04	---	---	-6273.1	-4071.2
	CO B In	I	611.48	---	---	-6321.6	-3700.8
	CO B Out	O	611.6	---	---	-6332.4	-3700.4
BG	8721	P	615.54	594.0	591.0	-1333.0	-6265.5
	8722		615.14	603.3	600.3	-1326.3	-6284.9
BH	8723	P	610.3	595.7	592.7	-1851.6	-6314.4
	8724		609.44	604.6	601.6	-1851.1	-6334.8
BI	8725	P	609.93	597.9	594.7	-2373.6	-6311.0
	8726		609.67	604.0	601.0	-2373.9	-6322.7
BJ	8727	P	614.7	600.7	597.7	-3120.1	-6309.2
	8728		613.78	603.0	600.0	-3119.5	-6322.8
BK	8729	P	611.82	602.0	599.0	-3119.5	-6304.7
	8730		611.21	605.2	602.2	-3512.7	-6318.4

[1]Top of Casing (TOC) Elevations surveyed 2011.

[2]Top of Casing (TOC) Elevations surveyed 2010.

[3]Top of Casing (TOC) Elevations surveyed 2009.

Table 8. SAP Revision Table

Revision Date	Revision Number	Summary Description of Revision	Approval Date
Dec-2002	1	Original, submitted with Environmental Monitoring Report in the License Application	Jul-2003
Apr-2005	2	Annual Revision - Added Additional Monitoring from Compliance Schedule Activities, and updated detection limits	Sep-2005
Apr-2006	3	Annual Revision - Aligned format with SLF SAP to be submitted in 2006; added NE Perimeter, CD-3, Greenbelt Soil Monitoring, etc	
Sep-2006	3A	Changes per DEQ comment; (See list attached to final submittal letter, dated October 26, 2006)	
Aug-2007	3B	Changes per DEQ comment; (See list attached to final submittal letter, dated August 17, 2007)	
Oct-2007	4	Annual Revision -	
Apr-2008	4A	Added 6178 and 6175 Areas, updated soil boxes	Oct-2008
Jan-2010	5	Annual Revision - aligned format with SLF SAP; added field data sheet and well inspcetion sheet as appendices; updated target lists and reduced monitoring frequencies where appropriate (for complete list see table attached to submittal letter, dated January 4, 2010).	
Dec-2011	6	Includes proposed revisions from Rev. 5 that were deemed acceptable by MDEQ, along with additional revisions that have been discussed in subsequent meetings (for complete list see table attached to submittal letter, dated December 9, 2011).	
Sep-2012	6A	Includes proposed revisions from Rev. 6 that were deemed acceptable by MDEQ, along with additional revisions that have been discussed in subsequent meetings.	
Feb-2013	6B	revisions based on technical review with MDEQ	May-2013
Mar-2015	7	Minor Updates - added LS 109 to RGIS West, removed background development from NEP, updated figures, typos, and format	
Sep-2015	7	Updated license condition references; added performance criteria for PLF Corrective Action wells	

Legend

- Piezometers
- Groundwater Monitoring Wells
- Tpond Slurry Wall
- Facility Boundary
- Tittabawassee River
- Ponds

Vertical Gradient Pairs

3066 3794 5220	3856 5232
3065 5266	3795 3796A

Cluster 8614
Cluster C-7
3137
3859
Cluster 8264
3861
Cluster 8265
3860
3858
2438
2745
Cluster C-8
6 Brine Pond
3138
3796A
5266
3065
3862
3795
3794
3066
5220
Tertiary Pond
Cluster C-9
5232
3856
3011
2708
3013

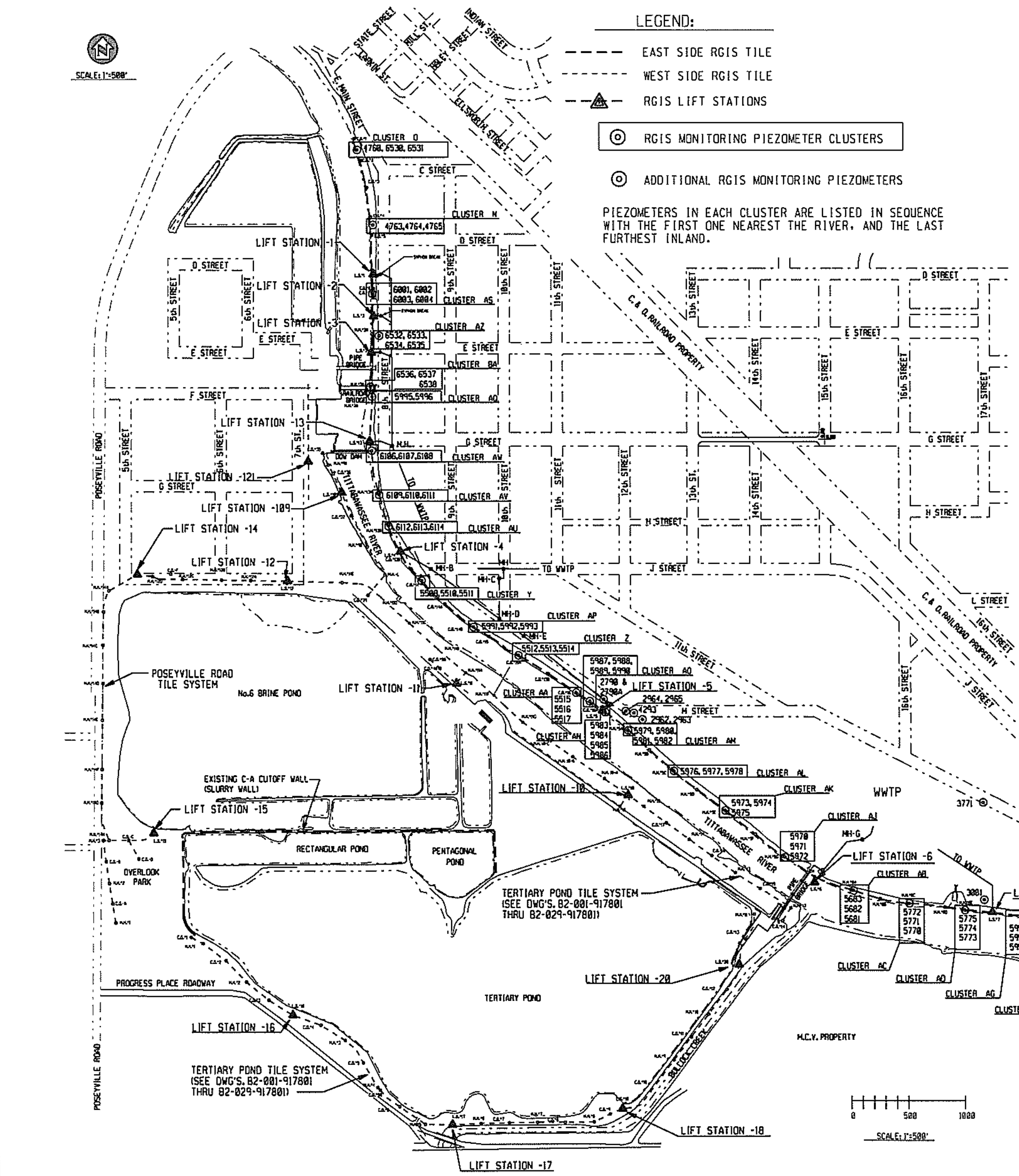
1 inch = 1,300 feet

0 650 1,300 2,600 3,900 5,200 Feet

URS
Dow Business Unit

Figure 1
Glacial Till and Regional Aquifer
Detection & Hydraulic Monitoring Wells Site Plan
The Dow Chemical Company
Michigan Operations

Drawn: MDC	Checked: LH	Approximate Scale: 1" = 1300'
Date: 4-1-2013-rev	Drawing File: Map_of Plant_w_clusters-4-2013-GTRA.mxd	



CLUSTER	PIEZO. No.	ELEV. TOC	TOP OF SCREEN	BOTTOM SCREEN	GRADE ELEV.	COORDINATES N./S.	E./W.
AZ	6532	600.68	588.60	585.60		N918.9	W3983.0
	6533	600.32	587.71	584.71		N918.6	W3979.0
	6534	600.50	589.37	586.37		N918.2	W3973.1
	6535	600.46	564.23	561.23		N918.2	W3973.1
BA	6536	600.19	588.38	585.38		N417.6	W3992.1
	6537	599.93	588.20	585.20		N419.5	W3987.2
	6538	600.23	588.35	585.35		N421.6	W3972.8
N	4763	600.44	589.25	585.25		N1861.8	W4003.3
	4764	600.26	588.76	584.76		N1862.3	W3992.9
	4765	600.68	588.52	584.52		N1861.8	W3982.7
O	4760	599.62	590.41	586.41		N2522.8	W4123.2
	6530	600.04	591.08	588.08		N2530.2	W4118.2
	6531	600.90	590.98	587.98		N2527.6	W4110.8
Y	5509	594.33	585.4	582.4	594.9	S1244.3	W3554.3
	5510	594.15	583.2	580.2	595.1	S1238.4	W3550.7
	5511	594.77	587.8	584.8	595.2	S1236.7	W3546.1
Z	5512	594.09	582.7	579.7	594.8	S1899.8	W2701.6
	5513	594.30	583.4	580.4	595.1	S1895.1	W2699.5
	5514	594.51	583.2	580.2	595.0	S1888.5	W2695.4

PIEZOMETER CLUSTER INFORMATION

CLUSTER	PIEZO. No.	ELEV. TOC	TOP OF SCREEN	BOTTOM SCREEN	GRADE ELEV.	COORDINATES N./S.	E./W.
AA	5515	594.00	583.7	580.7	594.8	S2229.3	W2190.1
	5516	594.18	582.3	579.3	595.2	S2223.3	W2188.3
	5517	594.65	584.9	581.9	595.3	S2219.8	W2184.8
AB	5681	594.37	583.82	580.82	593.7	S3965.8	E 236.6
	5682	594.43	580.97	577.97	593.7	S3954.2	E 239.2
	5683	594.79	583.07	580.07	593.7	S3948.2	E 241.1
AC	5770	593.79	586.00	583.00	593.4	S4076.3	E 725.8
	5771	593.88	581.50	578.50		S4071.6	E 725.8
	5772	593.80	583.01	580.01	593.8	S4066.3	E 726.2
AD	5773	594.31	583.99	580.99	593.5	S4129.2	E1218.3
	5774	594.59	582.12	579.12		S4124.1	E1219.0
	5775	594.22	584.53	581.53	594.6	S4118.7	E1219.5
AE	5831	593.95	583.30	580.30		S5060.0	E2795.5
	5832	594.05	581.83	578.83		S5056.05	E2801.35
	5833	594.06	580.21	577.21		S5053.05	E2805.3
AF	5834	593.82	580.96	577.96		S5356.9	E3158.1
	5835	594.16	580.04	577.04		S5349.9	E3162.8
	5836	594.01	581.13	578.13		S5346.3	E3165.1
AG	5950	594.64	585.82	582.82	594.4	S4189.1	E1772.7
	5951	594.58	582.28	579.28		S4182.8	E1773.5
	5952	594.77	587.27	584.27	594.4	S4177.6	E1775.2
AH	5953	594.66	585.81	582.81	592.5	S4420.6	E2187.3
	5954	594.66	585.44	582.44		S4414.8	E2189.9
	5955	594.82	586.16	583.16	592.5	S4410.4	E2192.3
AI	5956	594.43	588.67	585.67	592.5	S4690.5	E2485.9
	5957	594.51	588.07	585.07		S4686.8	E2490.3
	5958	594.57	589.06	586.06	592.5	S4683.7	E2494.0
AJ	5970	594.46	582.83	579.83	595.2	S3667.7	W 364.5
	5971	594.52	581.02	578.02	595.2	S3662.7	W 361.2
	5972	594.50	582.28	579.28	595.3	S3658.8	W 358.5
AK	5973	594.53	584.30	581.30	595.1	S3266.4	W 881.3
	5974	594.60	583.27	580.27	595.1	S3261.7	W 877.4
	5975	594.12	583.43	580.43	595.1	S3257.9	W 875.0
AL	5976	595.17	587.73	584.73	595.8	S2915.2	W1338.6
	5977	595.19	588.07	579.49	595.9	S2911.5	W1335.0
	5978	595.31	588.19	585.19	595.9	S2906.8	W1330.2
AM	5979	594.99	581.39	578.39	595.6	S2547.6	W1742.7
	5980	594.48	580.75	577.75	595.6	S2544.1	W1738.9
	5981	594.15	537.05	534.05	595.6	S2541.3	W1737.4
	5982	595.00	581.7	578.7	595.6	S2540.9	W1737.0
AN	5983	596.26	581.79	578.79	597.0	S2387.7	W1950.2
	5984	596.29	581.09	578.09	597.0	S2383.3	W1947.5
	5985	596.42	553.50	550.50	597.0	S2378.8	W1944.4
	5986	596.43	581.83	578.83	597.0	S2378.6	W1944.0
AO	5987	595.73	581.25	578.25	596.4	S2306.5	W2069.3
	5988	595.53	582.23	579.23	596.4	S2304.1	W2067.7
	5989	595.98	582.94	579.94	596.4	S2300.6	W2065.3
	5990	595.93	574.71	571.71	596.4	S2300.4	W2065.1
AP	5991	595.16	585.21	582.21	595.8	S1647.4	W3100.7
	5992	595.06	585.64	582.64	595.8	S1642.3	W3099.3
	5993	595.37	587.47	584.47	595.8	S1638.8	W3097.5
AQ	5995	600.57	594.18	591.18		N 354.1	W3985.2
	5996	600.03	593.24	590.24		N 353.8	W3979.9
AS	6001	600.48	586.80	583.80		N1280.0	W3982.2
	6002	600.66	589.74	586.74		N1278.3	W3974.7
	6003	598.39	587.65	584.65		N1281.7	W3969.5
	6004	599.45	543.94	540.94		N1281.6	W3969.3
AT	6005	609.96	597.39	594.39	609.0	S5272.7	E4099.2
	6006	608.45	594.51	591.51	608.6	S5278.5	E4067.7
	6207	609.65	595.69	592.69	608.7	S5274.0	E4062.9
AU	6112	596.93	579.76	576.76	597.3	S 758.1	W3846.0
	6113	596.77	583.10	580.10	597.4	S 755.4	W3840.4
	6114	596.44	584.84	581.84	597.4	S 754.6	W3836.0
AV	6109	597.63	584.36	581.36	598.0	S 477.5	W3926.4
	6110	597.70	584.11	581.11	598.2	S 476.4	W3920.3
	6111	597.52	584.68	581.68	598.2	S 475.3	W3916.8
AW	6106	603.30	587.91	584.91	603.7	S 96.6	W3993.8
	6107	603.27	588.73	585.73	603.7	S 95.4	W3989.3
	6108	603.08	588.95	585.95	603.7	S 94.9	W3984.0
AX	6196	598.42	583.77	580.77	598.6	S5564.5	E3723.7
	6197	598.79	579.76	576.76	598.6	S5569.5	E3725.2
	6198	598.19	582.36	579.36	598.6	S5575.1	E3726.1
--	6170	609.57	586.57	583.57	606.7	S 116.6	W4419.3
--	8356	597.15	589.98	586.98	596.0	S 226.2	W4366.3
--	8357	598.40	588.05	585.05	597.1	S 943.8	W4024.5

FIGURE 2

REV. MARK	REVISION	BY	CHK	APP	DATE
T	ADDED CLUSTERS BB, BC, BD, BE & BF	LEG	JJA	JJA	11/11
U	SEPERATED EAST AND WEST SIDE INTO 2 DRAWINGS	TMN	MDC	MDC	9/12
E	ADDED CLUSTERS AB, AC & AD TO TABLE AND DRAWING	LEG	JJA		12/97
F	REVISED NOTE @ BOTTOM OF TABLE & ADDED COORDINATES FOR PIEZO #5682	LEG	JJA		2/98
G	REMOVED CLUSTER P AND ADDED CLUSTERS AE & AF	LEG		JJA	1/99
H	REPLACED CLUSTERS B & C WITH CLUSTERS AG, AH & AI	LEG	JJA	JJA	10/99
I	REVISED CLUSTER AI TABLE DATA	LEG	JJA	JJA	11/99
J	ADDED AJ,AK,AL,AQ,AR,AS & AT TO DRAWING & TABLE	LEG	JJA	JJA	12/00
K	ADDED AM,AN,AO,AP,AU,AV & AW TO DRAWING & TABLE	LEG		JJA	12/01
L	REVISED CLUSTER AB DATA AFTER RAISING TOPS	LEG		JJA	10/02
M	ADDED WELLS 6170 & 6171	LEG			4/05
N	REMOVED Q , ADDED AX & REVISED AT	LEG		JJA	10/05
O	REVISED BOTTOM ELEV. ON PZ-5999 CLUSTER AR	LEG		JJA	12/05
P	ADDED CLUSTERS R, S & AY TO DRAWING & TABLE	LEG		JJA	4/06
Q	UPDATED CLUSTER M	LEG		JJA	5/07
R	REPLACED CLUSTERS M & AR WITH CLUSTERS AZ & BA	LEG		JJA	10/08
S	REPLACED PZ6170 & PZ6171 WITH PZ8356 & PZ8357	LEG		JJA	9/10

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
		DNR				10/18/95

DATE ISSUED FOR

DESIGNED	L.E.G./J.J.A.	12/94
DRAWN	L.E. GIRARDIN	12/94
CHECKED	J.J.A.	12/94
APPROVED	J.J.A.	12/94
PROJ. ENGR.	L.E. GIRARDIN	12/94
MFG. REP.	JIM SHAY	12/94

STATUS | PLANT NO. | P.E. SEAL

THE DOW CHEMICAL COMPANY

MICHIGAN DIVISION — MIDLAND, MICHIGAN

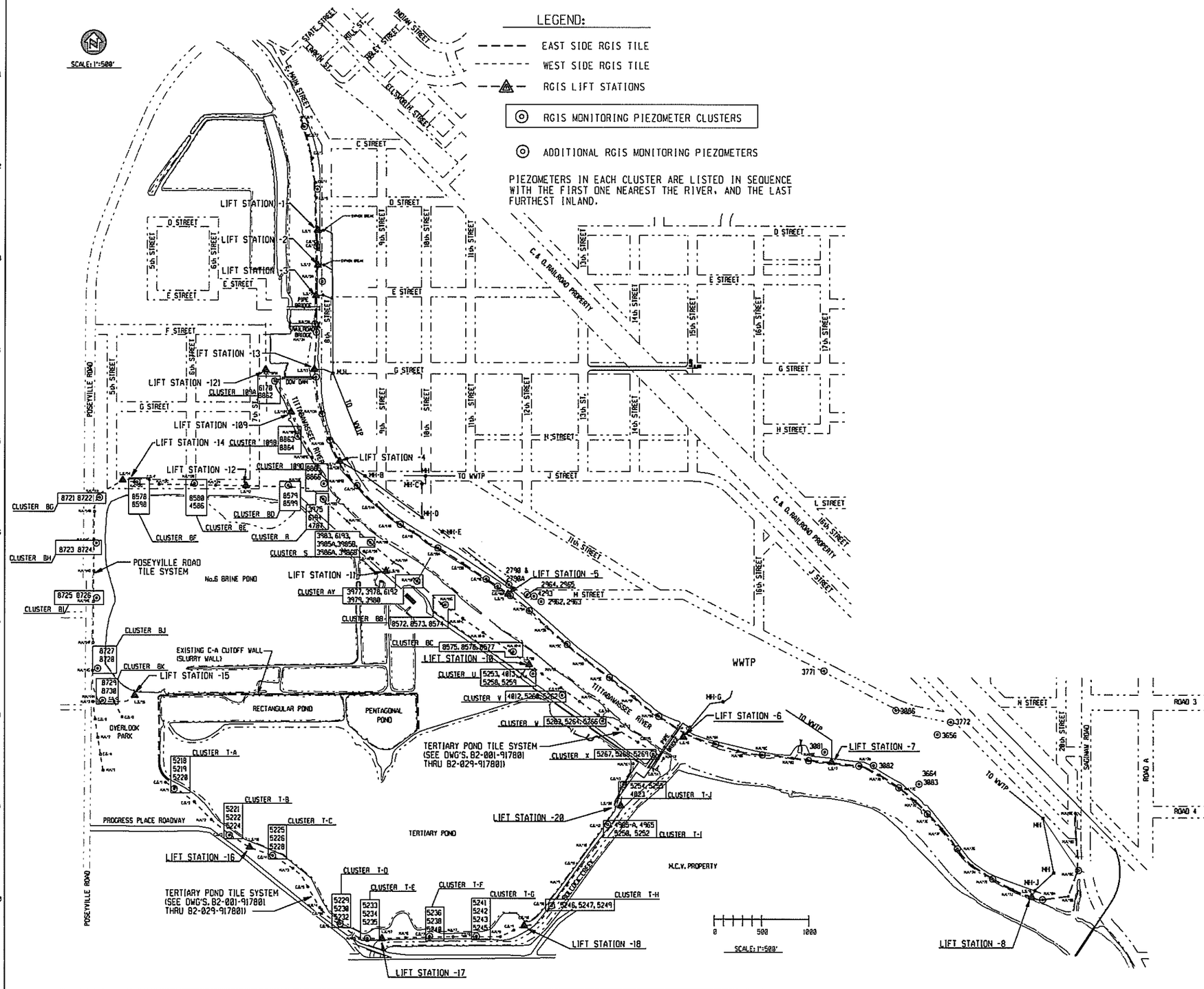
EVS — RGIS

REVETMENT GROUNDWATER INTERCEPTION SYS.
PIEZOMETER CLUSTER LOCATION PLAN & TABLE
EAST SIDE

PROJECT NUMBER	SCALE		REV.
000403	1"=500'	82-003-403	U

2 UND

PRINTED | VER.



PIEZOMETER CLUSTER INFORMATION

CLUSTER	PIEZO. No.	ELEV. TOC	TOP OF SCREEN	BOTTOM SCREEN	GRADE ELEV.	COORDINATES N./S.	E./W.
R	3975					S1318.4	W3823.9
	6194					S1383.8	W3909.1
	4787					S1435.0	W3958.1
S	3983					S1785.6	W3337.0
	6193					S1839.3	W3411.0
	3985A					S1877.5	W3484.1
	3985B					S1878.1	W3480.3
	3986A					S1910.8	W3514.4
	3986B					S1913.8	W3510.5
U	4013	600.67		582.88	598.7	S3339.6	W1634.0
	5253	597.70		558.92	595.2	S3178.2	W1665.3
	5258	597.88		579.95	595.1	S3174.8	W1662.8
	5259	598.03		577.23	595.4	S3151.3	W1613.2
V	4012	603.82		593.79	601.7	S3407.7	W1364.5
	5260	602.87		581.09	599.2	S3400.6	W1348.3
	5262	602.33		586.70	598.8	S3383.4	W1337.2
W	5263	600.41		586.87	597.4	S3709.9	W 950.1
	5264	599.67		582.78	596.8	S3694.6	W 939.7
	5266	598.99		583.59	596.2	S3670.9	W 922.7
X	5267	604.10		584.52	601.3	S4047.5	W 422.8
	5268	602.89		585.2	600.6	S4034.2	W 417.8
	5269	602.77		587.21	599.8	S4019.8	W 409.4
AY	3977					S2019.8	W2937.3
	3978					S2081.1	W3052.6
	6192					S2246.4	W2919.2
	3979					S2187.6	W3158.0
	3980					S2199.7	W3165.5
BB	8572	601.73	597.30	594.30	599.7	S2449.1	W2629.1
	8573	603.89	594.99	591.99	602.2	S2486.3	W2659.2
	8574	605.71	597.22	594.22	603.5	S2578.8	W2741.1
BC	8575	597.17	590.43	587.43	595.1	S2934.0	W1905.3
	8576	596.92	589.79	586.79	594.8	S2981.5	W1938.6
	8577	597.38	593.04	590.04	595.3	S2988.0	W1948.1
BD	8579	605.88	596.68	593.68	604.2	S1254.6	W4252.8
	8599	608.08	598.54	595.54	604.8	S1193.5	W4247.7
BE	8580	606.78	598.46	595.46	606.0	S1232.2	W5296.5
	4586		601.80	598.80	604.8	S1186.7	W5297.3
BF	8578	607.28	600.29	597.29	606.0	S1201.4	W5904.4
	8598	609.15	601.48	598.48	606.0	S1171.6	W5896.4
BG	8721	615.54	593.97	590.97	616.0	S1333.0	W6265.5
	8722	615.14	603.34	600.34	615.4	S1326.3	W6284.85
BH	8723	610.30	595.75	592.75	610.6	S1851.6	W6314.4
	8724	609.44	604.59	601.59	609.7	S1851.1	W6334.75
BI	8725	609.93	597.96	594.96	610.5	S2373.55	W6311.0
	8726	609.67	604.02	601.02	610.3	S2373.9	W6322.65
BJ	8727	614.70	597.71	600.71	615.2	S3120.10	W6309.20
	8728	613.78	602.63	599.63	614.2	S3119.45	W6322.75
BK	8729	611.82	601.99	598.99	614.2	S3119.45	W6304.65
	8730	611.32	605.32	602.32	611.8	S3512.7	W6318.35
109A	8862	608.07	589.32	586.32		S129.1	W4448.0
	6170	609.52	584.97	581.97		S115.5	W4422.8
109B	8864	602.93	588.86	585.86		S709.4	W4186.4
	8863	600.49	590.39	587.39		S700.43	W4167.42
109D	8866	601.59	590.79	587.79		S1214.6	W3896.4
	8865	600.53	589.88	586.88		S1214.2	W3882.5
--	6170	609.57	586.57	583.57	606.7	S 116.6	W4419.3
--	8356	597.15	589.98	586.98	596.0	S 226.2	W4366.3
--	8357	598.40	588.05	585.05	597.1	S 943.8	W4024.5

FIGURE 3

REV. MARK	REVISION	BY	CHK	APP	DATE
T	ADDED CLUSTERS BB, BC, BD, BE & BF	LEG	JJA	JJA	11/11
U	SEPERATED EAST AND WEST SIDE INTO 2 DRAWINGS	TMN	MDC	MDC	9/12
V	ADDED CLUSTER 109A, 109B, AND 109D	TMN	MC	MC	3/14
F	REVISED NOTE 6 BOTTOM OF TABLE & ADDED COORDINATES FOR PIEZO *5682	LEG	JJA		2/98
G	REMOVED CLUSTER P AND ADDED CLUSTERS AE & AF	LEG		JJA	1/99
H	REPLACED CLUSTERS B & C WITH CLUSTERS AG, AH & AI	LEG	JJA	JJA	10/99
I	REVISED CLUSTER AI TABLE DATA	LEG	JJA	JJA	11/99
J	ADDED AJ, AK, AL, AO, AR, AS & AT TO DRAWING & TABLE	LEG	JJA	JJA	12/00

REV. MARK	REVISION	BY	CHK	APP	DATE
K	ADDED AM, AN, AO, AP, AU, AV & AW TO DRAWING & TABLE	LEG		JJA	12/01
L	REVISED CLUSTER AB DATA AFTER RAISING TOPS	LEG		JJA	10/02
M	ADDED WELLS 6170 & 6171	LEG			4/05
N	REMOVED O. ADDED AX & REVISED AT	LEG		JJA	10/05
O	REVISED BOTTOM ELEV. ON PZ-5999 CLUSTER AR	LEG		JJA	12/05
P	ADDED CLUSTERS R, S & AY TO DRAWING & TABLE	LEG		JJA	4/06
Q	UPDATED CLUSTER M	LEG		JJA	5/07
R	REPLACED CLUSTERS M & AR WITH CLUSTERS AZ & BA	LEG		JJA	10/08
S	REPLACED PZ6170 & PZ6171 WITH PZ8356 & PZ8357	LEG		JJA	9/10

ORAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
		DNR				10/18/95

DATE ISSUED FOR

DESIGNED	L.E.G./J.J.A.	12/94
DRAWN	L.E. GIRARDIN	12/94
CHECKED	J.J.A.	12/94
APPROVED	J.J.A.	12/94
PROJ. ENGR.	L.E. GIRARDIN	12/94
MFG. REP.	JIM SHAY	12/94

STATUS | PLANT NO. | P.E. SEAL

THE DOW CHEMICAL COMPANY
MICHIGAN DIVISION — MIDLAND, MICHIGAN
EVS — RGIS

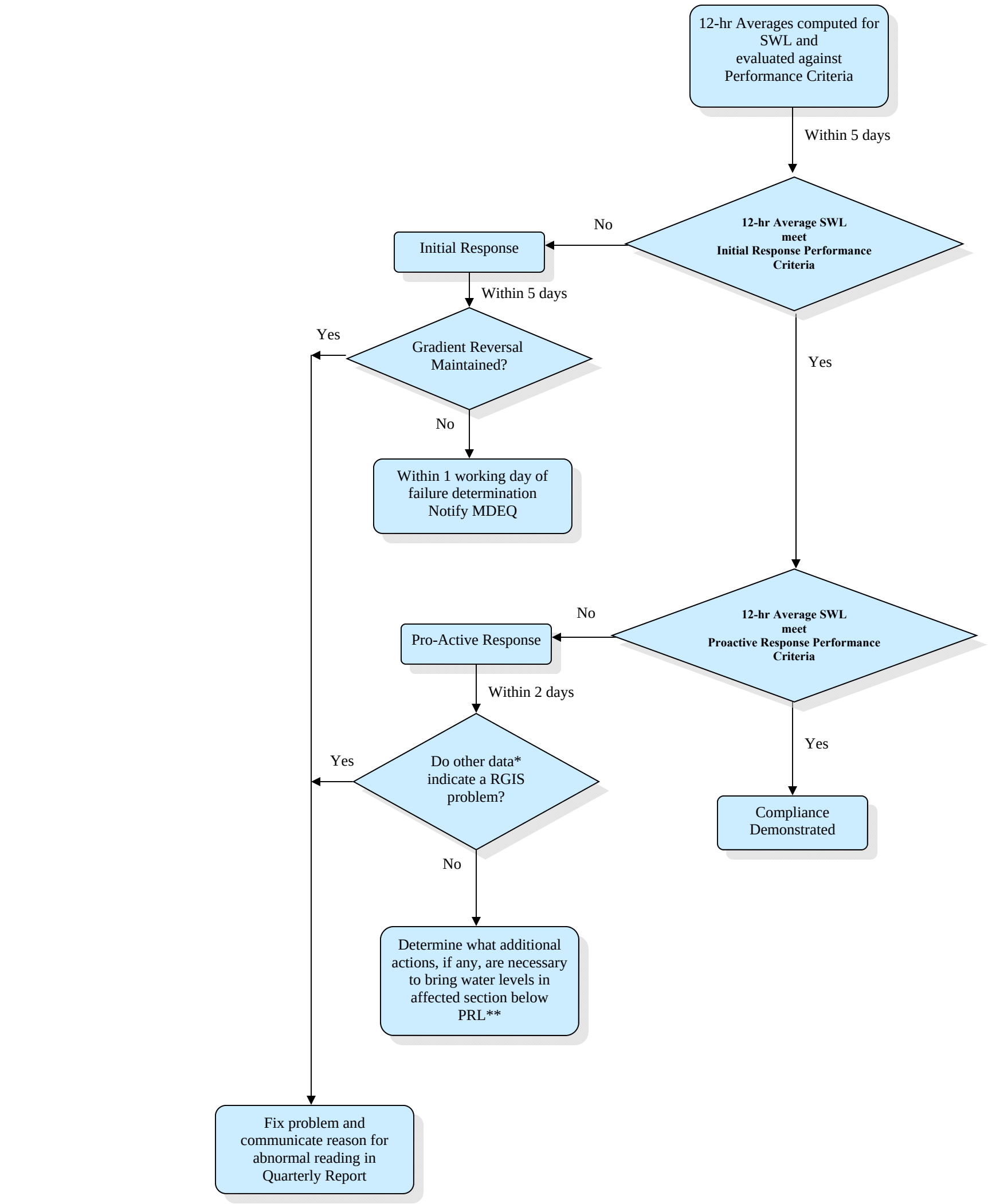
REVETMENT GROUNDWATER INTERCEPTION SYS.
PIEZOMETER CLUSTER LOCATION PLAN & TABLE
WEST SIDE

PROJECT NUMBER	SCALE		REV.
000403	1"=500'	B2-003A-403	V

2 UND

PRINTED | VER.

Figure 4
Flowsheet for East Side RGIS
Hydraulic Data Evaluation and Reporting



NOTES:
RGIS = Revetment Groundwater Interception System
SWL = Static Water Level
Performance Criteria area established in Table 2-B
PRL = Pro-Active Response Level (defined as: in Table 2-B Proactive Response Performance Criteria)

*may include:

- An on-line check of adjacent SWLs,;
- Monitoring of trends, including lift station levels and flow rates;
- Visual observation of affected area; and
- Manual SWL readings from piezometers, cleanouts, and/or manholes.

**If a planned response to repair or replace a section of RGIS is necessary, it will be submitted to the Division Chief for review and approval. The submittal will include a timetable which will summarize the time required to complete the repairs.

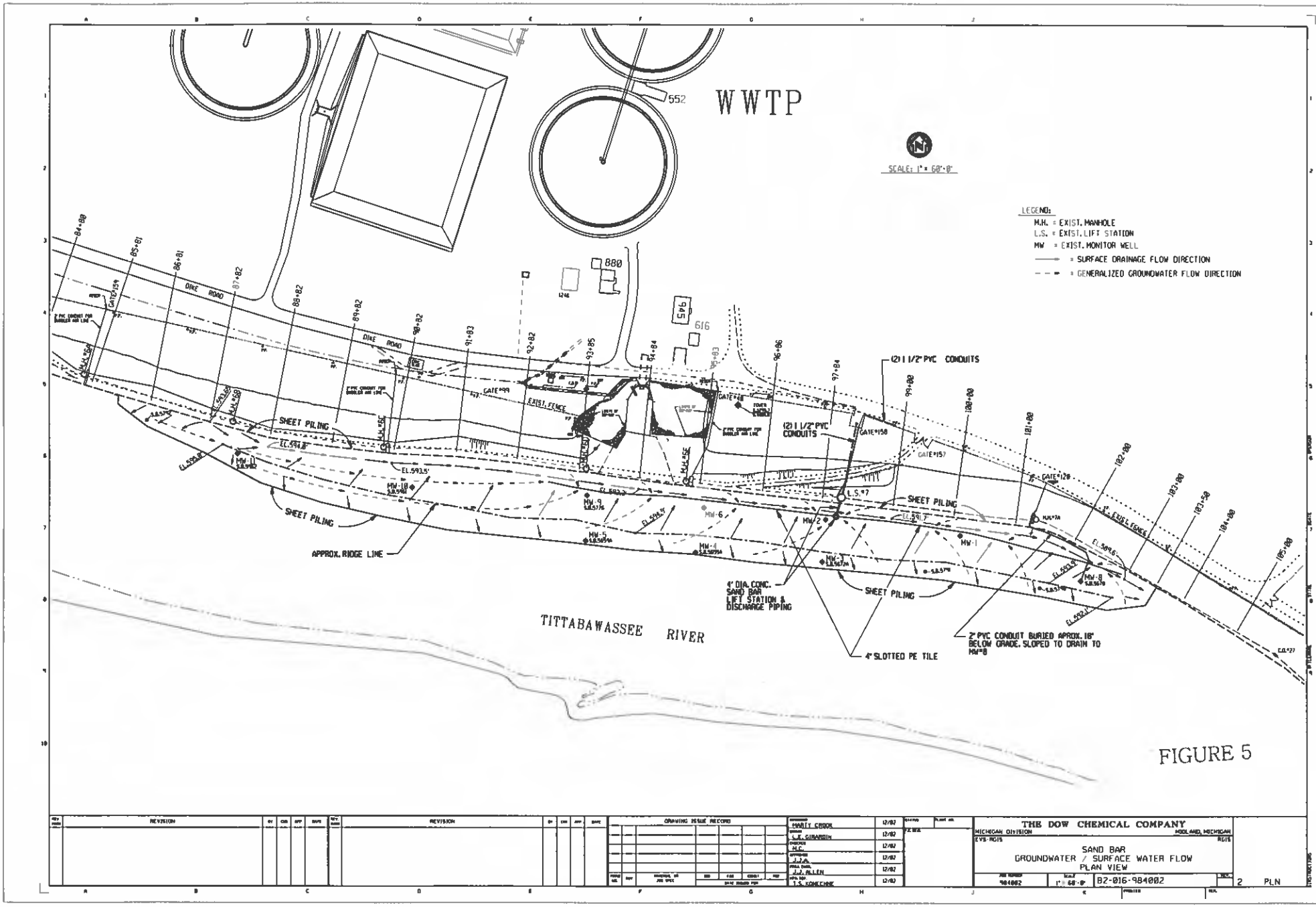


FIGURE 5

REVISION	BY	CHK	APP	DATE

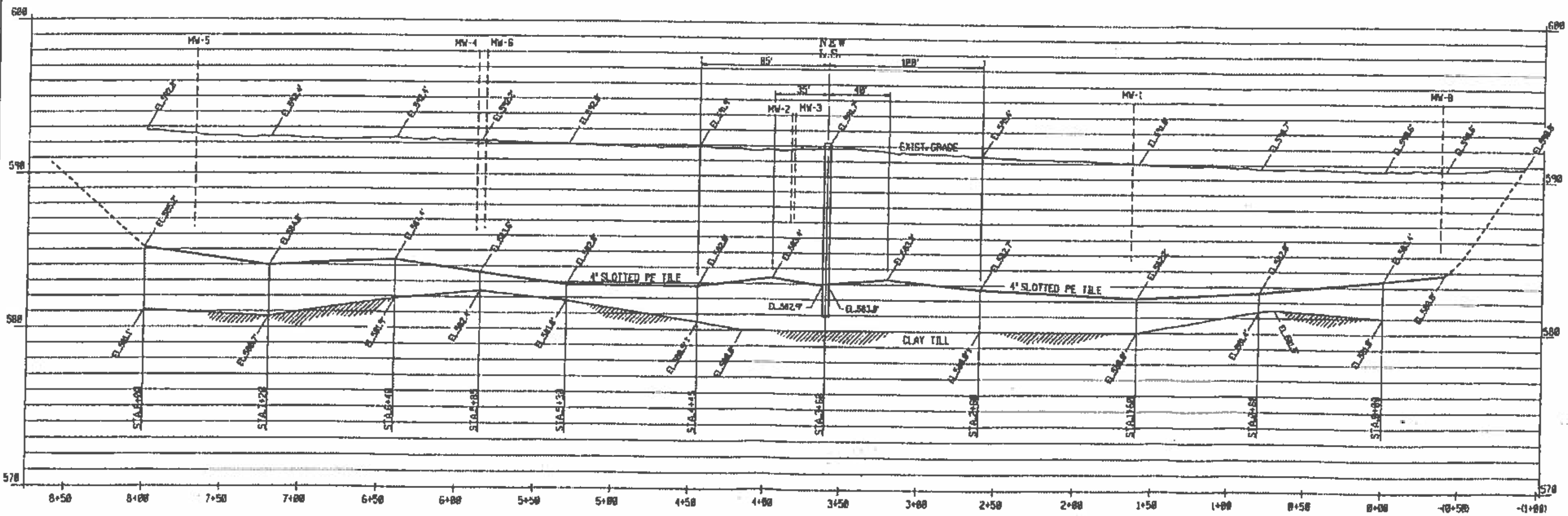
DRAWING ISSUE RECORD				

MARTY CROOK	12/82
L.E. GIRARDIN	12/82
H.C.	12/82
J.J.A.	12/82
J.J. ALLEN	12/82
T.S. KOMECKNE	12/82

THE DOW CHEMICAL COMPANY
MICHIGAN DIVISION — MIDLAND, MICHIGAN
EVS-RGTS — RGTS

SAND BAR
GROUNDWATER / SURFACE WATER FLOW
PLAN VIEW

JOB NUMBER	SCALE	DRAWING NO.	REV.
984002	1" = 60'-0"	B2-016-984002	2 PLN



SAND BAR TILE
AS-BUILT ELEVATIONS

SCALE: HORIZ. 1" = 30'-0" VERT. 1" = 3'-0"

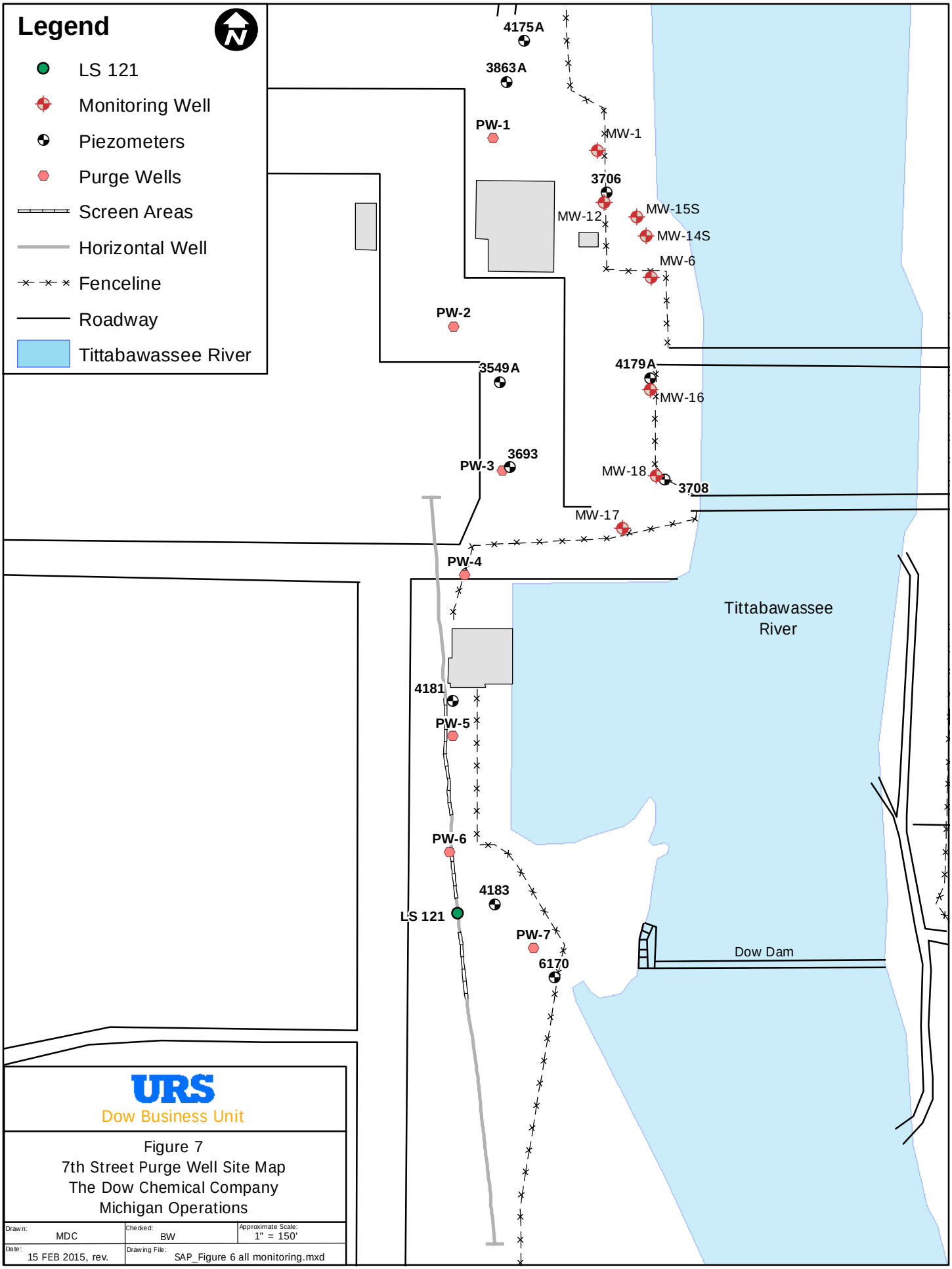
FIGURE 6

A "AS-BUILT"

THE DOW CHEMICAL COMPANY
MICHIGAN DIVISION — MIDLAND, MICHIGAN

SAND BAR SHEET PILING PROJECT
TILE PROFILE AS-BUILT

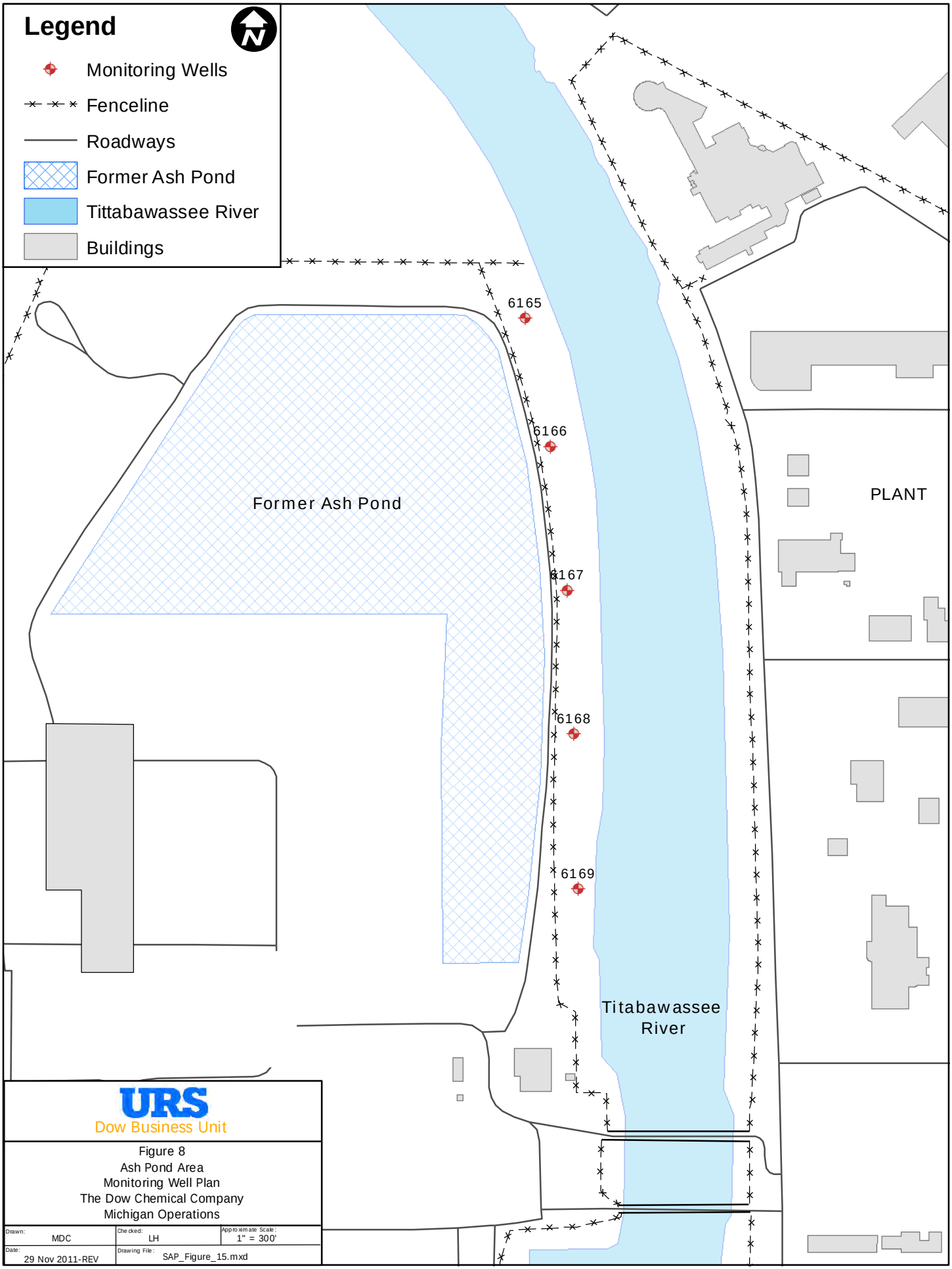
02-015-984002



URS
Dow Business Unit

Figure 7
7th Street Purge Well Site Map
The Dow Chemical Company
Michigan Operations

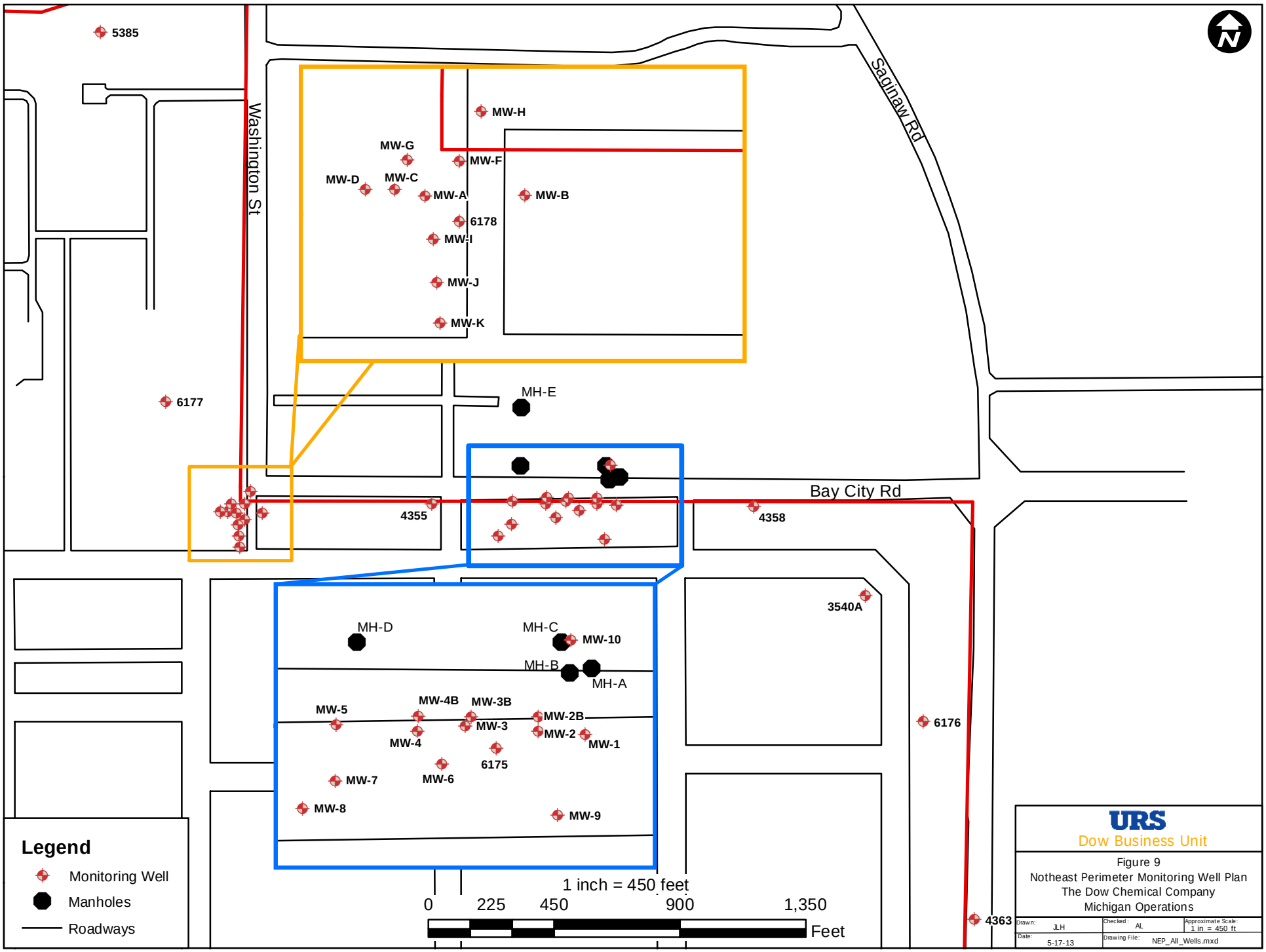
Drawn:	Checked:	Approximate Scale:
MDC	BW	1" = 150'
Date: 15 FEB 2015, rev.	Drawing File: SAP_Figure 6 all monitoring.mxd	

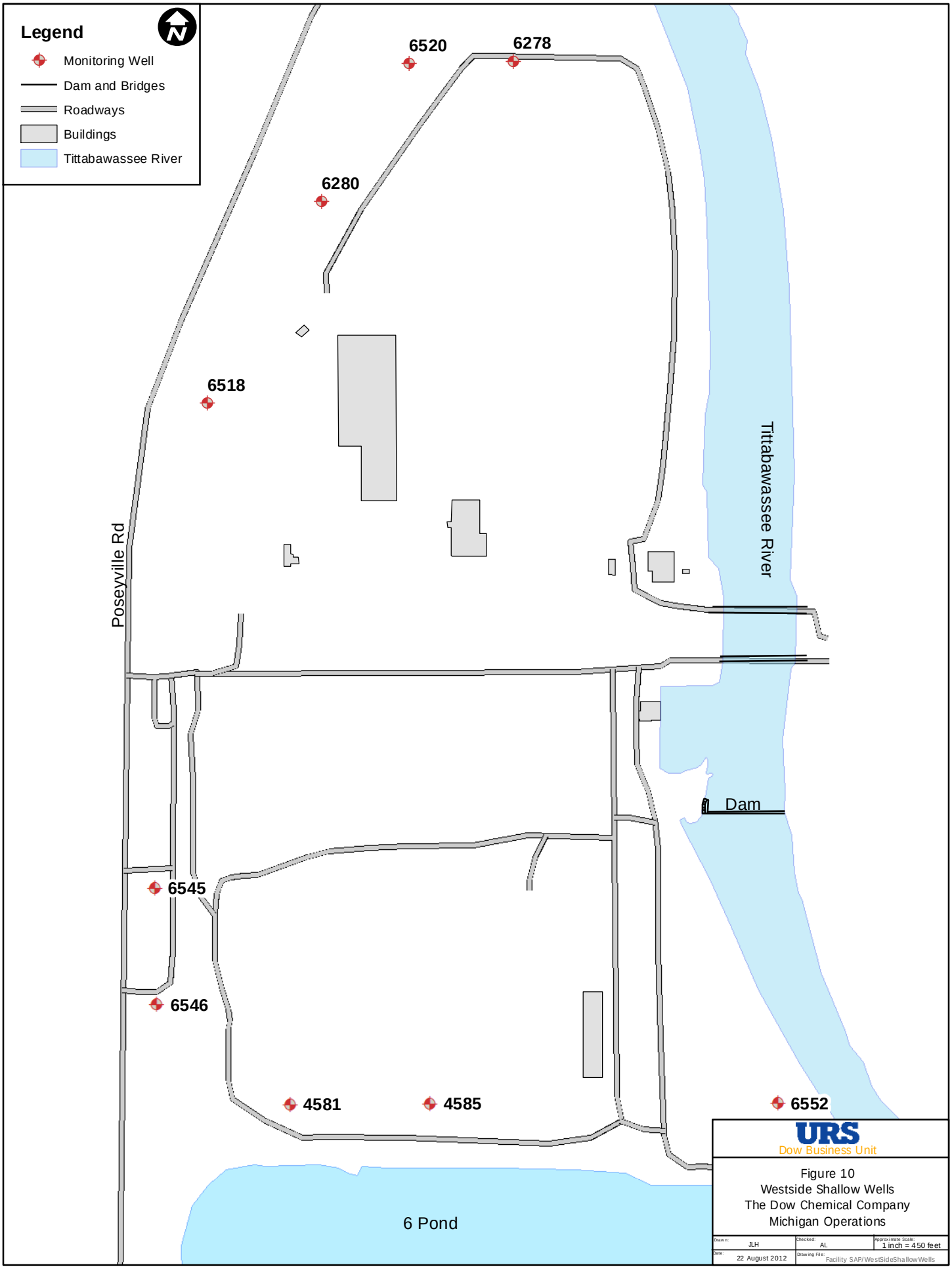


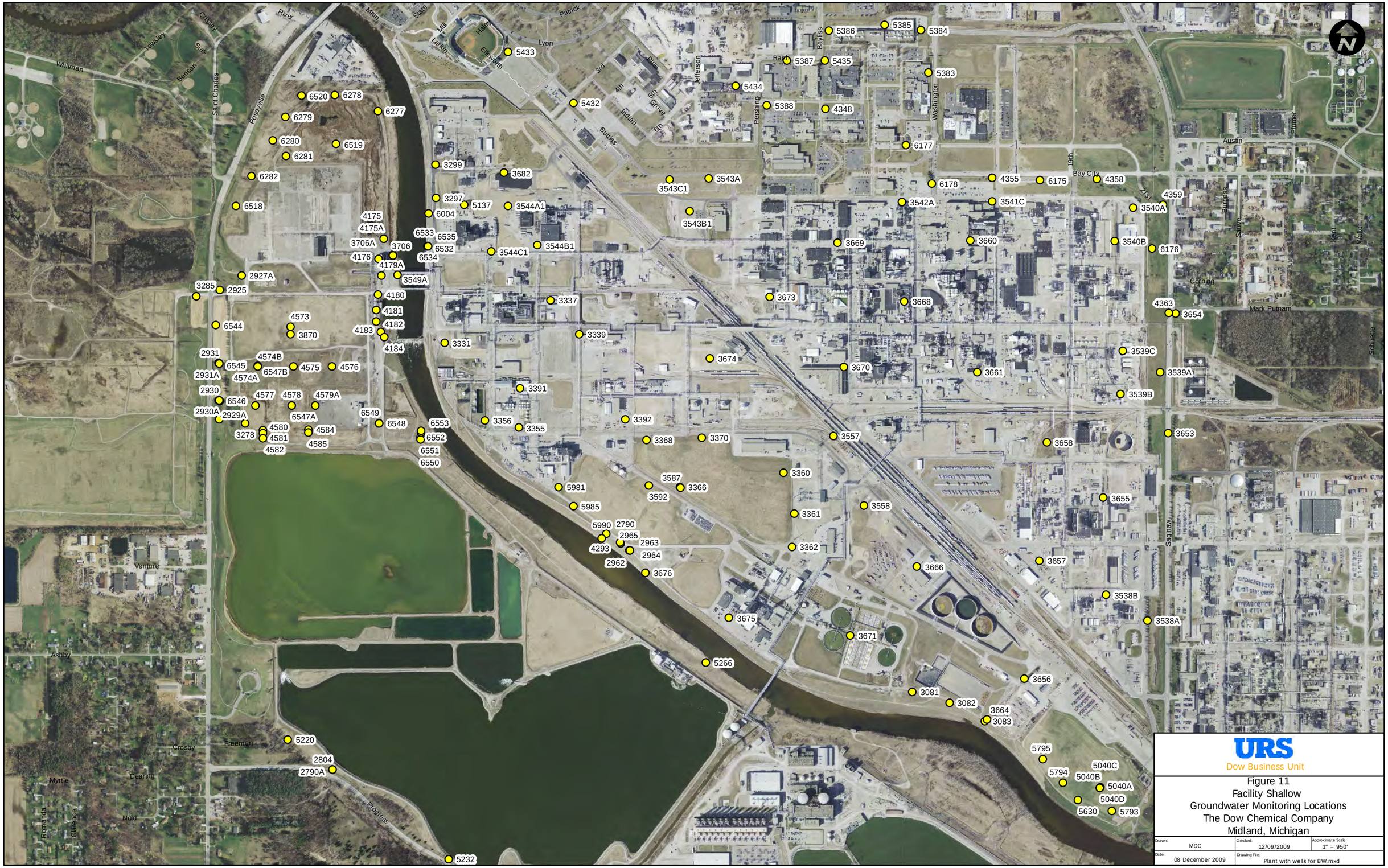
URS
Dow Business Unit

Figure 8
Ash Pond Area
Monitoring Well Plan
The Dow Chemical Company
Michigan Operations

Drawn:	Checked:	Approximate Scale:
MDC	LH	1" = 300'
Date:	Drawing File:	
29 Nov 2011-REV	SAP_Figure_15.mxd	


5385
Washington St
Saginaw Rd
MW-H
MW-G
MW-F
MW-D
MW-C
MW-A
MW-B
6178
MW-I
MW-J
MW-K
6177
MH-E
Bay City Rd
4355
4358
3540A
MH-D
MH-C
MW-10
MH-B
MH-A
MW-5
MW-4B
MW-3B
MW-2B
MW-3
MW-2
MW-1
MW-4
6175
MW-7
MW-6
MW-8
MW-9
6176
4363
Legend
Monitoring Well
Manholes
Roadways
1 inch = 450 feet
0
225
450
900
1,350
Feet
URS
Dow Business Unit
Figure 9
Notheast Perimeter Monitoring Well Plan
The Dow Chemical Company
Michigan Operations
Drawn: JLH
Checked: AL
Approximate Scale: 1 in = 450 ft
Date: 5-17-13
Drawing File: NEP_All_Wells.mxd


Legend
Monitoring Well
Dam and Bridges
Roadways
Buildings
Tittabawassee River
6520
6278
6280
6518
Poseyville Rd
Tittabawassee River
Dam
6545
6546
4581
4585
6552
6 Pond
URS
Dow Business Unit
Figure 10
Westside Shallow Wells
The Dow Chemical Company
Michigan Operations
Drawn: JLH
Checked: AL
Approximate Scale: 1 inch = 450 feet
Date: 22 August 2012
Drawing File: Facility SAP/WestSideShallowWells

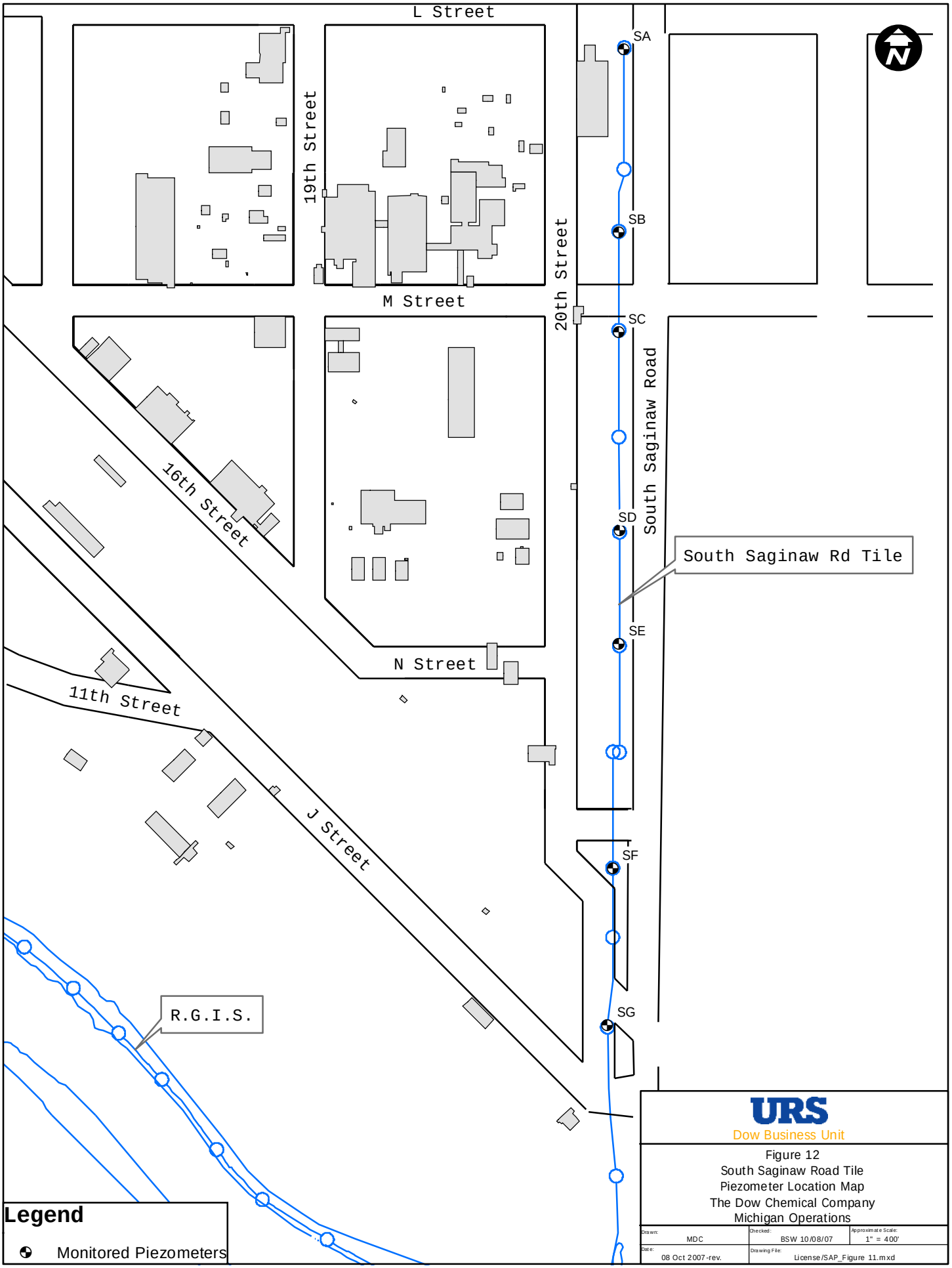


URS

Dow Business Unit

Figure 11
Facility Shallow
Groundwater Monitoring Locations
The Dow Chemical Company
Midland, Michigan

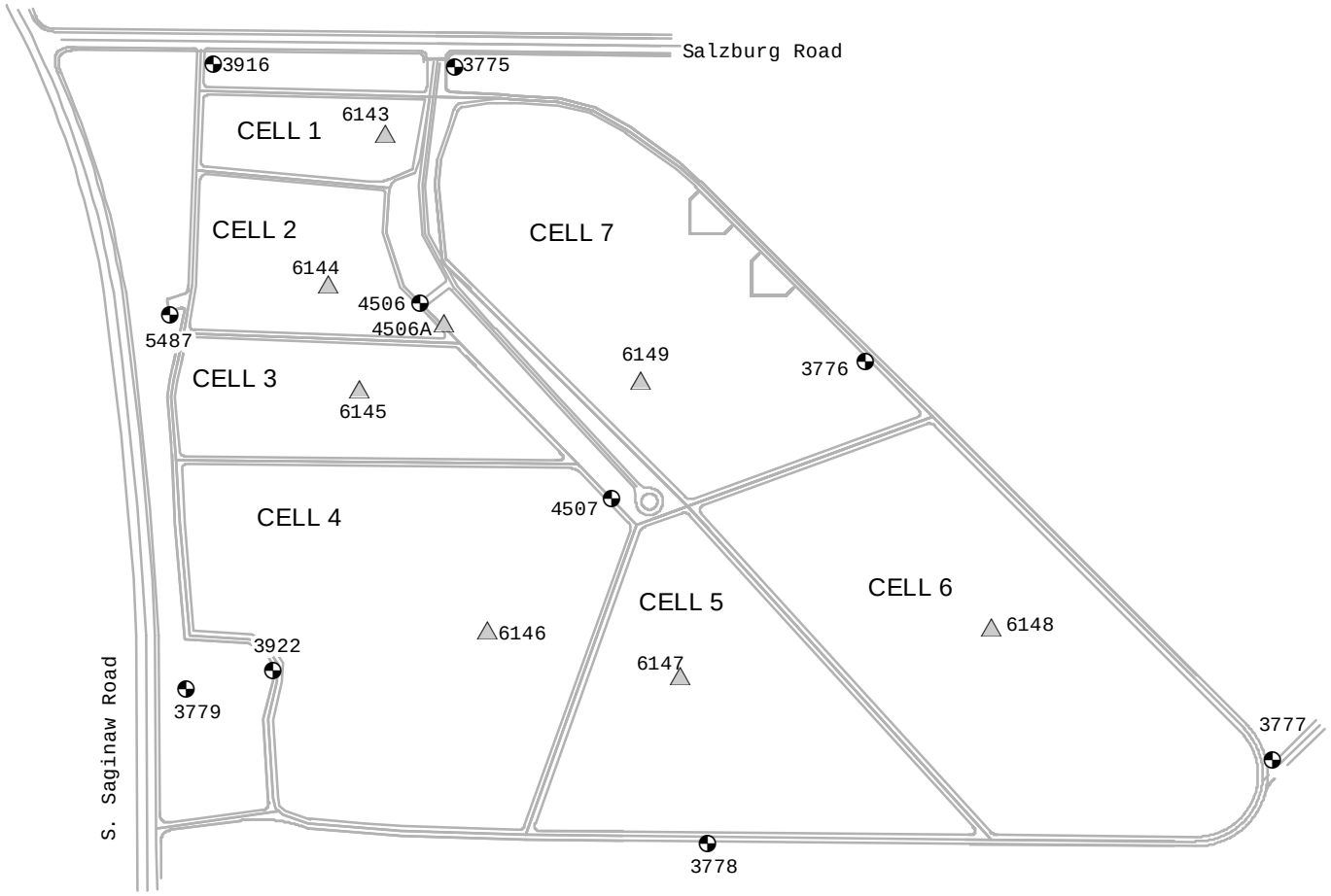
Drawn:	Checked:	Approximate Scale:
MDC	12/09/2009	1" = 950'
Date:	Drawing File:	
08 December 2009	Plant with wells for BW.mxd	



URS
Dow Business Unit

Figure 12
South Saginaw Road Tile
Piezometer Location Map
The Dow Chemical Company
Michigan Operations

Drawn:	Checked:	Approximate Scale:
MDC	BSW 10/08/07	1" = 400'
Date: 08 Oct 2007-rev.	Drawing File: License/SAP_Figure 11.mxd	



Legend

Well Type

- Monitoring Well
- Piezometer

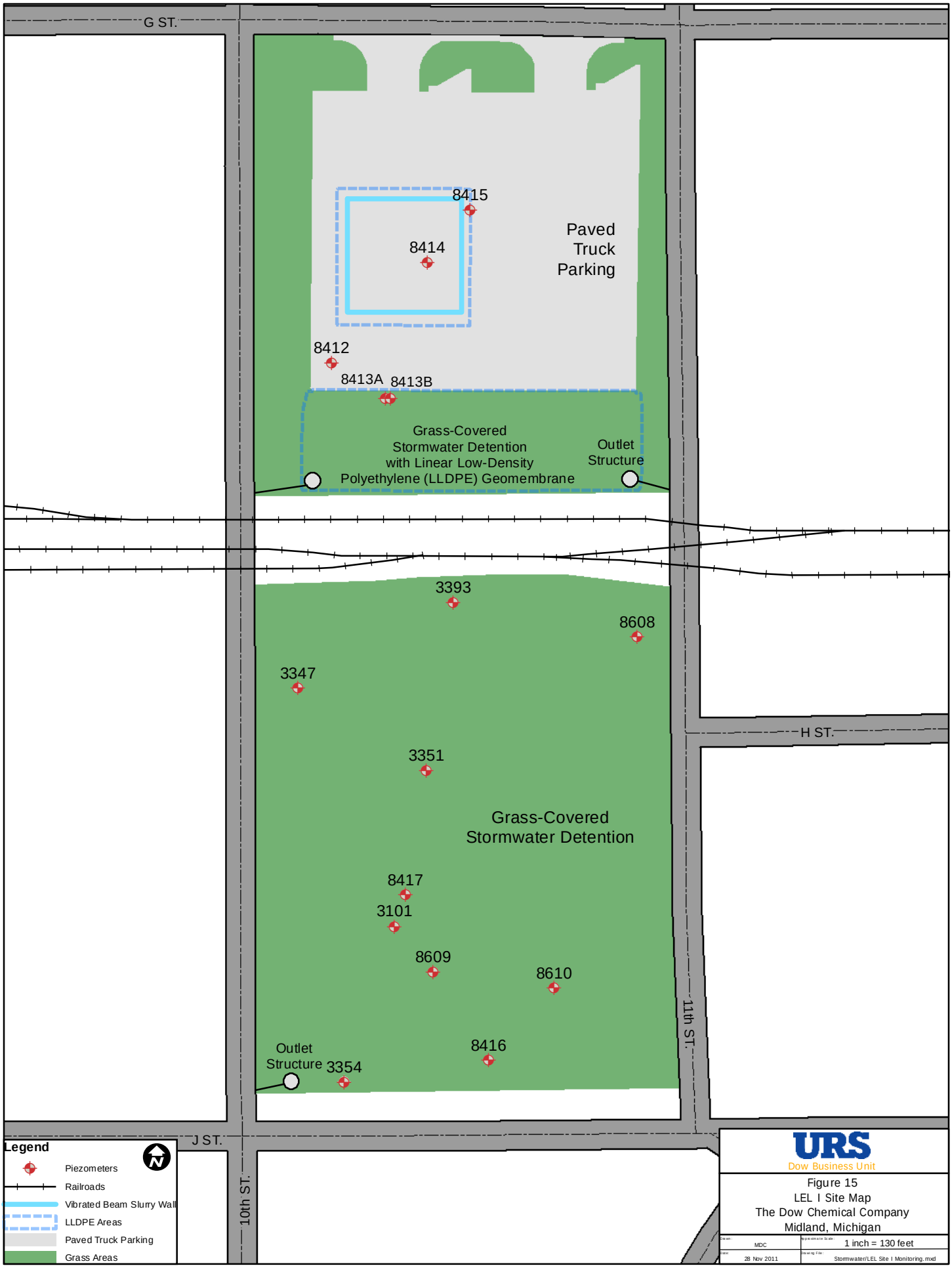
URS

Dow Business Unit

Figure 13
Monitoring Wells and Piezometers
Sludge Dewatering Facility
The Dow Chemical Company
Michigan Operations

Drawn: MDC	Checked: BSW 10/08/07	Approximate Scale: 1" = 300'
Date: 08 Oct 2007-rev	Drawing File: SAP_Figure_3.mxd	


2922
2908
MW-3283
MW-2907
2904
2906
2903
MW-2902
PW-2960
2915
5923
5924
2917A
PW-2917
2549
2930
3280
MW-5925
2550
2929A
3278
PW-2961
MW-2438
MW-6174
MW-2688
PW-2690-A
MW-2691
3282
MW-2692
MW-2995
MW-2994
MW-2985
MW-2992
MW-2693
MW-3004
MW-2969
MW-2991
MW-2968
Poseyville Landfill
MW-2986
MW-2998
MW-4505
MW-2999
MW-2996
MW-2686
MW-2684
Legend
Purge Well
Piezometer
Monitoring Well
RCRA Facility Boundary
Poseyville Landfill Extent
URS
Dow Business Unit
Figure 14
Site Location Plan
Poseyville Landfill
The Dow Chemical Company
Midland, Michigan
Drawn: MDC
Checked: 9/30/2010
Approximate Scale: 1" = 400'
Date: 29 September 2010
Drawing File: Poseyville Landfill Monitoring Points.mxd

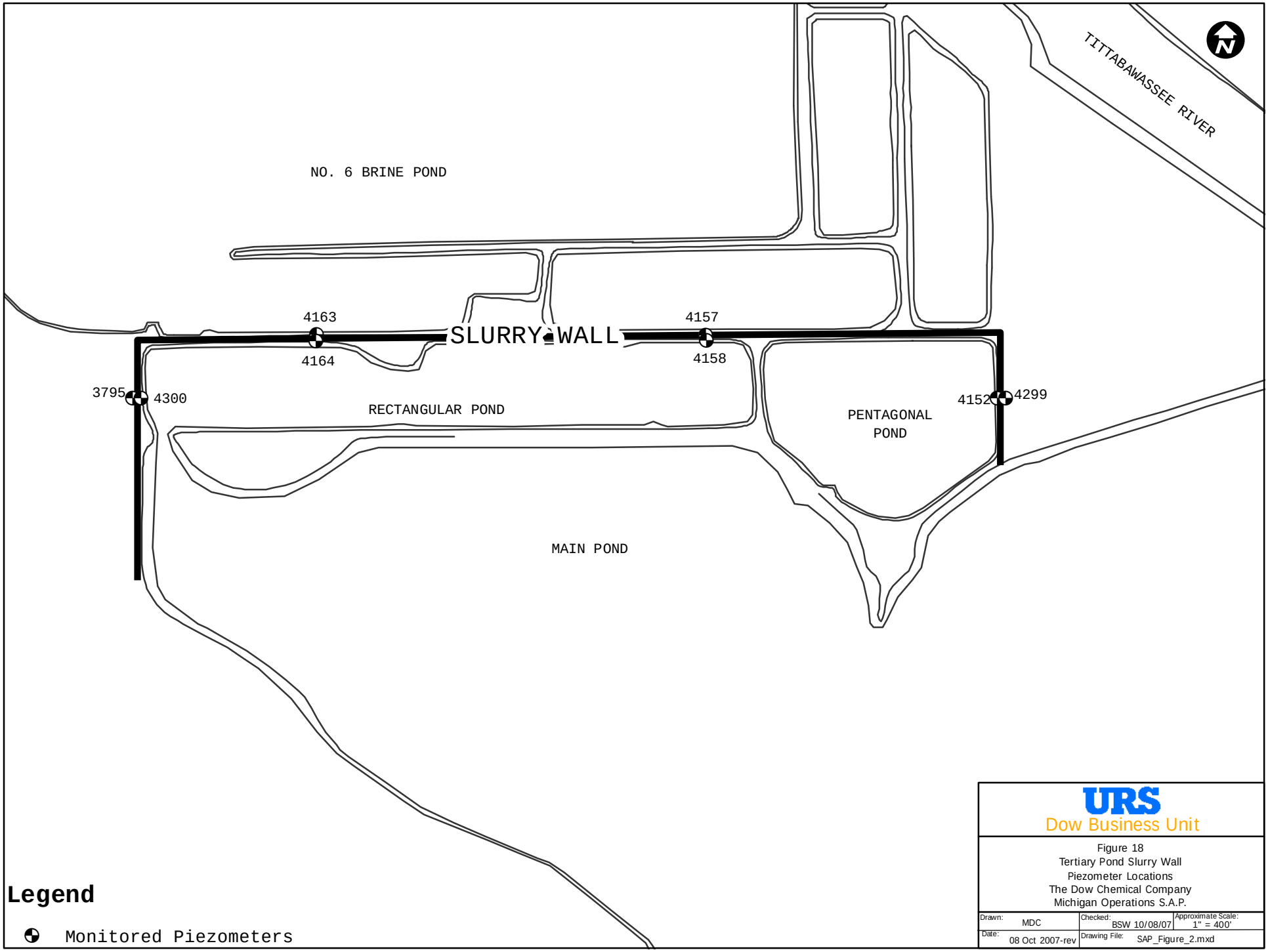

G ST.
8415
8414
Paved
Truck
Parking
8412
8413A
8413B
Grass-Covered
Stormwater Detention
with Linear Low-Density
Polyethylene (LLDPE) Geomembrane
Outlet
Structure
3393
8608
3347
H ST.
3351
Grass-Covered
Stormwater Detention
8417
3101
8609
8610
11th ST.
Outlet
Structure
3354
8416
J ST.
10th ST.
Legend
Piezometers
Railroads
Vibrated Beam Slurry Wall
LLDPE Areas
Paved Truck Parking
Grass Areas
URS
Dow Business Unit
Figure 15
LEL I Site Map
The Dow Chemical Company
Midland, Michigan
Drawn: MDC
Approximate Scale: 1 inch = 130 feet
Date: 28 Nov 2011
Drawing File: Stormwater/LEL Site I Monitoring.mxd


MW-3368
MW-3369
MW-3370
MW-3371
MW-3604
MW-3590
LEL II
MW-3367
MW-3358
MW-3359
MW-3588
MW-3360
MW-3592
MW-8334
MW-3587
MW-3366
MW-8335
MW-8336
MW-3365
MW-8337
MW-8338
MW-3600
MW-8339
MW-3361
MW-3364
MW-8340
MW-8343
LEL III
MW-8344
MW-3363
MW-3362
MW-8345
MW-8346
N
Legend
Wells Closed Due to WIF Construction
Existing Wells
Containment Slurry Walls
Cement-Bentonite
Vibrated Beam
Area Designated as LEL (Locally Elevated Levels)
URS
Dow Business Unit
Figure 16
LEL II & LEL III Site Map
The Dow Chemical Company
Michigan Operations
Drawn: JLH
Checked: LH
Scale: 1 inch = 200 feet
Date: 23 August 2010
Drawing File: Cap inspection/Figure17 LEL II LEL III.mxd

URS
Dow Business Unit

Figure 17
1925 Landfill
The Dow Chemical Company
Michigan Operations

Drawn:	Checked:	Approximate Scale:
JH	AL	As Shown
Date: 20 August 2012	Drawing File: Facility SAP/ 1925Landfill	



URS
Dow Business Unit

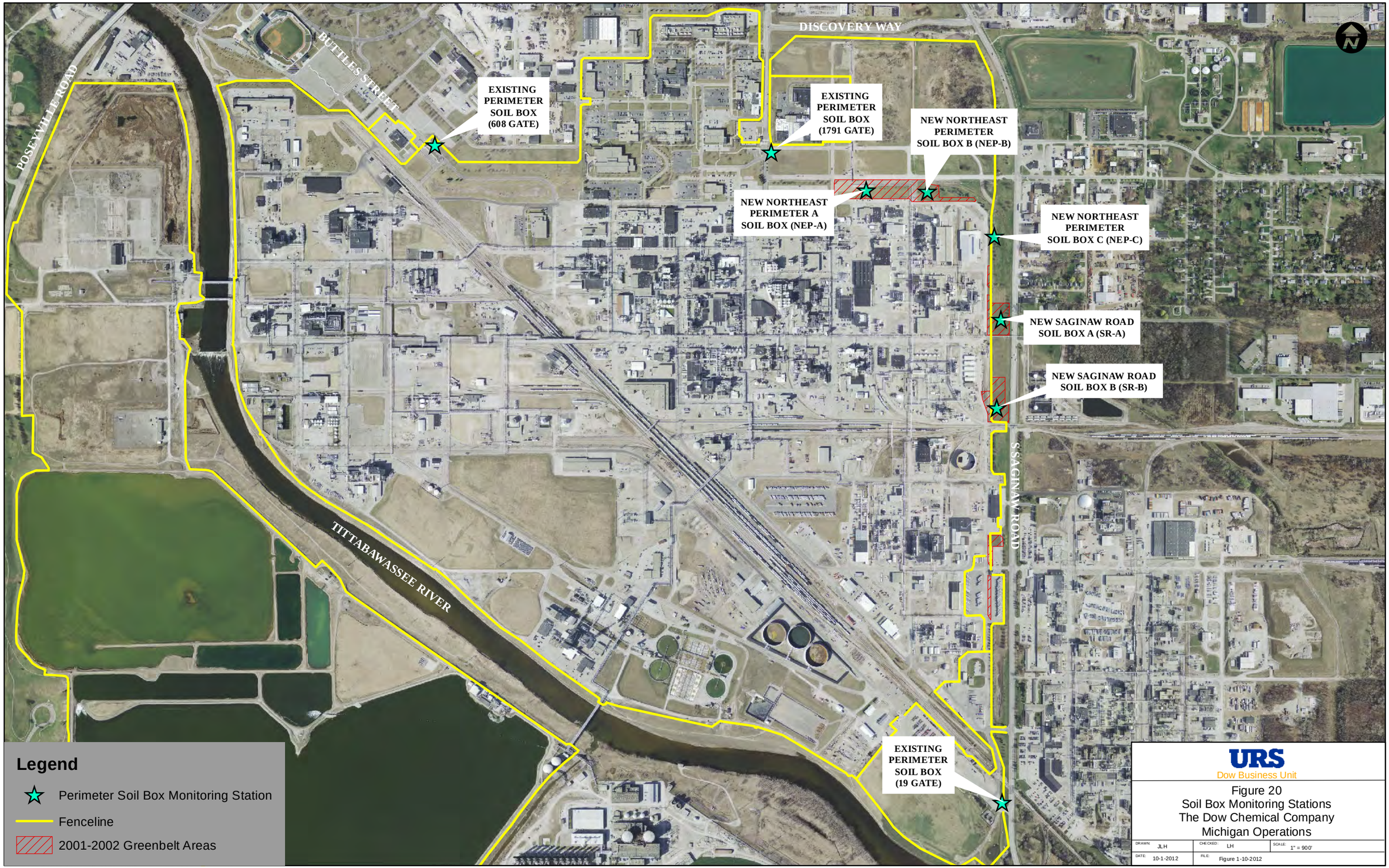
Figure 18
Tertiary Pond Slurry Wall
Piezometer Locations
The Dow Chemical Company
Michigan Operations S.A.P.

Drawn: MDC	Checked: BSW 10/08/07	Approximate Scale: 1" = 400'
Date: 08 Oct 2007-rev	Drawing File: SAP_Figure_2.mxd	

URS
Dow Business Unit

Figure 19
Overlook Park Site Map
The Dow Chemical Company
Midland County, Michigan

Drawn:	Approximate Scale:
JLH	As Shown
Date:	Drawing File:
20 August 2012	Facility SAP/Overlook Park


DISCOVERY WAY
BUTTLES STREET
POSEYVILLE ROAD
EXISTING PERIMETER SOIL BOX (608 GATE)
EXISTING PERIMETER SOIL BOX (1791 GATE)
NEW NORTHEAST PERIMETER SOIL BOX B (NEP-B)
NEW NORTHEAST PERIMETER A SOIL BOX (NEP-A)
NEW NORTHEAST PERIMETER SOIL BOX C (NEP-C)
NEW SAGINAW ROAD SOIL BOX A (SR-A)
NEW SAGINAW ROAD SOIL BOX B (SR-B)
S SAGINAW ROAD
TITTABAWASSEE RIVER
EXISTING PERIMETER SOIL BOX (19 GATE)
Legend
Perimeter Soil Box Monitoring Station
Fenceline
2001-2002 Greenbelt Areas
URS
Dow Business Unit
Figure 20
Soil Box Monitoring Stations
The Dow Chemical Company
Michigan Operations
DRAWN: JLH
CHECKED: LH
SCALE: 1" = 900'
DATE: 10-1-2012
FILE: Figure 1-10-2012

Appendix A

Analytical Procedures and Quality Control

ANALYTICAL PROCEDURES

Samples taken in support of Part 111 of Act 451/RCRA requirements will be analyzed by The Dow Chemical Company (Dow). The Dow Analytical Sciences Laboratories will the maintain quality control and good laboratory practices. Solvents, calibration standards, and calibration gases are analytical reagent grade or better and carrier gases are of high purity. All instruments are standardized or calibrated according to the appropriate method. Documentation is kept of instrument calibration and any instrument repair. All transportation, storage, and waste disposal at Dow's Analytical Science Laboratories will be done in accordance with applicable state and federal regulations. Reporting limits stated in Appendix B are for the Part 111 of Act 451/RCRA detection monitoring program. At the discretion of the Analytical Sciences Laboratories management, a Dow analytical facility or an outside contractor may be used to perform any analyses. Analytical Science Laboratories will assure that the outside laboratory chosen will be able to meet reporting limits as identified in Appendix B.

Samples are analyzed in accordance to EPA methods as presented in Appendix B to the SAP. Best laboratory practices will be utilized where an EPA method does not mandate. Laboratory procedures are reviewed and updated periodically. If review reveals that changes have been made in analytical methods, this information will be sent to MDEQ. Dow will submit proposed revisions to the SAP to the Chief of the Office of Waste Management and Radiological Protection for approval prior to implementation and will revise any other affected document accordingly. If approved, the revisions to the SAP will become part of the license without the need for a minor license modification.

Reporting limits are meant to represent typical limits achievable for clean water samples. Matrix interferences may prevent these levels from being met for some analyses. These limits are meant to be a representation of laboratory capability and may not be used for reporting purposes.

QUALITY CONTROL

Blanks are sampled and analyzed as described in the table below as a quality control check. The purpose of the checks is to detect sampling or laboratory contamination. A complete description of the quality assurance and quality control policies and procedures followed by the laboratory is provided in Appendix C to the SAP.

Quality Control Table

Media	Parameter	Field Duplicate	Trip Blank	Field Blank	Equipment Blank	Lab Blank
Groundwater	VOA	One per sample event	One per sample event (analysis optional)	One per sample event	One per sample event collected and analyzed for affected media, *if non-dedicated equipment is used*.	One for each 12-hour analytical batch
	EOA					One for each set of 20 or fewer samples
	Metals/ Inorganics		Not required	Not required		One for each set of 20 or fewer samples
Leachate (also applies to RGIS and all sump/purge well chemical monitoring programs)	VOA	One per sample event	Not required	Not required		One for each 12-hour analytical batch
	EOA					One for each set of 20 or fewer samples
	Metals/ Inorganics					One for each set of 20 or fewer samples
	D/F					One for each set of 20 samples
Soil	D/F	One per sample event	One per sample event	One blank collected for each sampling event as both Field Blank and Equipment Blank per SAP Section 5.2.		One for each set of 20 samples

Appendix B

Chemical Constituent, Analytical Method, and Reporting Limit List

Appendix B

Chemical Constituent, Analytical Method, and Reporting Limit List

	Page
Table I – Volatile Organics ……	2
Table II – Semivolatile Organics ……..	5
Table III – Metals ……	11
Table IV – Anions ……..	12
Table V – Pesticides and PCBs …….	13
Table VI – Dioxins and Furans …….	17
Table VII – Field Parameters …….	18

Notes:

(1) A Reporting Limit (RL) is defined as the lowest level at which measurements become quantitatively meaningful. An RL is greater than the statistically determined MDLs.

(2) Methods stated in this Appendix can change and will be updated to reflect the most recently approved EPA version.

(3) 1,4-Dioxane lower RL applies only to Glacial Till and Regional Aquifer detection monitoring wells.

(4) Polychlorinated biphenyls (CAS RN 1336-36-3); this category contains congener chemicals, including constituents of Aroclor-1016 (CAS RN 12674-11-2), Aroclor-1221 (CAS RN 11104-28-2), Aroclor-1232 (CAS RN 11141-16-5), Aroclor-1242 (CAS RN 53469-21-9), Aroclor-1248 (CAS RN 12672-29-6), Aroclor-1254 (CAS RN 11097-69-1), Aroclor-1260 (CAS RN 11096-82-5). The RL shown is an average value for PCB congeners.

(5) RLs for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans are in pg/g or ng/L depending on the matrix.

Table I
Volatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
Acetone	67-64-1	2-Propanone	8260B	20
Acetonitrile; Methyl cyanide	75-05-8	Acetonitrile	8260B	10
Acrolein	107-02-8	2-Propenal	8260B	10
Acrylonitrile	107-13-1	2-Propenenitrile	8260B	5
Allyl chloride	107-05-1	1-Propene, 3-chloro-	8260B	1
Benzene	71-43-2	Benzene	8260B	1
Bromochloromethane	74-97-5	Methane, bromochloro-……	8260B	1
Bromodichloromethane	75-27-4	Methane, bromodichloro-	8260B	1
Bromoform; Tribromomethane	75-25-2	Methane, tribromo-	8260B	1
sec-Butylbenzene	135988	Benzene, sec-butyl-	8260B	1
Carbon disulfide	75-15-0	Carbon disulfide	8260B	1
Carbon tetrachloride	56-23-5	Methane, tetrachloro-	8260B	1
Chlorobenzene	108-90-7	Benzene, chloro-	8260B	1
Chloroethane; Ethyl chloride	75-00-3	Ethane, chloro-	8260B	5
Chloroform	67-66-3	Methane, trichloro-	8260B	1
Chloroprene	126-99-8	1,3-Butadiene, 2-chloro-	8260B	5
Dibromochloromethane; Chlorodibromomethane	124-48-1	Methane, dibromochloro-	8260B	1
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	Propane, 1,2-dibromo-3-chloro-	8260B	5
1,2-Dibromoethane; Ethylene dibromide	106-93-4	Ethane, 1,2-dibromo-	8260B	1
o-Dichlorobenzene	95-50-1	Benzene, 1,2-dichloro-	8260B	1
m-Dichlorobenzene	541-73-1	Benzene, 1,3-dichloro-	8260B	1
p-Dichlorobenzene	106-46-7	Benzene, 1,4-dichloro-	8260B	1
trans-1,4-Dichloro-2-butene	110-57-6	2-Butene, 1,4-dichloro-, (E)-	8260B	1
Dichlorodifluoromethane	75-71-8	Methane, dichlorodifluoro-	8260B	5
1,1-Dichloroethane	75-34-3	Ethane, 1,1-dichloro-	8260B	1
1,2-Dichloroethane; Ethylene dichloride	107-06-2	Ethane, 1,2-dichloro-	8260B	1
1,1-Dichloroethylene; Vinylidene chloride.	75-35-4	Ethene, 1,1-dichloro-	8260B	1
cis-1,2-Dichloroethylene	156-59-3	Ethene, 1,2-dichloro-, (Z)-	8260B	1
trans-1,2-Dichloroethylene	156-60-5	Ethene, 1,2-dichloro-, (E)-	8260B	1

Table I (Continued)
Volatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
1,2-Dichloropropane	78-87-5	Propane, 1,2-dichloro-	8260B	1
cis-1,3-Dichloropropene	10061-01-5	1-Propene, 1,3-dichloro-, (Z)-	8260B	1
trans-1,3-Dichloropropene	10061-02-6	1-Propene, 1,3-dichloro-, (E)-	8260B	1
1,4-Dioxane	123-91-1	1,4-Dioxane	8260B	40/20 (See Note 3)
Ethylbenzene	100-41-4	Benzene, ethyl-	8260B	1
Ethyl methacrylate	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester.	8260B	1
2-Hexanone	591-78-6	2-Hexanone	8260B	5
Isobutyl alcohol	78-83-1	1-Propanol, 2-methyl-	8260B	20
Isopropylbenzene	98-82-8		8260B	1
Methacrylonitrile	126-98-7	2-Propenenitrile, 2-methyl-	8260B	5
Methyl bromide; Bromomethane	74-83-9	Methane, bromo-	8260B	5
Methyl chloride; Chloromethane	74-87-3	Methane, chloro-	8260B	5
Methylene bromide; Dibromomethane	74-95-3	Methane, dibromo-	8260B	1
Methylene chloride; Dichloromethane	75-09-2	Methane, dichloro-	8260B	5
Methyl ethyl ketone; MEK	78-93-3	2-Butanone	8260B	5
Methyl iodide; Iodomethane	74-88-4	Methane, iodo-	8260B	1
Methyl methacrylate	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester.	8260B	5
4-Methyl-2-pentanone; Methyl isobutyl ketone.	108-10-1	2-Pentanone, 4-methyl-	8260B	5
Pentachloroethane	76-01-7	Ethane, pentachloro-	8260B	1
Propionitrile; Ethyl cyanide	107-12-0	Propanenitrile	8260B	5
n-Propylbenzene	103-65-1		8260B	1
Styrene	100-42-5	Benzene, ethenyl-	8260B	1
1,1,1,2-Tetrachloroethane	630-20-6	Ethane, 1,1,1,2-tetrachloro-	8260B	1
1,1,2,2-Tetrachloroethane	79-34-5	Ethane, 1,1,2,2-tetrachloro-	8260B	1
Tetrachloroethylene; Perchloroethylene; Tetrachloroethene.	127-18-4	Ethene, tetrachloro-	8260B	1
Tetrahydrofuran	109-99-9	Tetrahydrofuran	8260B	5
Toluene	108-88-3	Benzene, methyl-	8260B	1

Table I (Continued)
Volatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
1,2,4-Trichlorobenzene	12-08-21	Benzene, 1,2,4-trichloro-	8260B	5
1,1,1-Trichloroethane; Methylchloroform	71-55-6	Ethane, 1,1,1-trichloro-	8260B	1
1,1,2-Trichloroethane	79-00-5	Ethane, 1,1,2-trichloro-	8260B	1
Trichloroethylene; Trichloroethene	79-01-6	Ethene, trichloro-	8260B	1
Trichlorofluoromethane	75-69-4	Methane, trichlorofluoro-	8260B	5
1,2,3-Trichloropropane	96-18-4	Propane, 1,2,3-trichloro-	8260B	1
1,2,4-Trimethylbenzene	95-63-6	Benzene, 1,2,4-trimethyl-	8260B	1
1,3,5-Trimethylbenzene	108-67-8	Benzene, 1,3,5-trimethyl-	8260B	1
Vinyl acetate	108-05-4	Acetic acid, ethenyl ester	8260B	5
Vinyl chloride	75-01-4	Ethene, chloro-	8260B	1
o-Xylene	95-47-6	Benzene, 1,2-dimethyl-	8260B	1
m-Xylene	108-38-3	Benzene, 1,3-dimethyl-	8260B	2
p-Xylene	106-42-3	Benzene, 1,4-dimethyl-	8260B	2
Xylenes (total)	1330207	Xylenes	8260B	2

Table II
Semivolatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
Acenaphthene	83-32-9	Acenaphthylene, 1,2-dihydro-…	8270C	1
Acenaphthylene	208-96-8	Acenaphthylene	8270C	1
Acetophenone	98-86-2	Ethanone, 1-phenyl-	8270C	10
2-Acetylaminofluorene; 2-AAF	53-96-3	Acetamide, N-9H-fluoren-2-yl-..	8270C	10
4-Aminobiphenyl	92-67-1	[1,1'-Biphenyl]- 4-amine	8270C	10
Aniline	62-53-3	Benzenamine	8270C	10
Anthracene	120-12-7	Anthracene	8270C	1
Aramite	140-57-8	Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester.	8270C	10
Benzo[a]anthracene; Benzanthracene	56-55-3	Benz[a]anthracene	8270C	1
Benzo[b]fluoranthene	205-99-2	Benz[e]acephenanthrylene	8270C	2
Benzo[k]fluoranthene	207-08-9	Benzo[k]fluoranthene……	8270C	2
Benzo[ghi]perylene	191-24-2	Benzo[ghi]perylene	8270C	2
Benzo[a]pyrene	50-32-8	Benzo[a]pyrene	8270C	2
Benzoic acid	65-85-0	Benzoic acid	8270C	10
Benzyl alcohol	100-51-6	Benzenemethanol	8270C	20
Bis(2-chloroethoxy)methane	111-91-1	Ethane, 1,1'-[methylenebis (oxy)]bis [2-chloro-.	8270C	2
Bis(2-chloroethyl)ether	111-44-4	Ethane, 1,1'-oxybis[2-chloro-..	8270C	1
Bis(2-chloro-1-methylethyl) ether; 2,2'-Di- chlorodiisopropyl ether.	108-60-1	Propane, 2,2'-oxybis[1-chloro-.	8270C	10
Bis(2-ethylhexyl) phthalate	117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl)ester.	8270C	2
4-Bromophenyl phenyl ether	101-55-3	Benzene, 1-bromo-4-phenoxy-	8270C	2
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester.	8270C	1
p-Chloroaniline	106-47-8	Benzenamine, 4-chloro-	8270C	20
Chlorobenzilate	510-15-6	Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester.	8270C	10
p-Chloro-m-cresol	59-50-7	Phenol, 4-chloro-3-methyl-	8270C	10
2-Chloronaphthalene	91-58-7	Naphthalene, 2-chloro-	8270C	2
2-Chlorophenol	95-57-8	Phenol, 2-chloro-	8270C	10

Table II (Continued)
Semivolatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
3-Chlorophenol	108-43-0	Phenol, 3-chloro-	8270C	10
4-Chlorophenyl phenyl ether	7005-72-3	Benzene, 1-chloro-4-phenoxy-	8270C	10
Chrysene	218-01-9	Chrysene	8270C	1
m-Cresol	108-39-4	Phenol, 3-methyl-	8270C	20
o-Cresol	95-48-7	Phenol, 2-methyl-	8270C	10
p-Cresol	106-44-5	Phenol, 4-methyl-	8270C	20
2,4-D; 2,4-Dichlorophenoxyacetic acid	94-75-7	Acetic acid, (2,4-Dichlorophenoxy)-.	8270C	10
Diallate	2303-16-4	Carbamothioic acid, bis(1-Methylethyl)- , S- (2,3-Dichloro-2-propenyl) ester.	8270C	10
Dibenz[a,h]anthracene	53-70-3	Dibenz[a,h]anthracene	8270C	2
Dibenzofuran	132-64-9	Dibenzofuran	8270C	5
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	Propane, 1,2-dibromo-3-chloro-	8270C	10
Di-n-butyl phthalate	84-74-2	1,2-Benzenedicarboxylic acid, Dibutyl ester.	8270C	1
o-Dichlorobenzene	95-50-1	Benzene, 1,2-dichloro-	8270C	1
m-Dichlorobenzene	541-73-1	Benzene, 1,3-dichloro-	8270C	1
p-Dichlorobenzene	106-46-7	Benzene, 1,4-dichloro-	8270C	1
3,3'-Dichlorobenzidine	91-94-1	[1,1'-Biphenyl]- 4,4'- diamine, 3,3'-dichloro-.	8270C	20
2,4-Dichlorophenol	120-83-2	Phenol, 2,4-dichloro-	8270C	10
2,6-Dichlorophenol	87-65-0	Phenol, 2,6-dichloro-	8270C	10
Diethyl phthalate	84-66-2	1,2-Benzenedicarboxylic acid, Diethyl ester.	8270C	1
O,O-Diethyl O-2-pyrazinyl phosphorothioate; Thionazin	297-97-2	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester.	8270C	10
Dimethoate	60-51-5	Phosphorodithioic acid, O,O-Dimethyl S-[2-(methylamino)-2-Oxoethyl] ester.	8270C	10
p-(Dimethylamino)azobenzene	60-11-7	Benzenamine, N,N-dimethyl-4-(phenylazo)-.	8270C	10
7,12-Dimethylbenz[a]anthracene	57-97-6	Benz[a]anthracene, 7,12-Dimethyl-.	8270C	10
3,3'-Dimethylbenzidine	119-93-7	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-.	8270C	10
alpha, alpha-Dimethylphenethylamine	122-09-8	Benzeneethanamine,	8270C	50

Table II (Continued)
Semivolatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
		α,α-dimethyl-.		
2,4-Dimethylphenol	105-67-9	Phenol, 2,4-dimethyl-	8270C	5
Dimethyl phthalate	131-11-3	1,2-Benzenedicarboxylic acid, Dimethyl ester.	8270C	2
m-Dinitrobenzene	99-65-0	Benzene, 1,3-dinitro-	8270C	10
4,6-Dinitro-o-cresol	534-52-1	Phenol, 2-methyl-4,6-dinitro-	8270C	50
2,4-Dinitrophenol	51-28-5	Phenol, 2,4-dinitro-	8270C	50
2,4-Dinitrotoluene	121-14-2	Benzene, 1-methyl-2,4-dinitro-.	8270C	5
2,6-Dinitrotoluene	606-20-2	Benzene, 2-methyl-1,3-dinitro-.	8270C	5
Dinoseb; DNBP; 2-sec-Butyl- 4,6-dinitrophenol	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-.	8270C	10
Di-n-octyl phthalate	117-84-0	1,2-Benzenedicarboxylic acid, Dioctyl ester.	8270C	2
Diphenylamine	122-39-4	Benzenamine, N-phenyl-	8270C	10
2,6-Diphenylphenol	2432-11-3		8270C	10
Disulfoton	298-04-4	Phosphorodithioic acid, O,O-Diethyl S-[2-(ethylthio)ethyl]ester	8270C	10
Ethyl methanesulfonate	62-50-0	Methanesulfonic acid, ethyl Ester.	8270C	10
Famphur	52-85-7	Phosphorothioic acid, O-[4-[(dimethylamino)sulfonyl]phenyl]-O,O-dimethyl ester.	8270C	10
Fluoranthene	206-44-0	Fluoranthene	8270C	1
Fluorene	86-73-7	9H-Fluorene	8270C	1
Hexachlorobenzene	118-74-1	Benzene, hexachloro-	8270C	1
Hexachlorobutadiene	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-Hexachloro-.	8270C	1
Hexachlorocyclopentadiene	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-.	8270C	10
Hexachloroethane	67-72-1	Ethane, hexachloro-	8270C	1
Hexachlorophene	70-30-4	Phenol, 2,2'-methylenebis[3,4,6-Trichloro-.	8270C	75
Hexachloropropene	1888-71-7	1-Propene, 1,1,2,3,3,3-Hexachloro-.	8270C	10
Indeno(1,2,3-cd)pyrene	193-39-5	Indeno[1,2,3-cd]pyrene	8270C	2

Table II (Continued)
Semivolatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
Isodrin	465-73-6	1,4,5,8-Dimethanonaphthalene,1,2,3,4,10,10- hexachloro-1,4,4a,5,8,8a hexahydro-(1α, 4α, 4aβ, 5β, 8β,8aβ)-.	8270C	10
Isophorone	78-59-1	2-Cyclohexen-1-one, 3,5,5-Trimethyl-.	8270C	1
Isosafrole	120-58-1	1,3-Benzodioxole, 5-(1-Propenyl)-.	8270C	10
Kepone	143-50-0	1,3,4-Metheno-2H-cyclobuta-[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-Decachlorooctahydro-	8270C	25
Methapyrilene	91-80-5	1,2,Ethanediamine, N,N-dimethyl-N'-2- pyridinyl- N'-(2-Thienylmethyl)-.	8270C	10
3-Methylcholanthrene	56-49-5	Benz[j]aceanthrylene, 1,2-Dihydro-3-methyl-.	8270C	10
Methyl methanesulfonate	66-27-3	Methanesulfonic acid, methyl Ester.	8270C	10
1-Methylnaphthalene	90-12-0	Naphthalene, 1-methyl-	8270C	10
2-Methylnaphthalene	91-57-6	Naphthalene, 2-methyl-	8270C	5
Methyl parathion; Parathion methyl	298-00-0	Phosphorothioic acid, O,O-Dimethyl O-(4-nitrophenyl) Ester.	8270C	10
Naphthalene	91-20-3	Naphthalene	8270C	1
1,4-Naphthoquinone	130-15-4	1,4-Naphthalenedione	8270C	10
1-Naphthylamine	134-32-7	1-Naphthalenamine	8270C	10
2-Naphthylamine	91-59-8	2-Naphthalenamine	8270C	10
o-Nitroaniline	88-74-4	Benzenamine, 2-nitro-	8270C	50
m-Nitroaniline	99-09-2	Benzenamine, 3-nitro-	8270C	50
p-Nitroaniline	100-01-6	Benzenamine, 4-nitro-	8270C	50
Nitrobenzene	98-95-3	Benzene, nitro-	8270C	2
o-Nitrophenol	88-75-5	Phenol, 2-nitro-	8270C	5
p-Nitrophenol	100-02-7	Phenol, 4-nitro-	8270C	25
4-Nitroquinoline 1-oxide	56-57-5	Quinoline, 4-nitro-, 1-oxide	8270C	10

Table II (Continued)
Semivolatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
N-Nitrosodiethylamine	55-18-5	Ethanamine, N-ethyl-N-nitroso-.	8270C	10
N-Nitrosodimethylamine	62-75-9	Methanamine, N-methyl-N-nitroso-	8270C	5
N-Nitrosodi-n-butylamine	924-16-3	N-Nitrosodi-n-butylamine	8270C	10
N-Nitrosodiphenylamine	86-30-6	Benzenamine, N-nitroso-N-phenyl-	8270C	2
N-Nitrosodipropylamine; Di-n-propylnitrosamine.	621-64-7	1-Propanamine, N-nitroso-N-Propyl-.	8270C	2
N-Nitrosomethylethylamine	10595-95-6	Ethanamine, N-methyl-N-nitroso-	8270C	10
N-Nitrosomorpholine	59-89-2	Morpholine, 4-nitroso-	8270C	10
N-Nitrosopiperidine	100-75-4	Piperidine, 1-nitroso-	8270C	10
N-Nitrosopyrrolidine	930-55-2	Pyrrolidine, 1-nitroso-	8270C	10
5-Nitro-o-toluidine	99-55-8	Benzenamine, 2-methyl-5-nitro-.	8270C	10
Parathion	56-38-2	Phosphorothioic acid, O,O-Diethyl-O-(4-nitrophenyl) Ester	8270C	10
Pentachlorobenzene	608-93-5	Benzene, pentachloro-	8270C	10
Pentachloroethane	76-01-7	Ethane, pentachloro-	8270C	10
Pentachloronitrobenzene	82-68-8	Benzene, pentachloronitro-	8270C	10
Pentachlorophenol	87-86-5	Phenol, pentachloro-	8270C	50
Phenacetin	62-44-2	Acetamide, N-(4-ethoxyphenyl)..	8270C	10
Phenanthrene	85-01-8	Phenanthrene	8270C	1
Phenol	108-95-2	Phenol	8270C	10
p-Phenylenediamine	106-50-3	1,4-Benzenediamine	8270C	25
[4-(2-phenylisopropyl)phenol]	599-64-4	Phenol, 4-Cumyl	8270C	10
o-Phenylphenol	90-43-7	Phenol, 2-phenyl-	8270C	10
Phorate	298-02-2	Phosphorodithioic acid, O,O-Diethyl S- [(ethylthio)methyl] Ester	8270C	10
2-Picoline	109-06-8	Pyridine, 2-methyl-	8270C	10
Pronamide	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-Dimethyl-2-propynyl)-.	8270C	10
Pyrene	129-00-0	Pyrene	8270C	1
Pyridine	110-86-1	Pyridine	8270C	10
Safrole	94-59-7	1,3-Benzodioxole, 5-(2-Propenyl)-.	8270C	10
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5-Trichlorophenoxy)-.	8270C	2
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid.	93-76-5	Acetic acid, (2,4,5-Trichlorophenoxy)-.	8270C	2

Table II (Continued)
Semivolatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
1,2,3,4-Tetrachlorobenzene.....	634-66-2	Benzene, 1,2,3,4-tetrachloro-..	8270C	10
1,2,4,5- Tetrachlorobenzene.....	95-94-3	Benzene, 1,2,4,5-tetrachloro-..	8270C	10
2,3,4,6-Tetrachlorophenol.....	58-90-2	Phenol, 2,3,4,6-tetrachloro-...	8270C	10
Tetraethyl dithiopyrophosphate; Sulfotepp.	3689-24-5	Thiodiphosphoric acid ([(HO)2P(S)]2O), tetraethyl ester	8270C	10
4-tert-Butylphenol.....	98-54-4	.....	8270C	10
o-Toluidine.....	95-53-4	Benzenamine, 2-methyl-.....	8270C	10
1,2,3-Trichlorobenzene.....	87-61-6	Benzene, 1,2,3-trichloro-.....	8270C	10
1,2,4-Trichlorobenzene.....	120-82-1	Benzene, 1,2,4-trichloro-.....	8270C	2
2,4,5-Trichlorophenol.....	95-95-4	Phenol, 2,4,5-trichloro-.....	8270C	5
2,4,6-Trichlorophenol.....	88-06-2	Phenol, 2,4,6-trichloro-.....	8270C	10
O,O,O-Triethyl phosphorothioate.....	126-68-1	Phosphorothioic acid, O,O,O-Triethyl ester.	8270C	10
sym-Trinitrobenzene.....	99-35-4	Benzene, 1,3,5-trinitro-.....	8270C	10

Table III
Metals

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
Aluminum	7429905	Aluminum	6020	50
Antimony	7440360	Antimony	6020/7040	2/1
Arsenic	7440-38-2	Arsenic	6020/7060A	1
Barium	7440393	Barium	6020/6010B	5/5
Beryllium	7440417	Beryllium	6020/6010B	1/3
Boron	7440428	Boron	6010B	50
Cadmium	7440439	Cadmium	6020/6010B	0.2/5
Calcium	7440-70-2	Calcium	6020/6010B	300/1000
Chromium	18540299	Chromium	6020/6010B	1/20
Cobalt	7440484	Cobalt	6020/6010B	5/15
Copper	7440508	Copper	6020/6010B	1/10
Iron	7439896	Iron	6020/6010B	50/20
Lead	7439921	Lead	6020/7421	1
Lithium	7439932	Lithium	6010B	8
Magnesium	7439954	Magnesium	6020/6010B	250/1000
Manganese	7439965	Manganese	6020/6010B	5/5
Mercury	7439-97-6	Mercury	7470A	0.2
Nickel	7440020	Nickel	6020/6010B	5/25
Phosphorous(total)	7723-14-0	Phosphorous (total)		50
Potassium	7440-09-7	Potassium	6020*/6010B	250/100
Selenium	7782492	Selenium	6020/7740	2/1
Silver	7440224	Silver	6020/7761	0.5
Sodium	17341252	Sodium	6020/6010B	250/1000
Strontium	7440-24-6	Strontium	6020/6010B	5
Thallium	7440280	Thallium	6020/7841	1/2
Tin	7440-31-5	Tin	6020/7870	10/8000
Vanadium	7440622	Vanadium	6020/6010B	2/10
Zinc	7440666	Zinc	6020/6010B	10/10

Table IV
Anions/Other

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
Ammonia	7664-41-7	Ammonia	350.1	50
Bicarbonate	(Total)	Bicarbonate	310.1	10,000
Carbonate	(Total)	Carbonate	310.1	10,000
Carbon dioxide	124-38-9	Carbon dioxide		
Chloride	16887006	Chloride	9056	1000
Cyanide	57-12-5	Cyanide	9012A	5
Ethane	74-84-0	Ethane		
Ethene	74-85-1	Ethene		
Ferric iron		Ferric iron	3500	50
Ferrous iron	1345-25-1	Ferrous iron	3500	50
Fluoride		Fluoride	9056	1000
Nitrate		Nitrate	9056	100
Nitrite		Nitrite	9056	100
Sulfate	14808798	Sulfate	9056	2000
Sulfide	18496-25-8	Sulfide	376.2	100
Total Organic Carbon (TOC)			9060*	1000

Table V
Pesticides and PCBs

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
Aldrin	309-00-2	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1α,4α, 4aβ, 5α,8α,8aβ)-	8081A	0.02
alpha-BHC	319-84-6	Cyclohexane, 1,2,3,4,5,6-Hexachloro-,(1α, 2α,3β, 4α,5β,6β)-	8081A	0.02
beta-BHC	319-85-7	Cyclohexane, 1,2,3,4,5,6-Hexachloro-,(1α,2β, 3α,4β, 5α,6β)-	8081A	0.02
delta-BHC	319-86-8	Cyclohexane, 1,2,3,4,5,6-Hexachloro-,(1α,2α, 3α, 4β,5α,6β)-	8081A	0.02
gamma-BHC; Lindane	58-89-9	Cyclohexane, 1,2,3,4,5,6-Hexachloro-,(1α, 2α, 3β, 4α,5α,6β)-	8081A	0.02
Chlordane;(each isomer alpha and gamma).	57-74-9	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a- hexahydro-.	8081A	0.02
4,4'-DDD	72-54-8	Benzene 1,1'-(2,2-Dichloroethylidene) bis[4-Chloro-.	8081A	0.02
4,4'-DDE	72-55-9	Benzene, 1,1'-(dichloroethenylidene) bis[4-Chloro-.	8081A	0.02

Table V (Continued)
Pesticides and PCBs

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
4,4'-DDT	50-29-3	Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-chloro-.	8081A	0.02
Dieldrin	60-57-1	2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a- octahydro-, (1aα,2β, 2aα, 3β,6β,6aα,7&bet,7aα)-	8081A	0.02
Endosulfan I	959-98-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide, (3α,5aβ,6α,9&a,9aβ)-.	8081A	0.02
Endosulfan II	33213-65-9	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide, (3α,5aα, 6β,9β, 9aα)-	8081A	0.05
Endosulfan sulfate	1031-07-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3,3-dioxide.	8081A	0.05

Table V (Continued)
Pesticides and PCBS

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
Endrin.....	72-20-8	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a- octahydro-, (1aα, 2β,2aβ, 3α,6α, 6aβ,7β, 7aα)-	8081A	0.02
Endrin aldehyde.....	7421-93-4	1,2,4-Methenocyclopenta[cd]pentalene-5-carboxaldehyde, 2,2a,3,3,4,7-Hexachlorodecahydro-, (1α,2β, 2aβ,4β, 4aβ,5β,6aβ,6b&b e,7R*)-	8081A	0.05
Heptachlor.....	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-.....	8081A	0.02
Heptachlor epoxide.....	1024-57-3	2,5-Methano-2H-indeno[1,2-b]oxirene, 2,3,4,5,6,7,7-Heptachloro-1a,1b,5,5a,6,6a,-Hexahydro-, (1aα,1bβ,2α,5 &,5aβ,6β,6aα)	8081A	0.02
Methoxychlor.....	72-43-5	Benzene, 1,1'-(2,2,2,trichloroethylidene)bis[4-methoxy-.	8081A	0.05

Table V (Continued)
Pesticides and PCBS

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
Polychlorinated biphenyls; PCBs.....	See Note 4	1,1'-Biphenyl, chloro (derivatives)	8082	0.1
Arochlor 1016.....	12674-11-2		8082	0.1
Arochlor 1221.....	11104-28-2		8082	0.1
Arochlor 1232.....	11141-16-5		8082	0.1
Arochlor 1242.....	53469-21-9		8082	0.1
Arochlor 1248.....	12672-29-6		8082	0.1
Arochlor 1254.....	11097-69-1		8082	0.1
Arochlor 1260.....	11096-82-5		8082	0.1
Toxaphene.....	8001-35-2	Toxaphene.....	8081	0.2

Table V
Dioxins and Furans

Common Name	CAS #	Chemical Abstract Service Index Name	Method	Soil RL, Water RL (See Note 5 regarding units)
2378-TCDD	1746-01-6		1613b	1, 0.01
Total TCDD	41903-57-5		1613b	
12378-PeDD	40321-76-4		1613b	5, 0.05
Total PeCDD	36088-22-9		1613b	
123478-HxCDD	39227-28-6		1613b	5, 0.05
123678-HxCDD	57653-85-7		1613b	5, 0.05
123789-HxCDD	19408-74-3		1613b	5, 0.05
Total HxCDD	34465-46-8		1613b	
1234678-HpCDD	35822-46-9		1613b	5, 0.05
Total HpCDD	37871-00-4		1613b	
OCDD	3268-87-9		1613b	10, 0.1
2378-TCDF	51207-31-9		1613b	1, 0.01
Total TCDF	55722-27-5		1613b	
12378-PeCDF	57117-41-6		1613b	5, 0.05
23478-PeCDF	57117-31-4		1613b	5, 0.05
Total PeCDF	36088-22-9		1613b	
123478-HxCDF	70648-26-9		1613b	5, 0.05
123678-HxCDF	57117-44-9		1613b	5, 0.05
234678-HxCDF	60851-34-5		1613b	5, 0.05
123789-HxCDF	72918-21-9		1613b	5, 0.05
Total HxCDF	34465-46-8		1613b	
1234678-HpCDF	67562-39-4		1613b	5, 0.05
1234789-HpCDF	55673-89-7		1613b	5, 0.05
Total HpCDF	38998-75-3		1613b	
OCDF	390001-02-0		1613b	10, 0.1

Table VI
Field Parameters

Common Name	CAS #	Chemical Abstract Service Index Name	Method
pH……..			SW-846 or ASTM
Conductivity…….			SW-846 or ASTM
Temperature…….			SW-846 or ASTM
Redox……			SW-846 or ASTM
Dissolved Oxygen (DO)……..			SW-846 or ASTM
Turbidity……..			SW-846 or ASTM

Appendix C

Quality Assurance Program

DOW ENVIRONMENTAL LABORATORY

QUALITY ASSURANCE PROGRAM (QAP)

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1.0 INTRODUCTION

1.1. The objective of any laboratory providing environmental analyses to The Dow Chemical Company (Dow) must be to provide data of sufficiently known quality to meet or exceed applicable permit and other legal requirements. The same objectives apply to internal company laboratories and to external contract labs. This manual provides guidelines under which general permit requirements, method requirements, and work instructions, protocol specifications or standard operating procedures (SOP) will be generated and maintained. Dow will ensure all internal and external laboratories meet the criteria of this plan.

1.2. It is not the intent of this document to restate specific quality control (QC) procedures already contained in referenced methods or permits since they are not applied universally.

1.3. An organizational chart will be available upon request for Michigan Department of Environmental Quality (MDEQ) review.

1.4. Definitions:

- QSDs: Quality Support Documents including SOPs, work instructions and protocol specifications.
- SW-846 Methods – EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. [1]
- Compendium IO Methods – Determination of Inorganic Compounds in Ambient Air. [2]
- Compendium TO Methods – Determination of Toxic Organic Compounds in Ambient Air. [3]
- Deviation: Any activity that is not performed in accordance with the QSD is considered a deviation. Deviations may or may not affect the quality of the data. If a deviation is going to be required on a routine basis, a request in writing to formally modify the QSD should be initiated by the appropriate personnel.

2.0 QUALITY ASSURANCE

2.1. The objective of the Quality Assurance (QA) function is to assure that procedures are in place to produce data of known and documented quality that will meet the quality objectives of the users of the data. This is accomplished through the Analytical Sciences Laboratory quality management system.

2.2. Data quality assurance will be documented through annual reporting of pertinent QA/QC review information to management. The report should provide a summary of key QA activities during the applicable time period. The report will describe quality indicators observed and will document which indicators meet and do not meet acceptable QC performance criteria.

2.3. Any unacceptable quality indicators observed will be followed up with corrective action. If no corrective action is taken, reasons for this decision will be stated. Corrective actions taken, or reasons for no action needed, will be documented.

3.0 QUALITY CONTROL

3.1 Introduction

3.1.1 The procedures indicated below apply in most cases. Specific QC requirements relevant to particular activity or analyses are contained in the pertinent field, QSDs, SW-846 analytical procedures, EPA methods, or Compendium IO/TO methods.

3.1.2 Throughout the QAP document the term QSD will be used to refer to a work instruction, protocol specification, and/or SOP.

3.2 General Quality Control for field procedures are outlined as follows (Pre-sampling procedures, post-sampling procedures, equipment cleaning procedures, field data collection procedures, analytical sample specifications, and chain-of-custody information are included as individual attachments to the SAP):

3.2.1 Non-standard field information which is not found in the method should be documented in a field log with appropriate signatures and dates.

3.2.2 All pre-field activities such as equipment checkout, calibrations, and container storage and preparations will be documented.

3.2.3 Documentation of all field activities and conditions, which may have an effect on the analyses, is required.

3.2.4 Documentation of any deviations from the QSD is required. The extent of and the reason for the deviation should be documented.

3.2.5 Duplicate samples, trip, field, and equipment blanks will be taken when appropriate, as specified by the analyses methods, or project specifications.

3.3 General laboratory quality control requirements are taken from 40 CFR Part 136 [4] and SW-846.

3.3.1 The person doing the analysis (the analyst) will do an initial demonstration of their capability to generate acceptable accuracy and precision on water samples. The results of this demonstration will be kept on file.

3.3.2 The analyst will determine whether their equipment and standards meet the requirements for the analysis.

3.3.3 Before starting the analysis, the analyst will demonstrate the measurement system is in control. Instrument calibration and calibration frequency will be done in accordance with the applicable standard, method, and/or QSD

3.3.4 The appropriate blanks (trip, reagent, and field, if necessary), duplicate samples or spikes, and standards will be analyzed as specified in the applicable standard, method, DQO request, and/or QSD.

3.3.5 Deviations, errors, deficiencies, and other non-standard events that fall outside established acceptance criteria should be investigated. In some instances, corrective action may be needed to resolve the problem and restore proper functioning to the system. The investigation of the problem and any subsequent corrective action taken should be documented.

3.3.6 Specific analytical procedures, reporting limits, QA/QC frequencies, and precision and accuracy requirements used in the laboratory and field programs will change with time. These changes will be reviewed. If the review reveals that the changes have been made in analytical methods or QA/QC procedures, the appropriate documents will be updated without prior approval from the agency unless prohibited by a license or other regulatory agreement. All updates will be communicated via applicable management of change procedures.

3.3.7 Instrument maintenance logs will be kept, signed, and dated.

3.3.8 Sample handling and custody requirements will follow the applicable standard, method, and/or QSD.

4.0 WORK INSTRUCTIONS, PROTOCOL SPECIFICATIONS or SOP

4.1 QSDs are documents which will require modification or be discontinued due to matrix, instrument, and method changes. In order to assure ourselves that the proper QSD is being used, each document will have an effective date printed on them.

4.2 Non-current QSDs will be kept according to Dow's records retention policy.

4.3 A list of QSD documents will be kept available at the analytical facility. The list will be updated on a biannual basis, or as needed.

4.4 Communication of changes will be done via Management of Change (MOC) or equivalent process.

5.0 REPORTING OF DATA

5.1 Data will be reduced according to the analytical methods and the established laboratory procedures that will be used for the analyses.

5.1.1 All information used in the calculations (e.g., raw data, calibration files, tuning records, results of standard additions, interference check results, and blank or background-correction protocols) should be recorded in order to enable reconstruction of the final result at a later date. Raw data is defined as that data which cannot be easily derived or recalculated from other information.

5.2 Since the data are reported to the agency under a variety of laws, permits, and other agreements, a single specific guideline cannot be established for reporting data. In general, data will be submitted to the agency under the following guidelines:

5.2.1 Data may be reported using a reporting limit (RL) or a laboratory practical quantitation limit (PQL).

5.2.1.1 The RL is defined as the lowest level at which measurements become quantitatively meaningful. An RL is equal to or greater than the statistically determined method detection limits (MDLs).

5.2.1.2 The PQL is the lowest concentration used in the calibration of the measurement system. RLs will be reported for detection monitoring programs. In the absence of a specified RL, a PQL will be reported. Data will not be reported below the applicable RL or PQL.

5.2.2 All data will be reported to two significant figures. If not reported to two significant figures, an explanation for the deviation will be provided.

5.2.3 Indirect measurement instruments such as pH, electrical resistance, oxidation potential, etc. will be reported as indicated on the instrument display.

5.3 The raw data must be signed and dated by the analyst.

5.4 As an additional procedure, all data generated by the Dow Analytical Laboratories will be peer reviewed by an analyst qualified in the analytical technique. The signature of the reviewer and the date of the review must be documented with the raw data.

5.5 All data sets will be placed in a data packet. The data packet must be given a unique identification number to assist in tracking, archival and retrieval. The project identification, signature of analyst completing the packet, and date the packet was closed must be completed.

5.6 The person assigned to the Quality Assurance function will annually do a random QA/QC check of data packets and report the results of the review to the laboratory supervisor.

6.0 PERSONNEL RECORDS

6.1 Training and proficiency records will be maintained by employees and stored in the Dow Analytical Sciences building.

6.2 Records of the personnel qualifications, education, and experience will be updated annually.

7.0 RECORDS

7.1 Records will be maintained that provide direct supporting evidence and the necessary technical support to legally defend the data reported by the laboratory. This will require a copy of any report issued and/or any supporting documentation for the report.

7.2 Field and laboratory notebooks will have the pages numbered and appropriate signatures and dates. Each book will be assigned an identification number. The book will be retained according to Dow's Records Management Manual.

7.3 Retained laboratory records will include the following:

7.3.1 Calibration records and traceability of standard and reagents.

7.3.2 Documentation of the accuracy of all working standards against primary grade standards.

7.3.3 A method or QSD should be referenced. A Standard or EPA method should not be referenced unless the analysis is being performed EXACTLY as described in the published method. (See SW- 846, chapter 1, paragraph 4.3.4) [1]

7.4 QSDs shall be kept according to Dow records retention guidelines.

7.5 Records will be stored in a clean, dry area under with controlled access. Access to the archive is limited to administrative, quality and management personnel. Records removed from the archive will be signed out and tracked.

8.0 REFERENCE DOCUMENTS

1. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, U.S. Government Printing Office, Publication Number: 955-001-00000-1.

2. IO Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air, EPA/625/R-96/01a, July 1999.

3. Compendium of Methods for the Determination of Toxic Organic in Ambient Air, EPA/625/R-96/010b, January 1999.

4. "Code of Federal Regulations," 40 CFR 136, Appendix A, pp. 490 and 491, (1992). [Greg to check this reference.]

Appendix D

Chain of Custody Example

ENVIRONMENTAL ANALYSIS LABORATORY
(EXAMPLE) CHAIN OF CUSTODY (EXAMPLE)

Facility Sampled:	Parameter:	AL-EL Number
		Field Log Book:
		Field Log Pages:
		Frequency:
		Account No:

Number of Containers	Sample Identification	Sample Date	Filtered?	Preservatives Added?

Printed Name(s) of Sampler (s):

Signature:_____ Date:_____

I have received____samples in good condition from the sampler(s).

Signature:_____ Date:_____

I have received___samples in good condition from the preceding person

Signature:_____ Date:_____

This original copy shall remain with the samples at all time.
After completion of all testing, this copy shall be attached to the original report.
Refer to sample log book for sample time.

Note: this is an example COC Only

Appendix E

Survey Schedule

SURVEY SCHEDULE

Monitoring well and piezometers are re-surveyed periodically to update top of casing (TOC) elevations. The monitoring wells and piezometers are also re-surveyed if damage to the well or piezometer is identified during a routine inspection or otherwise noted.The survey location for each well or piezometer will be the north side of the casing for the purpose of taking accurate and consistent static water level measurements. The re-survey schedule is shown below.

Program	TOC Survey Frequency
East Side RGIS Piezometers	Every Five Years (beginning in 2009)
West Side RGIS Piezometers	Every Five Years (beginning in 2009)
Poseyville Landfill Corrective Action Piezometers	Every Five Years (beginning in 2011)
Poseyville Landfill Corrective Action Monitoring Wells	Every Five Years (beginning in 2011)
Glacial Till and Regional Aquifer Detection Monitoring Wells	Every Five Years (beginning in 2011)
Tertiary Pond Slurry Wall Piezometers	Every Five Years (beginning in 2012)
Tertiary Pond Recovery Monitoring Well	Every Five Years (beginning in 2012)
Sludge Dewatering Facility Perimeter and Detection Wells	Every Five Years (beginning in 2012)
Facility Shallow Groundwater Monitoring Piezometers (includes monitoring wells from various groundwater monitoring programs)	Every Five Years (beginning in 2013)

Appendix F

Example Field Data Sheet

Field Data Sheet

Monitoring Well Purging and Sampling Form

Project: Facility SAP	**Well ID:**	**Sample Time:**	**Weather:** Ambient Temp: Wind (speed/direction):
Location:	**Well Depth:**	**Purge Start:**	
Field Personnel:	**Well Diameter:**	**Purging Device:**	General Weather Conditions:
Date:	***Well Volume:**	**Pump Intake Depth:**	
Initial SWL & Time:	****Purge Volume:**	**Pumped Dry (circle):** Y / N	Ground Conditions (circle): wet / dry / snow (amount) / ice
Well Type: (circle) Monitoring Well	Flowing Well	**Screen Interval:**	

Reading	Time (24HR)	Water Level (ft) (BTOC)	Volume Purged (L) or (gal)	Purge Rate (~mL/min)	pH (Units) (±0.1)	Specific Conductivity (µS/cm) (±3%)	ORP (mV) (±10mV)	D.O. (mg/L) (±10% if ≥0.3)	Turbidity (NTU) (±10% if ≥20)	Temp (ºC)	**Field Blank Collected (circle):** Y / N **Time:** **Duplicate Collected (circle):** Y / N **Time:** **Comments**
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

SAMPLE DESCRIPTION: Color: Odor: Y / N	**Bottle**	**Preservative**	**Required**	**Collected**	**Analyses/Method**	**Analytical Lab**
Clarity: Other Info:						
Calibration:						
Other Instrumentation Notes/Info:						
Other Info:						
Analytical Lab: **TA = Test America,** **D = Dow,** **O = Other**_____						

*** Well volume = (Well Depth - SWL) x (volume conversion factor)** ****Purge Volume = Well Volume x 3**

Well Diameter (in)	**1**	**1.5**	**2**	**3**	**4**	**6**	**8**	**10**
Volume conversion factor(gal/ft)	0.04	0.09	0.16	0.37	0.65	1.47	2.61	4.08
Volume conversion factor(L/ft)	0.15	0.35	0.61	1.40	2.46	5.56	9.88	15.44

Additional Notes on Back

Reading	Time (24HR)	Water Level (ft) (BTOC)	Volume Purged (L) or (gal)	Purge Rate (~mL/min)	pH (Units) (±0.1)	Specific Conductivity (µS/cm) (±3%)	ORP (mV) (±10mV)	D.O. (mg/L) (±10% if ≥0.3)	Turbidity (NTU) (±10% if ≥20)	Temp (ºC)	Comments
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											

Additional Notes:

Appendix G

Example Well Inspection Sheet

Well Inspection Checklist

List each well that is inspected and provide comments as needed. The following are examples items that should be inspected at each monitoring well: secured cap available and in tact, properly labeled and visible, pooling around base, excessive silting; check sheds for door/lock integrity, rodents, and hazardous insects.

List all observed issues or corrective measures needed in Observations column.

Provide completed form to the Environmental Monitoring Program Coordinator.

Monitoring Program/Area _____

Field Personnel: _____ Date: _____

Well #	Observations	Time

Appendix H

Temporal Evaluation of Stiff Geochemical Diagram Patterns

Temporal Evaluation of Stiff Geochemical Diagram Patterns

Stiff diagrams are used as a graphical representation of the general chemistry in a water source or sample. A polygonal shape is created from four horizontal axes extending from a central vertical axis. Cation concentrations are plotted on the left of the vertical axis and anions are plotted on the right. The data are plotted in four rows and the points are connected to form a polygon. These shapes are unique for a unit or body of water. Stiff diagrams are widely used because they facilitate rapid comparison of water quality from distinctive shapes resulting from changes in general water chemistry.

Stiff diagrams may also be used to evaluate changes in general water chemistry over time from a single monitoring point. Two possible causes of long term geochemistry are possible in groundwater monitoring: (1) response of natural systems to a 'source' or (2) natural variability. Evaluating changes in major ion geochemistry over time can make subtle changes more apparent. In the case of (1), ion ratios would trend towards the "source" ratio as a release slowly mixed with ambient groundwater. Changes in overall chemistry (or Stiff pattern) evaluated against the hypothesis that a release of a specific chemistry would cause a consistent change to the overall geochemistry. In the case of (2), changes in geochemistry from one monitoring period to the next should be random, periodic and not consistent.

Temporal Stiff diagrams include results of both current and the previous monitoring period. In addition, the difference between periods (or difference pattern) is plotted as a relative percent difference (RPD). An example Temporal Stiff diagram is included as Figure 1. In the case of (1) above, the difference pattern would be expected to be consistent and similar between periods. The figures in Figure 2 demonstrate this condition. In the case of (2), the difference pattern would be expected to fluctuate between periods. The patterns in Figure 3 demonstrate this condition.

Because errors and uncertainty are present in all measurements, subtle trends in geochemistry over time may be masked and difficult to discern by difference pattern alone. Therefore, additional trend evaluation is prudent. Many trend evaluation methods are available. Consistent changes in tracking parameter concentrations may be detected by comparing the average concentrations for each calendar year against a threshold level of 50% increase each year over a period of two years.

Long term changes in geochemistry may be natural, and can be compared to the possible sources that exist to determine if they are truly a result of a new release.

Appendix I

Soil Box
Data
Evaluation

SOIL BOX
DATA EVALUATION PLAN

THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS
MIDLAND, MICHIGAN

Revised: September, 2015

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Figure 1 Soil Box Monitoring Stations

Figure 2 Monitoring Data Evaluation Flowchart

Attachments

Attachment A History of Soil Box Monitoring Program

Attachment B Summary of Soil Box Data Time Plots

1.0 INTRODUCTION

The Surface Soil Exposure Control Program is a component of the Worker Exposure Control Program for the Midland Plant. The program is designed to address direct contact exposure to surface soils located at the Facility, initially including enhancement of buffer areas in the northeast corner and east perimeter of the Facility adjacent to Saginaw Road. Soil sampling was performed at the Midland Plant to follow-up EPA and Dow studies completed in the early 1980s. Enhancements to cover at the site were conducted, beginning in 2001, in areas prioritized for early action (summarized in Attachment A), based on results of trace organic analysis of surface soils for dioxins and furans in 1996 and 1998.

This Soil Box Data Evaluation Plan (Data Evaluation Plan) has been prepared to comply with Operating License Condition IX.K. of The Dow Chemical Company's (Dow) Hazardous Waste Management Facility Operating License, dated September 25, 2015.

This document contains the methodology for evaluating the Soil Box analytical results, establishing the appropriate action levels, and recommending actions to be undertaken should these levels be exceeded. A summary of the history and evolution of the Soil Box Monitoring Program and Data Evaluation Plan (including a summary of historical data) are provided in Attachment A.

1.1 Purpose

The purpose of the Monitoring Program is to verify that on-site measures completed as part of the *Worker Exposure Control Program* (Attachment 19 of the License), are effectively preventing the migration of dioxins and furans from facility surficial soils via track out and blowing dust, and to gauge the potential concern from dust generated by vehicles in high traffic locations.

This Data Evaluation Plan specifies how to identify and characterize whether a significant change is occurring in dioxin and furan concentrations in the designated Soil

Boxes, which in turn, may indicate the potential for off-site dioxin and furan migration. This Data Evaluation Plan presents the approach for evaluating Soil Box Monitoring results in accordance with License Conditions IX.A. and IX.K.1.(a) through (d) and Table 2-V of the MP SAP (Attachment 15 of the License). This document contains the methodology for evaluating the analytical results of the semi-annual (or quarterly) monitoring events, establishing the appropriate action levels based on rate of change ("flux rate"), and recommending actions to be undertaken should these levels be exceeded. Results of the data evaluation for monitoring events are submitted in the Midland Plant Quarterly Environmental Monitoring Reports.

Correspondingly, the result of data evaluation will assist to determine whether the soil exposure control actions are adequate, in light of multiple lines of evidence and other site observations. The following sections describe the components of the Data Evaluation Plan.

1.2 Overview of Soil Box Monitoring

The currently approved Soil Box Monitoring Program consists of eight soil box monitoring points established in the vicinity of exit points from the Dow facility and at downwind locations along the north and east perimeter of the facility. Three perimeter Soil Boxes were established in the vicinity of exit points of the Dow facility. These Soil Boxes are located at 608-Gate, 1791-Gate, and 19-Gate. Two soil boxes are located in the area of the former Northeast Perimeter Greenbelt Area (NEP-A and NEP-B), and two Soil Boxes are located in the area of the former Saginaw Road Greenbelt Area (SR-A and SR-B). A fifth Soil Box is located between the two former Greenbelt Areas (SR-C). Figure 1 depicts the locations of the facility Soil Boxes.

Current sampling procedures are listed in the Facility Sampling and Analysis Plan (SAP), Attachment 15 of the License, approved by MDEQ in 2015. The Monitoring Program contains information pertinent to this Data Evaluation Plan, and should be referenced for details such as the target analyte list, detection limits, and sampling protocols.

The size of each Soil Box is approximately eight inches high and ten feet square. They were constructed using non-treated wood or cement blocks. The Soil Boxes are lined with a geotextile fabric before being filled with clean topsoil. Grass is then planted to establish a vegetative cover. The Soil Boxes are maintained without the use of commercial fertilizer or herbicides. Vegetation height is maintained through the use of electrically powered cutting equipment. Surface soil composite samples are collected from the Soil Boxes to evaluate the potential migration of dioxins and furans via vehicular track-out or fugitive dust, as described in the Monitoring Program. To maintain the sensitivity of the soil in the box, the Soil Boxes may be rebuilt approximately every ten years beginning in 2015. A Soil Box with a soil concentration below 10 ppt may not be considered to be rebuilt.

One composite sample is collected from each Soil Box on a semi-annual basis (approximately May and October), and the collected samples are analyzed for the seventeen 2,3,7,8-substituted dioxin and furan isomers. The dioxin and furan data are expressed as toxic equivalent concentrations (TEC) based on the WHO-TEC factors (World Health Organization 2005 Toxic Equivalency Factors). For samples where a specific isomer was not detected, one-half the detection limit of that isomer is used to calculate the WHO-TEC for that sample. The WHO-TEC results for field duplicate samples are averaged with the corresponding primary sample results for this data evaluation.

2.0 METHODS FOR DETECTING CHANGES FROM BASELINE CONDITIONS

Data analysis for detecting a consistent change in dioxin and furan concentrations from baseline conditions will be done by comparing the rate of change ("flux rate") to a pre-determined criterion, and a rules-based system that identifies relevant patterns in these comparisons over time. The analysis will include constructing a series of time plots for each location, including the plotting of semi-annual data, flux rate, and rolling average of flux rate (i.e., an average flux rate for the last four periods). The following sections describe the methods for detecting a change from historic conditions.

2.1 Establishing a Baseline Concentration

For the Soil Box at 19-Gate, given a longer history of establishment, a semi-annual sampling schedule was generally followed from 2002 to 2009; which included developing the baseline between 2002 and 2006, and a quarterly sampling schedule between 2010 and present. Baseline concentrations for the Soil Boxes at 608-Gate and 1791-Gate were established by eight sampling events spaced throughout 2008; otherwise, a semi-annual sampling schedule was generally followed.

Baseline concentrations for the new soil boxes, or re-built soil boxes will be established by analyzing a total of three replicate composite soil samples for each Soil Box.

2.2 Constructing Time Plots

Time plots were constructed for each of the Soil Boxes. The following time plots were prepared, based on the data collected up to April 2015, and are shown in Attachment B (Summary of Soil Box Data and Time Plots):

- Time-series plot of TEC concentrations
- Flux rate plot of TEC concentrations (flux rate = TEC concentration of this period minus TEC concentration of last period)
- Rolling average (4-period) flux rate plot (average of the four most recent flux rates)

If a field duplicate was collected, the primary and duplicate results were averaged to form a single data point to ensure data independence.

On at least a semi-annual basis, samples will be collected from each of the eight locations and plotted onto the aforementioned time plots.

2.3 Data Evaluation for Soil Boxes

TEC concentration data obtained during each monitoring period will be plotted as described above. If the results are below the pre-determined *flux rate screening level* and *rolling average flux rate screening level*, no further action will be required, and the semi-annual monitoring effort will be continued. If the results are above one or both screening levels, additional information is necessary (as described below) to determine if the results truly represent a consistent and significant increase. If it is determined that a consistent and significant increase exists, and that this condition represents potential for off-site migration, appropriate action(s) (as described by Condition IX.K.1.(c) or IX.K.1.(d). of the License) will be considered and taken. Detailed descriptions of the specific evaluations are listed in Section 2.4.

2.4 Tiered Evaluation

Based on the observation of data collected thus far, the *flux rate screening level* and *rolling average flux rate screening level* were set at 2.5 ppt and 1.0 ppt, respectively, per a 6-month period. More frequent monitoring (i.e, 3-month period, or quarterly) will utilize screening levels of 1.25 ppt for the flux rate and 0.5 ppt for the rolling average flux rate.

In addition, a conservative value of 30 ppt will also be used as a "threshold value." This threshold value is approximately 60% below the Act 451, Part 201 Residential Direct Contact to soil criterion of 90 ppt.

Step-wise or tiered "decision point" evaluations will be used to determine whether the data indicate a shift (i.e., a consistent upward change) in dioxin and furan concentrations, and/or if further action is warranted. Step-wise decision points are established in the following sequence, and Figure 3 depicts a flowchart of the decision process described below:

Tier I

a. If the flux rate for a Soil Box exceeds 2.5 ppt (per a 6-month period), a verification sample will be collected from the particular location within a reasonable and practical time frame. If the verification sample confirms the flux rate exceedance, the sampling frequency will increase to quarterly (i.e., four times a year) for this particular location.
b. If the rolling average flux rate for a Soil Box exceeds 1.0 ppt (per a 6-month period), the sampling frequency will increase to quarterly (i.e., four times a year) for this particular location.

Tier II

a. After a minimum of eight quarterly monitoring events (i.e., at the increased sampling frequency in Tier II), the sampling frequency will revert to semi-annually if at any given monitoring event, the flux rate returns to less than 1.25 ppt (per a 3-month period) and the rolling average flux rate is less than 0.5 ppt (per a 3-month period).
b. During the increased sampling frequency period (i.e., at Tier II), if the flux rate exceeds 1.25 ppt (per a 3-month period), or the rolling average flux rate exceeds 0.5 ppt (per a 3-month period), consecutively for four quarters, additional evaluation will be conducted at the Tier III level (see also Section 2.5). In addition, if the threshold value of 30 ppt is reached, additional Tier III level evaluation, and/or collecting verification sample(s), will be considered.

2.5 Trend Analysis and Additional Evaluation

In the event that a location reaches Tier III, further evaluation may be conducted, including comparison of data to regional background levels, previous sample results,

results from other Soil Boxes, and whether the fingerprint is distinguishable from historic samples. Further statistical analysis may also be warranted and could include assessment of duplicate sample variability, formal trend analysis, and/or other methods, as appropriate.

Any volatility in the duplicates or trends identified by the data will be evaluated in an attempt to determine the cause of the change. If a trend is identified, further evaluation is required, as discussed above. However, the identification of a trend, in and of itself, does not indicate noncompliance.

In accordance with Conditions IX.K.1.(c) and IX.K.1.(d) of the License, if the evaluation of the data indicates the potential for off-site dioxin and furan migration, action(s) to eliminate the source of the contamination will be made by proposing a modification to the Worker Exposure Control Program, or other appropriate actions for review and approval by MDEQ. This modification will follow the requirements of Condition XI.C.4. of the License.

3.0 SUMMARY OF EXISTING MONITORING DATA

Attachment B shows the data collected for the Soil Boxes (through April 2015) and the associated time plots.

3.1 608-Gate

The flux rate and rolling average flux rate for dioxin and furan WHO-TEC concentrations collected from the 608-Gate Soil Box location were within the screening levels during the entire monitoring period.

3.2 1791-Gate

The flux rate and rolling average flux rate for dioxin and furan WHO-TEC concentrations collected from the 1791-Gate Soil Box location were within the screening levels during the entire monitoring period.

3.3 NEP-A

The flux rate and rolling average flux rate for dioxin and furan WHO-TEC concentrations collected from the NEP-A Soil Box location were within the screening levels during the entire monitoring period.

3.4 NEP-B

The flux rate and rolling average flux rate for dioxin and furan WHO-TEC concentrations collected from the NEP-B Soil Box location were within the screening levels during the entire monitoring period.

3.5 NEP-C

The flux rate and rolling average flux rate for dioxin and furan WHO-TEC concentrations collected from the NEP-C Soil Box location were within the screening levels during the entire monitoring period.

3.6 SR-A

The flux rate and rolling average flux rate for dioxin and furan WHO-TEC concentrations collected from the SR-A Soil Box location were within the screening levels during the entire monitoring period.

3.7 SR-B

The flux rate and rolling average flux rate for dioxin and furan WHO-TEC concentrations collected from the SR-B Soil Box location were within the screening levels during the entire monitoring period.

3.8 19-Gate

The flux rate for dioxin and furan WHO-TEC concentrations exceeded the 2.5 ppt screening level in May 2008. An increase in sampling frequency to quarterly was implemented in March 2009. A total of nine quarterly samples have been collected from March 2009 through June 2011. Of these quarterly events, no exceedance of the 3-month period screening levels (flux rate or rolling average flux rate) was observed consecutively for four quarters, and hence, the Tier III level evaluation process was not triggered.

Following the tiered evaluation method described in Section 2.4, after eight quarterly monitoring events, the sampling frequency reverted to semi-annually beginning in Fourth Quarter of 2011. The flux rate for the 19-Gate Soil Box was again measured above the semi-annual screening criterion during Fourth Quarter of 2013. The Tier III level evaluation process has not been triggered during this period. Sampling may return to semi-annually beginning in First quarter 2016, provided the conditions outlined in Section 2.4 are satisfied.

4.0 PROGRAM EFFECTIVENESS

The Data Evaluation Plan approved November 12, 2010 indicated that the Soil Monitoring Program, and its associated screening levels would be re-evaluated in five years (2015) to determine if the program purpose of verifying that the actions that Dow has taken under the Worker Exposure Control Program and other preventative measures are *"effectively preventing the migration of dioxins and furans from facility surficial soils via track out and blowing dust"* is being met. Dow agreed to submit a report documenting the conclusions and recommendations for the Soil Monitoring Program and Data Evaluation Plan to MDEQ for review and approval by December 31, 2015. This section includes the results of the evaluation.

4.1 Soil Monitoring Program

The current program consists of soil boxes at the three main gates out of the facility, and five soil boxes along the northeast margins of the facility, in the down-wind direction. Gate 52 (along South Saginaw Road) has been increased usage since 2010, so an additional soil box should be placed adjacent to the gate exit (see Section 4.3).

Prior to updating the soil monitoring program in 2010, the program included a hybrid system of soil boxes and greenbelt areas (summarized in Attachment A). A unified monitoring and evaluation system has streamlined and simplified the evaluation of data, making it much more effective and consistent.

4.2 Screening Levels

The screening levels were evaluated independently using a non-parametric Mann Kendall trend evaluation of the existing data for each soil box using ProUCL software (USEPA, 2013). The trend evaluations identified an increasing trend for 19-gate, 608-gate and 1791-gate soil boxes. No trends were identified for the remaining soil boxes using both methods.

The Mann-Kendall test results can be further interpreted beyond the 'yes' or 'no' outputs. For example, comparing the absolute values of the standardized S-values can provide

some contrast in the magnitude of the trends. Positive or negative S-values generally indicate an increasing or decreasing trend, respectively. S-values close to zero do not indicate a trend. The S-values for the 19-gate soil box are significantly higher than those computed for 608-gate and 1791-gate soil boxes. Similarly, the approximated P-values (test statistics) are very close to the tabulated P-values for 608-gate and 1791-gate soil boxes (differing only by tenths of a percent). In addition, the maximum value detected at the 19-gate soil box is 19.5 ppt, where the maximum detected value from the 608-gate and 1791-gate soil boxes was 2.73 ppt.

Contrasting the Mann-Kendall test with the methods outlined in Section 2.4, the Mann-Kendall test is sensitive to statistical trends in the results, but it appears to be insensitive to the relative concentrations (the trends identified at 608-gate and 1791-gate at concentrations that are difficult to distinguish from background). Therefore, the screening levels developed for this monitoring program are effective at identifying increases in concentrations in the soil boxes, while reducing "nuisance triggers" of standard methods like the Mann-Kendall test.

4.3 Conclusions and Recommendations

A review of the soil box monitoring program and evaluation methods has been completed and has determined that the program purpose of *"effectively preventing the migration of dioxins and furans from facility surficial soils via track out and blowing dust"* is being met. Two additional follow-up actions listed below have been identified to strengthen the existing program and will ensure the on-going effectiveness of the program.

Increases in the concentration of the soil within the 19-gate soil box have been observed between 2008 and 2014. While the concentrations appear to have stabilized, the baseline concentrations are now at or slightly over 10 ppt TEQ. Provided the 4Q2015 sample does not exceed the relevant screening levels identified in Section 2.4, a proposal may be submitted to MDEQ for their review and approval to re-build the soil box to maintain the sensitivity of the monitoring program.

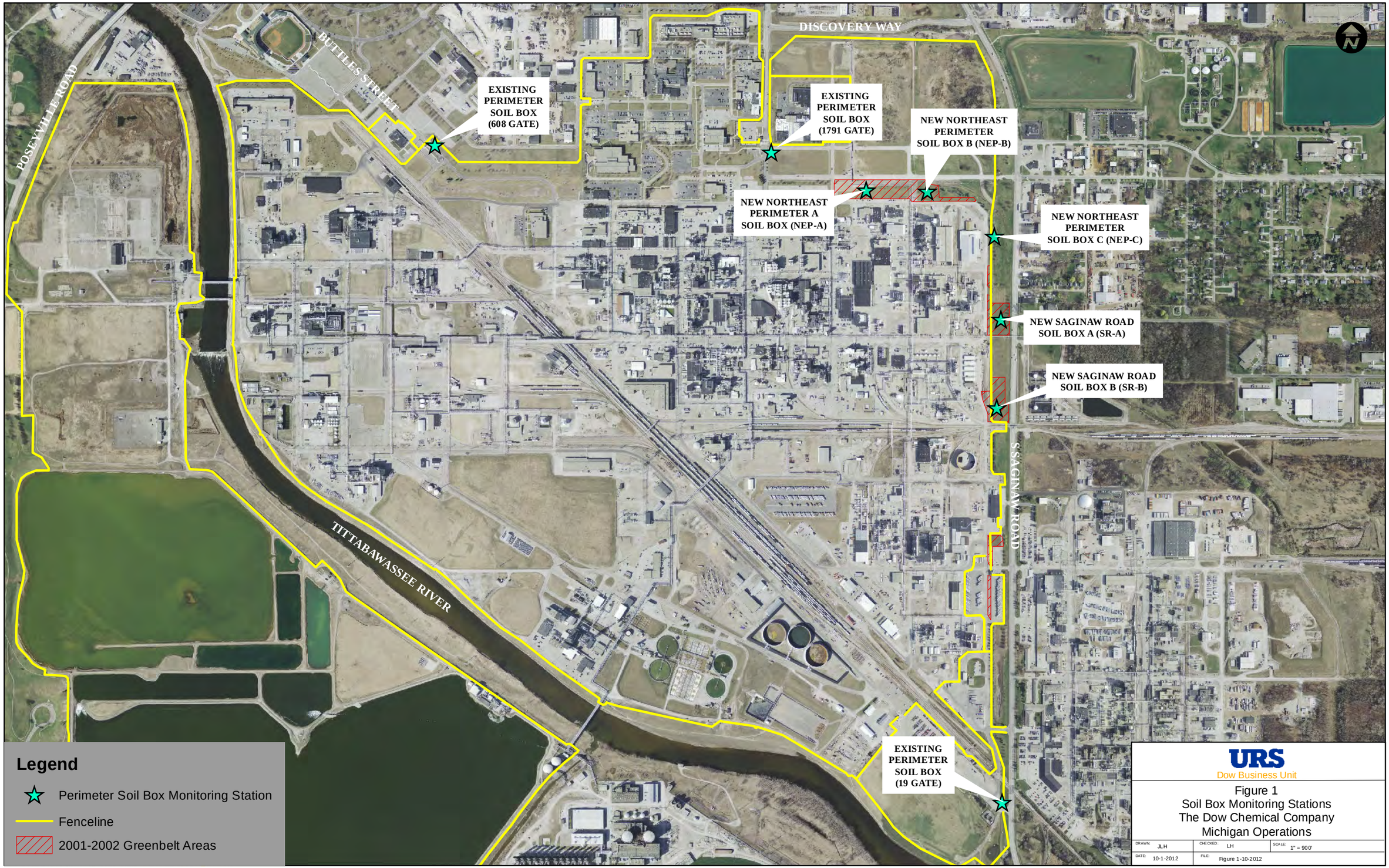
Due to the increased traffic at 52-gate, along South Saginaw Road, one additional soil box will be constructed at the exit point in 2015.

5.0 REFERENCES

Soil Box and Greenbelt Monitoring Program, The Dow Chemical Company, December 10, 2004, Revised February 7, 2007.

ProUCL Version 5.0.00 Technical Guide Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. USEPA. September, 2013.

FIGURES


DISCOVERY WAY
BUTTLES STREET
POSEYVILLE ROAD
EXISTING PERIMETER SOIL BOX (608 GATE)
EXISTING PERIMETER SOIL BOX (1791 GATE)
NEW NORTHEAST PERIMETER SOIL BOX B (NEP-B)
NEW NORTHEAST PERIMETER A SOIL BOX (NEP-A)
NEW NORTHEAST PERIMETER SOIL BOX C (NEP-C)
NEW SAGINAW ROAD SOIL BOX A (SR-A)
NEW SAGINAW ROAD SOIL BOX B (SR-B)
S SAGINAW ROAD
TITTABAWASSEE RIVER
EXISTING PERIMETER SOIL BOX (19 GATE)
Legend
Perimeter Soil Box Monitoring Station
Fenceline
2001-2002 Greenbelt Areas
URS
Dow Business Unit
Figure 1
Soil Box Monitoring Stations
The Dow Chemical Company
Michigan Operations
DRAWN: JLH
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DATE: 10-1-2012
FILE: Figure 1-10-2012

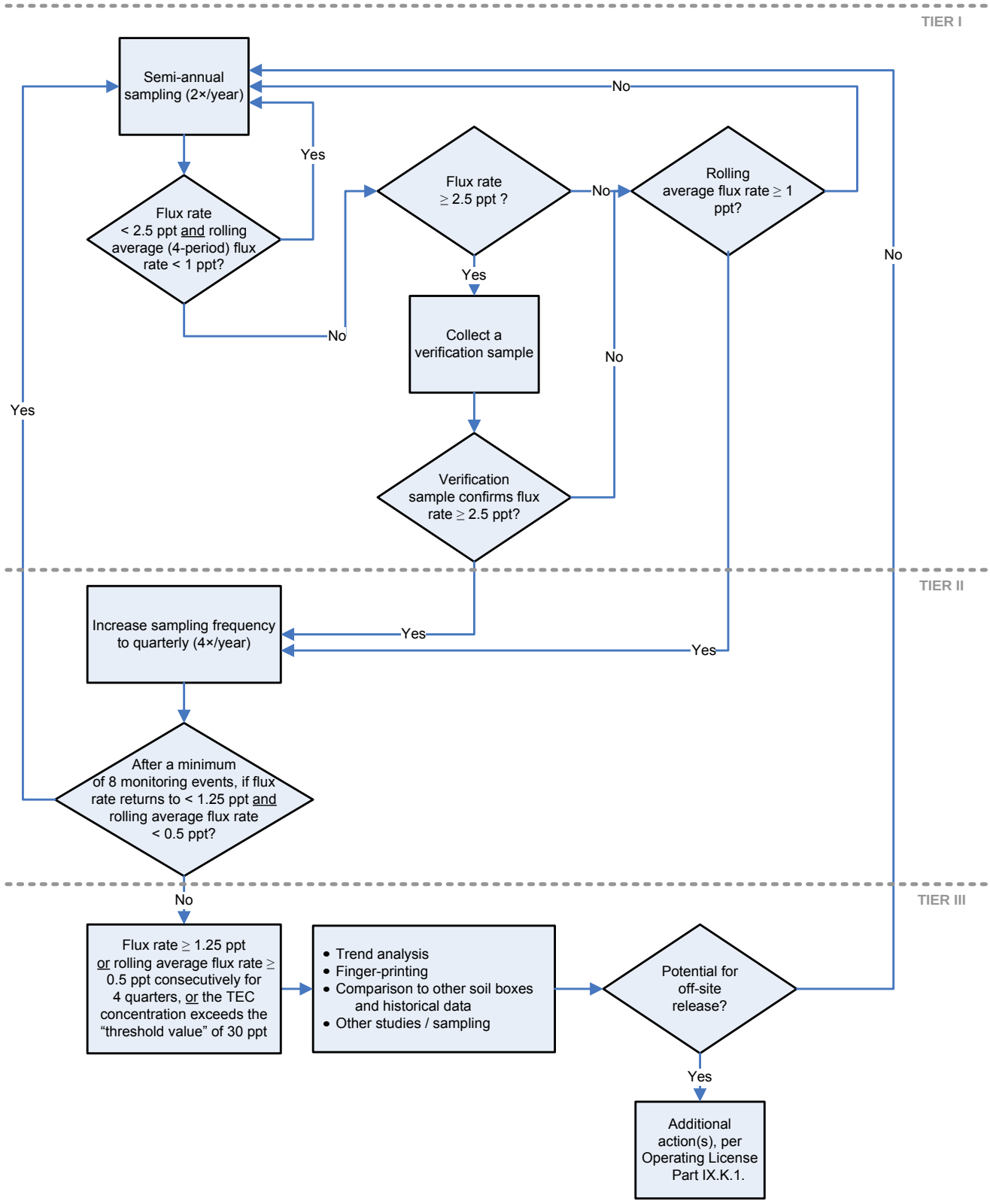


Figure 2. Monitoring Data Evaluation Flowchart

ATTACHMENTS

ATTACHMENT A

Attachment A

Surface soil samples were collected within the Dow facility located in Midland, Michigan in the early 1980s. Samples were collected by the U.S. Environmental Protection Agency (USEPA) and Dow and analyzed for dioxin and furan congeners. Additional surface soil samples were later collected within Michigan Operations in 1996, 1998, 2005 and 2006 by Dow and MDEQ.

In part, as a result of these investigations, a site Soil and Groundwater Exposure Control Program (later expanded to a more inclusive Worker Exposure Control Program) was developed in part to address measurable levels of residual dioxin and furan congeners in the surface soils within the Dow facility. Since the initial development of the Worker Exposure Control Program, a number of interim activities had been completed, including the following:

- Placement of barrier controls by covering certain existing surface areas within Michigan Operations with a minimum of six-inches of topsoil and establishing vegetation;
- Enhancing the Greenbelt Areas in the northeast corner and the eastern perimeter;
- Placement of barrier controls by covering some unused areas with stone or gravel;
- Restricting traffic patterns and traffic access to identified areas;
- Improving dust management by replacing selected gravel parking areas with asphalt;
- Additional cover has been placed over significant areas of the Facility to provide storm water detention, with the added benefit of providing a direct contact barrier to the existing soils;
- Enhancing Michigan Operation's Fugitive Dust Control Program; and
- Enhancing Michigan Operation's internal environmental excavation procedures.

On-going activities include monitoring the effectiveness of the above enhancements, by specifically monitoring the Soil Boxes semi-annually.

Dow was required by the Operating License issued on June 12, 2003, to submit a plan to establish a soil monitoring program that shall include soil box monitoring and monitoring of the Green Belt Areas located on Dow property north and east of the facility fence line along Bay City and Saginaw Roads. The Soil Box and Greenbelt Monitoring Program (Monitoring Program) was prepared by Dow and submitted to Michigan Department of Environmental Quality (MDEQ) on December 10, 2004, and revised on February 7, 2005. MDEQ was notified by Dow on August 28, 2007 that two new Soil Boxes were going to be constructed due to the reconfiguration of the perimeter fence and traffic patterns. MDEQ approved the new locations on October 30, 2008 via the approval of the Facility Sampling and Analysis Plan.

The Soil Box at 608-Gate was installed in October 2007, and the Soil Box at 1791-Gate was installed in November 2007. These Soil Boxes were installed at the new gates to replace Soil Boxes that were located at closed 2-Gate and 11-Gate.

As part of the amendment to the monitoring program in 2013, the Greenbelt Areas in the northeast perimeter of Midland Plant were changed from a gridded surface plot that contained thirty-three sample nodes to a series of Soil Boxes consistent with the approach used at other locations around the site. A multiple Soil Box approach was more applicable to monitor the northeast perimeter Greenbelt Area of Midland Plant. Therefore, the previous sampling scheme of using twenty-foot by one-hundred-foot gridded plots was discontinued.

For reference, soil data collected through June 2011 from the former Greenbelt Area surface plots are included with this Attachment as Table 1.

Table 1
Greenbelt Results by Grid Node

Location	Date	Result	Duplicate Result
SS-REF-G01	20-Sep-10	1.13	1.12
SS-REF-G02	25-Sep-06	2.21	
SS-REF-G03	06-Oct-10	1.1	
SS-REF-G04	20-Sep-10	1.16	
SS-REF-G05	25-Sep-06	1.12	
SS-REF-G06	25-Sep-06	3.57	
SS-REF-G07	26-Sep-06	1.61	
	08-Oct-08	0.638	
	02-Jun-11	0.803	
SS-REF-G08	06-Oct-10	0.845	
SS REF G09	31-May-07	0.869	0.911
	24-Oct-07	1.09	
	20-May-08	0.994	
SS-REF-G10	06-Oct-10	0.815	
SS-REF-G11	05-May-10	0.665	
SS-REF-G12	20-Sep-10	1.3	
SS-REF-G13	20-Sep-10	1.56	
SS-REF-G14	20-Sep-10	0.943	
SS-REF-G15	20-Sep-10	1.28	
SS-REF-G16	06-Oct-10	1.13	1.13
SS-REF-G17	25-Sep-06	1.02	
SS-REF-G18	25-Sep-06	0.985	
SS-REF-G19	06-Oct-10	0.828	
SS-REF-G20	26-Sep-06	1.4	
SS-REF-G21	06-Oct-10	0.67	
SS-REF-G22	07-Oct-09	0.898	
SS-REF-G23	26-Sep-06	0.78	
SS-REF-G24	20-Sep-10	1.4	
SS-REF-G25	20-Sep-10	1.11	
SS-REF-G26	20-Sep-10	2.9	
SS-REF-G27	20-Sep-10	1.05	
SS-REF-G28	06-Oct-10	0.948	
SS-REF-G29	06-Oct-10	1.11	

Location	Date	Result	Duplicate Result
SS-NEP-G01	3-Oct-06	3.07	
SS-NEP-G02	20-May-08	2.09	
	2-Jun-11	2.65	
SS-NEP-G03	14-Oct-09	3	
SS-NEP-G04	14-Oct-09	3.93	
	6-Oct-10	11	
	17-Mar-11	6.21	
	31-Mar-11	5.41	
SS-NEP-G05	8-Oct-08	4.64	
SS-NEP-G06	9-Oct-09	6.14	
SS-NEP-G07	9-Oct-09	5.38	
SS-NEP-G08	8-Oct-09	12.3	
SS-NEP-G09	8-Oct-09	3.3	4.84
	31-Mar-11	3.17	3.88
SS-NEP-G10	8-Oct-09	4.8	
SS-NEP-G11	29-May-07	2.25	
SS-NEP-G12	14-Oct-09	4.59	
SS-NEP-G13	14-Oct-09	10.9	
SS-NEP-G14	21-Oct-04	2.72	
SS-NEP-G15	14-Oct-09	3.16	
SS-NEP-G16	14-Oct-09	21.7	
	31-Mar-11	14	
SS-NEP-G17	21-Oct-04	2.77	
	2-Jun-11	12.73	
SS-NEP-G18	9-Oct-09	6.49	
SS-NEP-G19	21-Oct-04	9.34	
	2-Jun-11	4.31	4.71
SS-NEP-G20	9-May-06	2.73	
	5-May-10	5.13	
SS-NEP-G21	8-Oct-09	6.37	
	31-Mar-11	9.69	
SS-NEP-G22	21-Oct-04	2.06	
SS-NEP-G23	11-May-05	1.17	

Location	Date	Result	Duplicate Result
SS-SR-G01	21-Oct-04	3.6	
SS-SR-G02	11-May-05	1.97	1.75
	6-Oct-10	5.26	
SS-SR-G03	7-Oct-09	6.23	
SS-SR-G04	21-Oct-04	2.87	
SS-SR-G05	21-Oct-04	3.38	
SS-SR-G05	9-May-06	2.94	
SS-SR-G06	7-Oct-09	5.29	
SS-SR-G07	5-May-09	3.39	
SS-SR-G08	29-May-07	2.96	
SS-SR-G09	5-May-09	4.49	
SS-SR-G10	5-May-09	3.59	
SS-SR-G11	5-May-09	3.62	2.22
SS-SR-G12	7-Oct-09	5.33	
	2-Jun-11	11.5	
SS-SR-G13	8-Oct-08	7	
SS-SR-G14	7-Oct-09	4.94	
SS-SR-G15	7-Oct-09	5.15	
SS-SR-G16	7-Oct-09	3.39	3.42
SS-SR-G17	3-Oct-06	3.51	
SS-SR-G18	5-May-09	2.81	
SS-SR-G19	20-May-08	2.99	
SS-SR-G20	21-Oct-04	2.41	
SS-SR-G21	5-May-09	2.94	
SS-SR-G22	21-Oct-04	3.5	
SS-SR-G23	24-Oct-07	6.5	7.25
SS-SR-G24	21-Oct-04	2.59	
	31-Oct-05	2.97	
SS-SR-G25	7-Oct-09	6.61	
SS-SR-G26	21-Oct-04	3.21	2.97
SS-SR-G27	7-Oct-09	4.4	
SS-SR-G28	7-Oct-09	4.14	
	5-May-10	4.4	4.77

Table 1
Greenbelt Results by Grid Node

Location	Date	Result	Duplicate Result
SS-REF-G30	06-Oct-10	0.821	
SS-REF-G31	06-Oct-10	0.83	
SS-REF-G32	06-Oct-10	0.826	
SS-REF-G33	05-May-09	0.845	

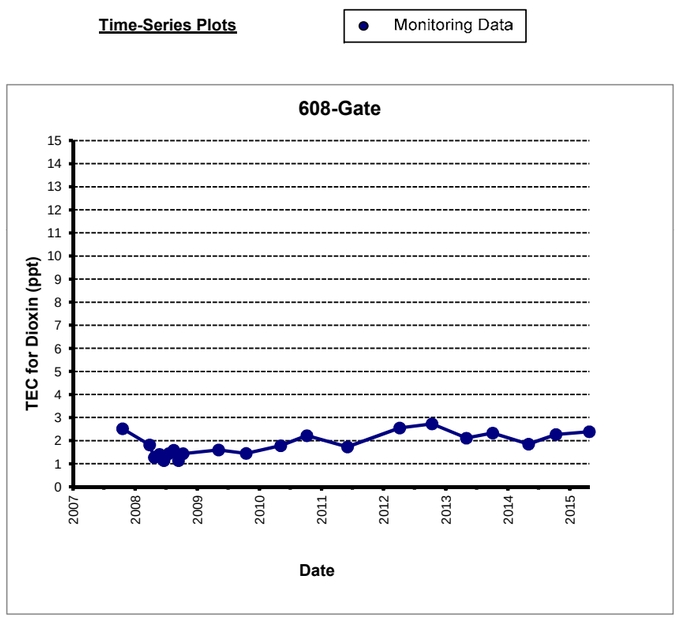
Location	Date	Result	Duplicate Result
SS-NEP-G24	21-Oct-04	2.74	
SS-NEP-G25	14-Oct-09	8.37	
	31-Mar-11	6.78	
SS-NEP-G26	14-Oct-09	3.78	4.98
SS-NEP-G27	21-Oct-04	2.33	
SS-NEP-G28	9-Oct-09	5.26	
SS-NEP-G29	21-Oct-04	2.7	2.71
	24-Oct-07	5.98	
SS-NEP-G30	8-Oct-09	16.2	
SS-NEP-G31	8-Oct-09	5.25	
SS-NEP-G32	31-Oct-05	3.08	
	2-Jun-11	9.57	
SS-NEP-G33	8-Oct-09	8.87	

Location	Date	Result	Duplicate Result
SS-SR-G29	7-Oct-09	4.46	
SS-SR-G30	5-May-09	3.74	
SS-SR-G31	5-May-09	2.91	
SS-SR-G32	21-Oct-04	2.51	
SS-SR-G33	5-May-09	3.27	

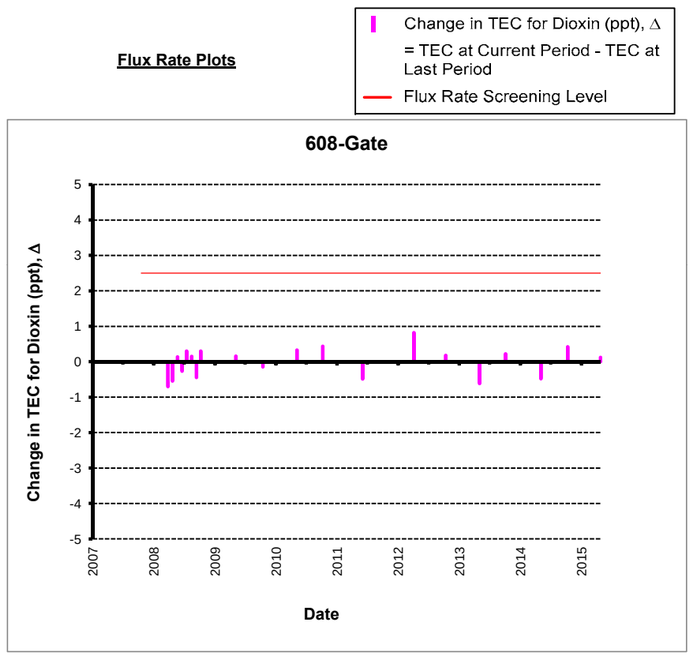
ATTACHMENT B

Soil Box 608
Soil Data Summary

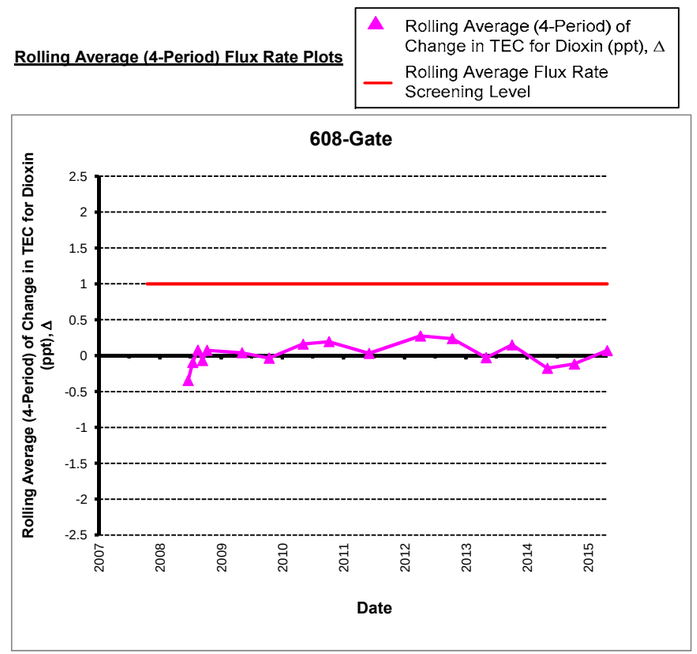
Time-Series Plots



Flux Rate Plots



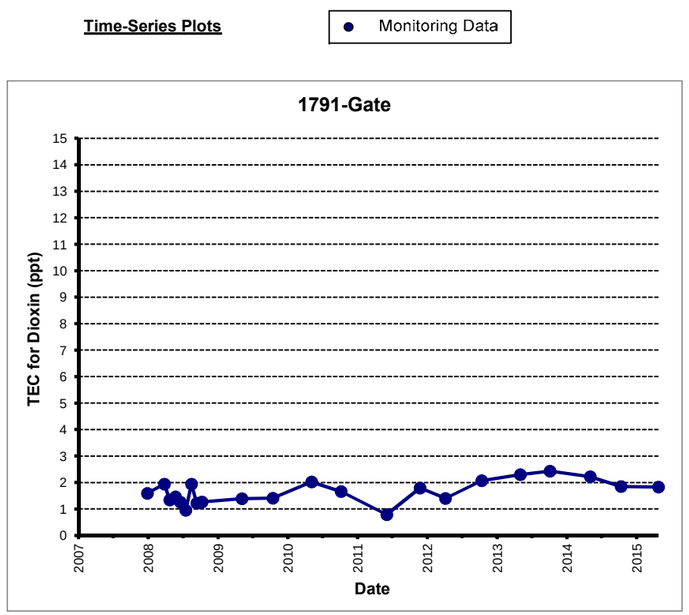
Rolling Average (4-Period) Flux Rate Plots



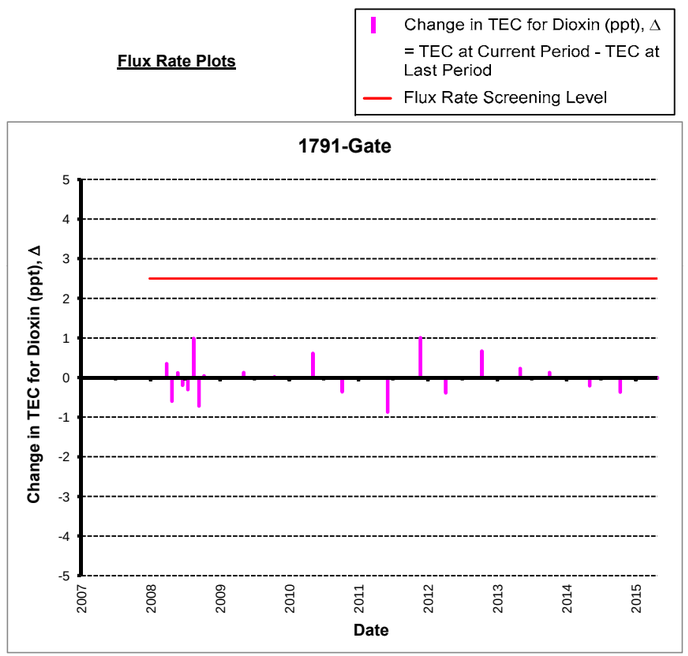
TEC = Toxic Equivalency Factor
ppt = part per trillion

Soil Box 1791
Soil Data Summary

Time-Series Plots



Flux Rate Plots



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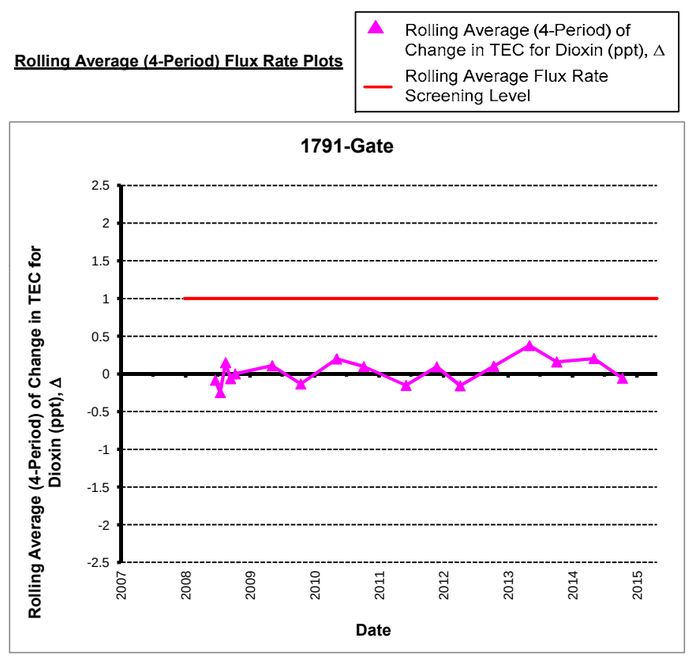
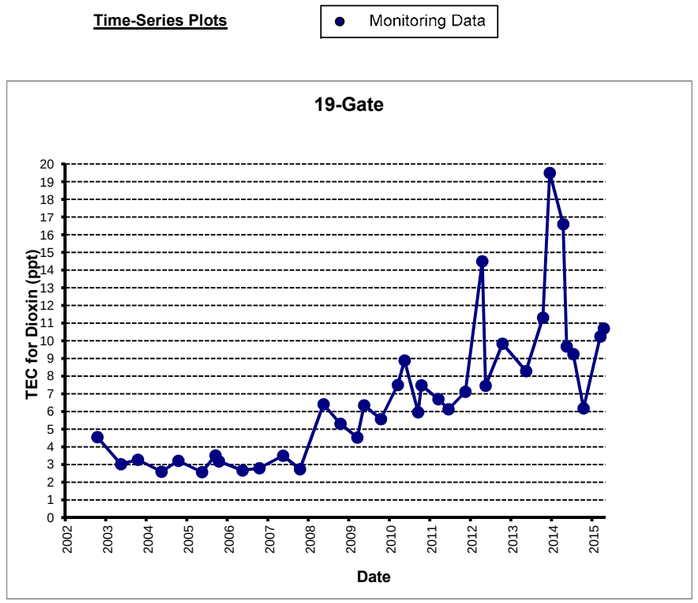


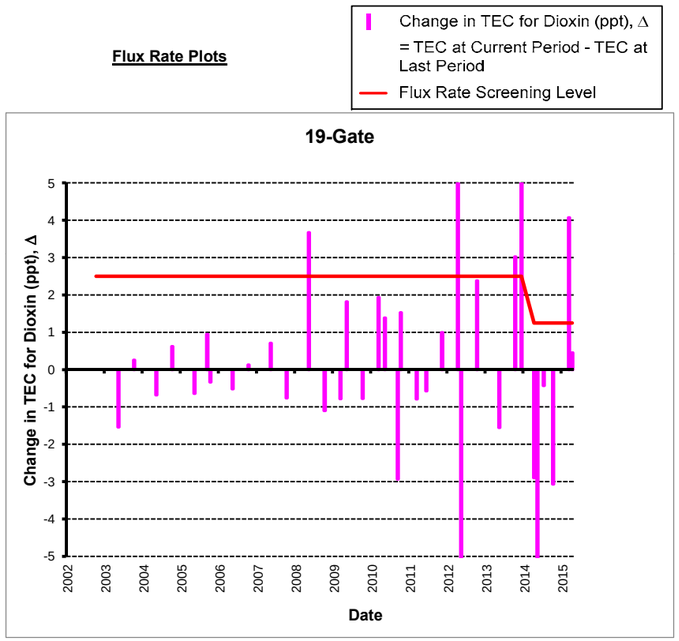
TEC = Toxic Equivalency Factor
ppt = part per trillion

Soil Box 19
Soil Data Summary

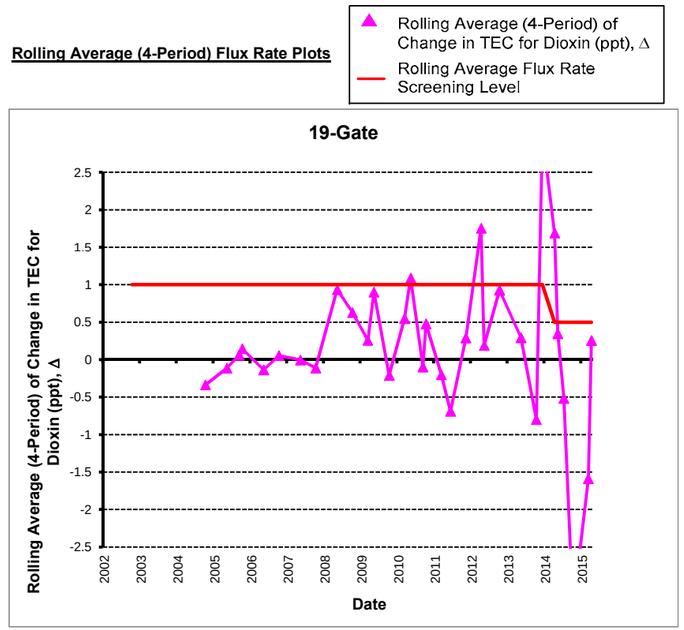
Time-Series Plots



Flux Rate Plots



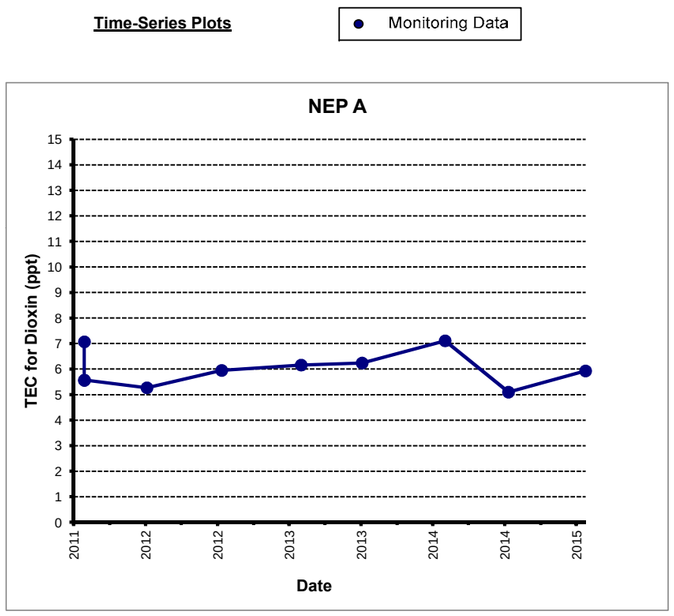
Rolling Average (4-Period) Flux Rate Plots



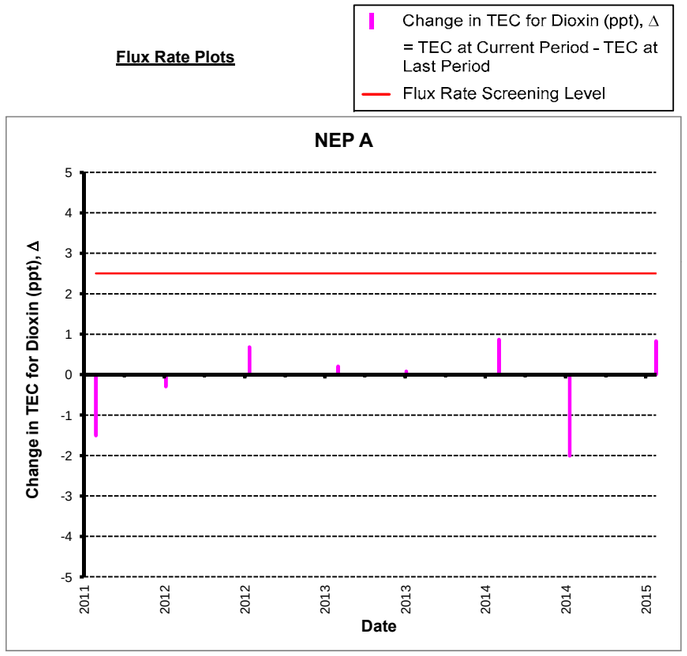
TEC = Toxic Equivalency Factor
ppt = part per trillion

Soil Box NEP A
Soil Data Summary

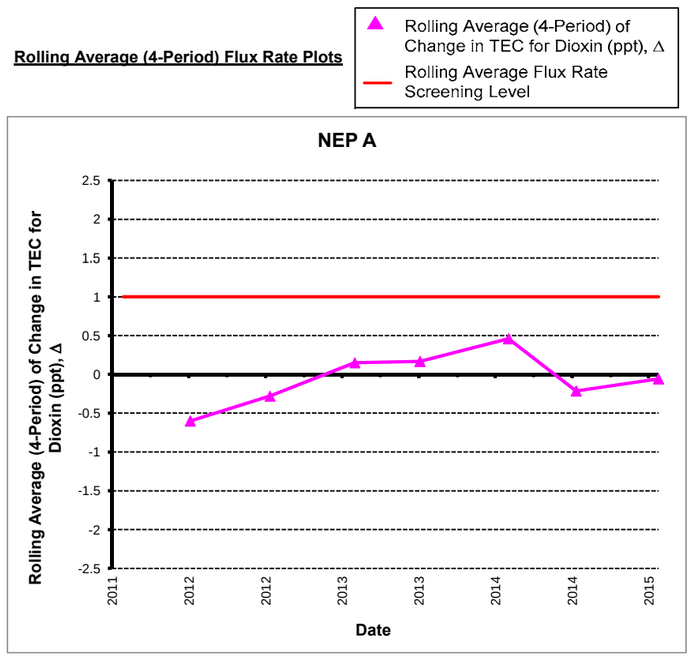
Time-Series Plots



Flux Rate Plots



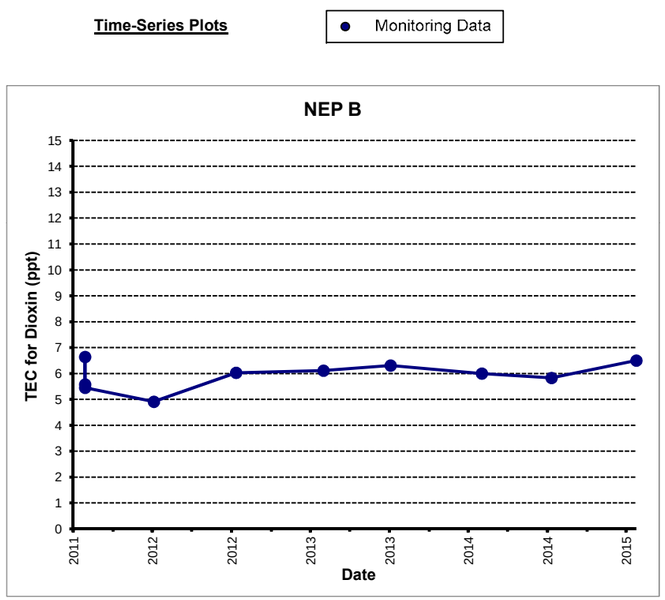
Rolling Average (4-Period) Flux Rate Plots



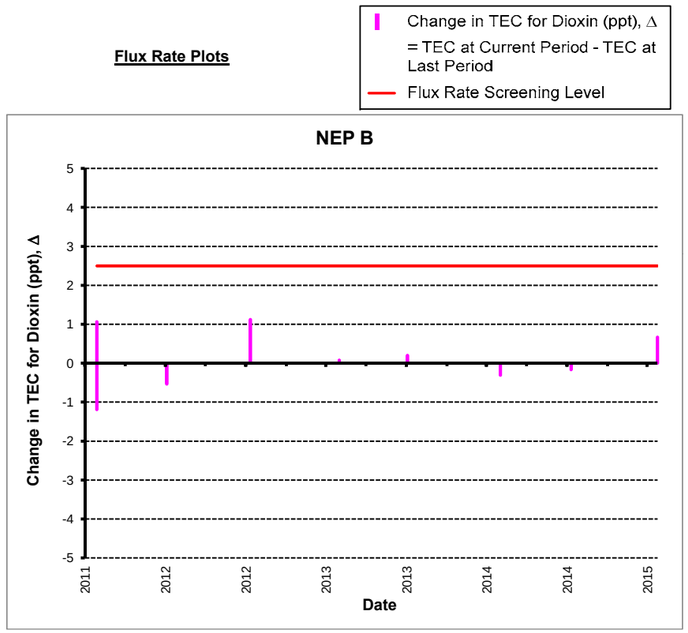
TEC = Toxic Equivalency Factor
ppt = part per trillion

Soil Box NEP B
Soil Data Summary

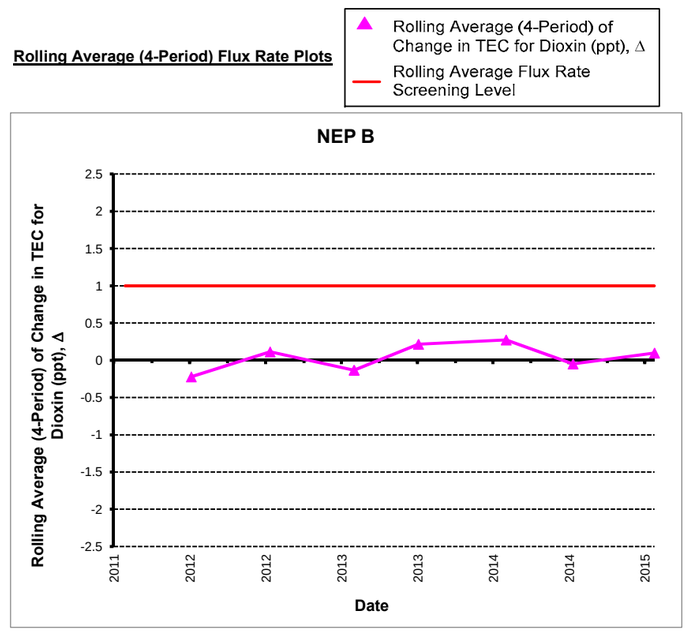
Time-Series Plots



Flux Rate Plots



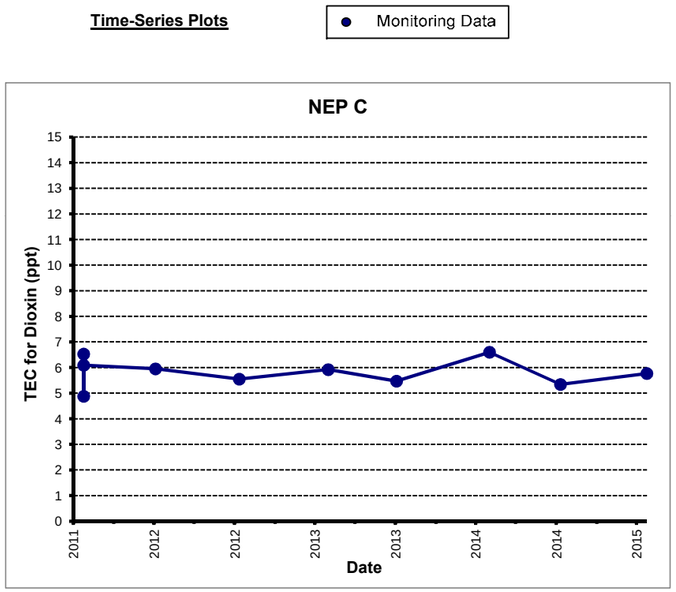
Rolling Average (4-Period) Flux Rate Plots



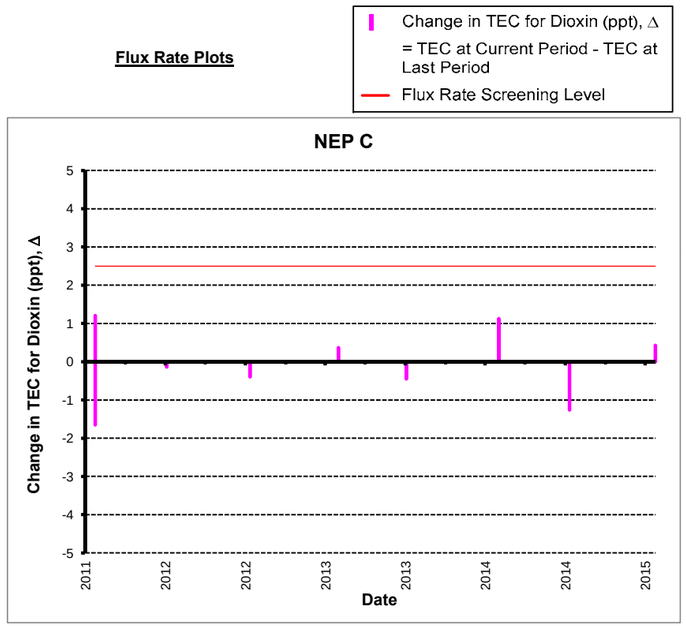
TEC = Toxic Equivalency Factor
ppt = part per trillion

Soil Box NEP C
Soil Data Summary

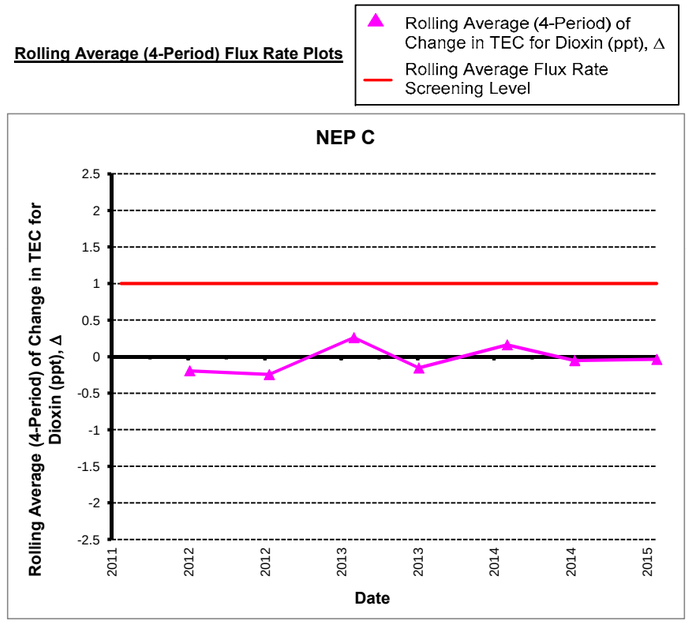
Time-Series Plots



Flux Rate Plots



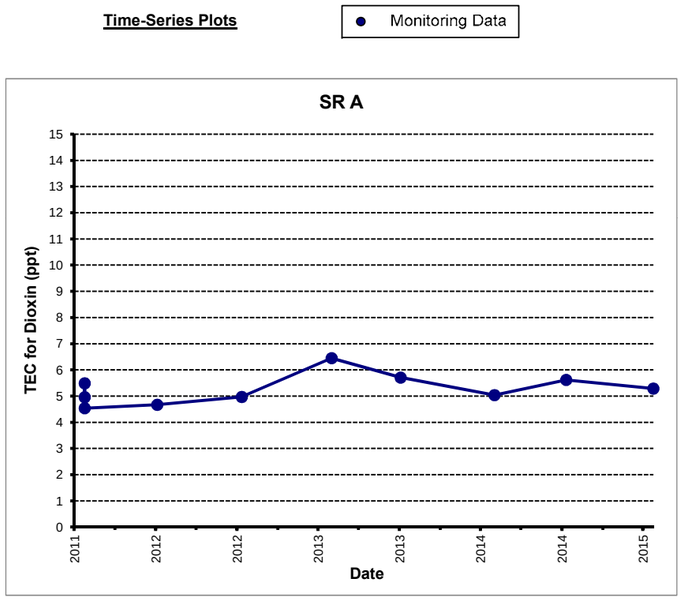
Rolling Average (4-Period) Flux Rate Plots



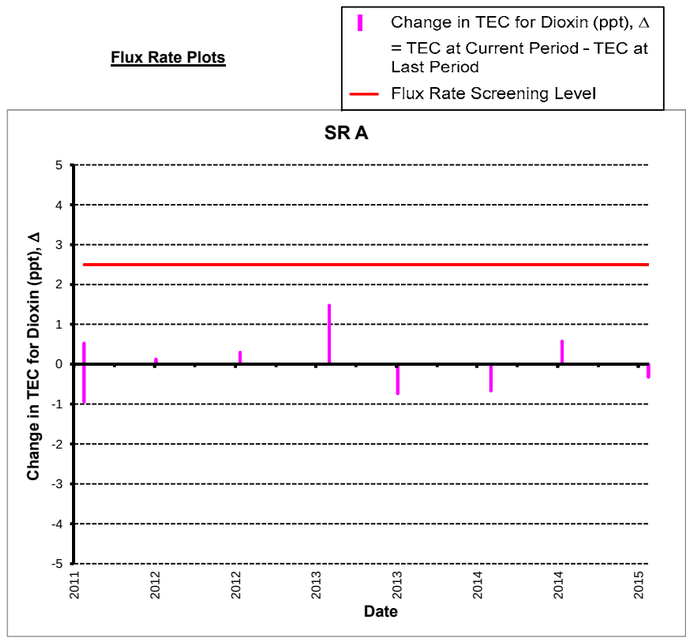
TEC = Toxic Equivalency Factor
ppt = part per trillion

Soil Box SRA
Soil Data Summary

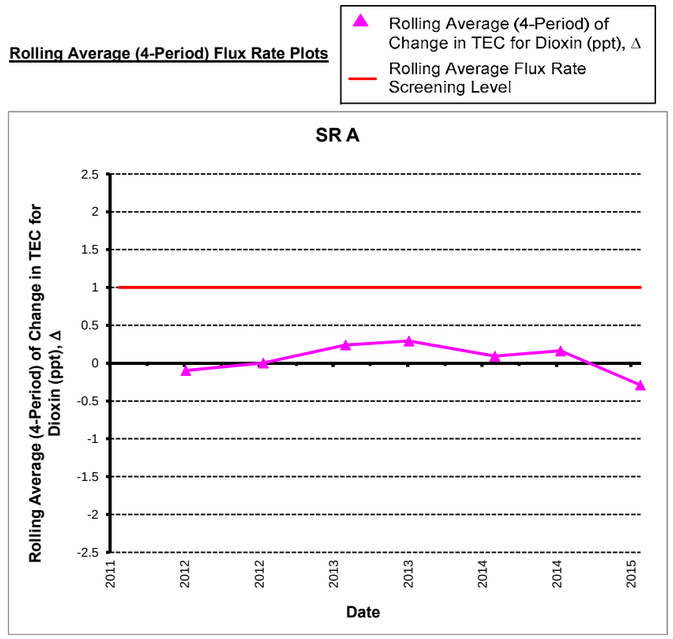
Time-Series Plots



Flux Rate Plots



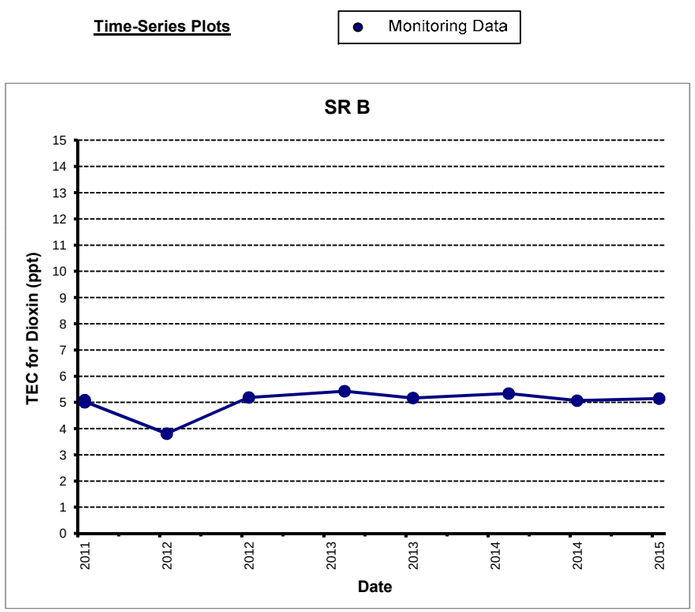
Rolling Average (4-Period) Flux Rate Plots



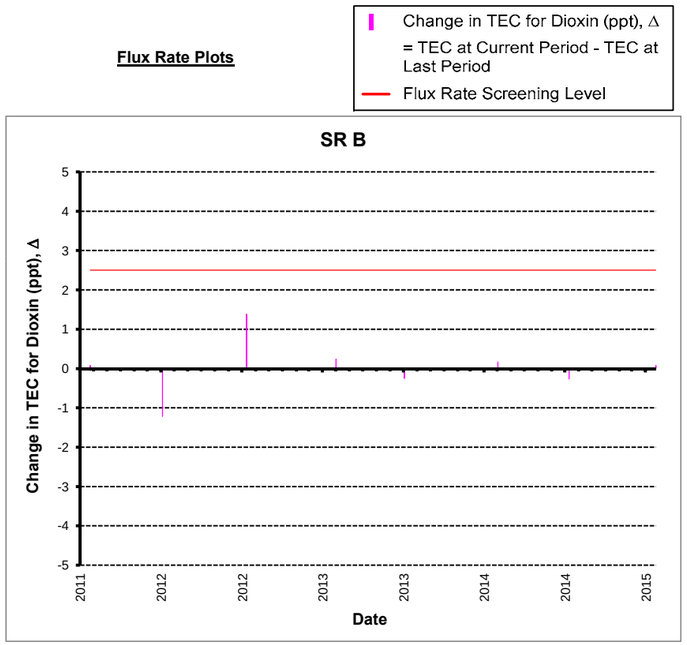
TEC = Toxic Equivalency Factor
ppt = part per trillion

Soil Box SRB
Soil Data Summary

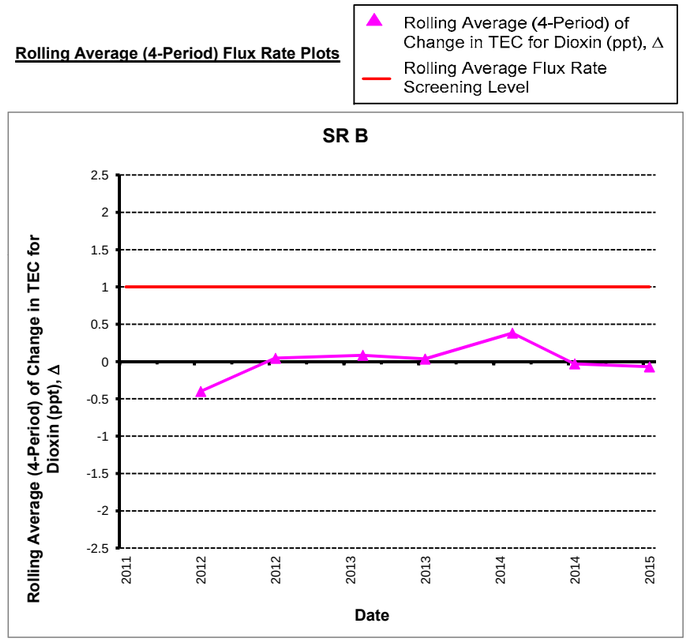
Time-Series Plots



Flux Rate Plots



Rolling Average (4-Period) Flux Rate Plots



TEC = Toxic Equivalency Factor
ppt = part per trillion

Appendix J

Performance Criteria Values

Appendix J - Performance Criteria Values

Program	Well(s)	Compound	Performance Criteria Value	Type	Background Dataset Submitted
7th Street Purge Well Area Corrective Action Monitoring	compliance monitoring wells listed in Table 2-F	1,1,1-Trichloroethane	89 ug/L	Cleanup Criteria (MDEQ Generic GSI Criteria R 299.5744)	Not Applicable
		1,1-Dichloroethene	130 ug/L		
		1,1-Dichloroethane	740 ug/L		
		1,2,4-Trimethylbenzene	17 ug/L		
		1,2-Dichlorobenzene	13 ug/L		
		1,2-Dichloropropane	230 ug/L (X)		
		1,3,5-Trimethylbenzene	45 ug/L		
		1,4-Dichlorobenzene	17 ug/L		
		Benzene	200 ug/L (X)		
		Bromodichloromethane	ID		
		Bromomethane	35		
		2-Butanone	2200 ug/L		
		Carbon Disulfide	ID		
		Chlorobenzene	25 ug/L		
		Chloroethane	1100 ug/L (X)		
		Chloromethane	ID		
		Cis-1,2-Dichloroethene	620 ug/L		
		Dichlorodifluoromethane	ID		
		Ethylbenzene	18 ug/L		
		Isopropylbenzene	28 ug/L		
		N-Propylbenzene	ID		
		Sec-Butylbenzene	ID		
		Tetrachloroethene	60 ug/L (X)		
		Tetrahydrofuran	11000 ug/L (X)		
		Toluene	270 ug/L		
		Trichloroethene	200 ug/L (X)		
		M-Xylene	41 ug/L		
		O-Xylene	41 ug/L		
		P-Xylene	41 ug/L		
		Vinyl Chloride	13 ug/L (X)		
		1-Methylnaphthalene	no GSI criterion		
		2-Methylnaphthalene	19 ug/L		
		Acenaphthene	38 ug/L		
		Anthracene	ID		
		Benzo(A)Pyrene	ID		
		Benzo(B)Fluoranthene	ID		
		Benzo(Ghi)Perylene	ID		
		Chrysene	ID		
		Fluoranthene	1.6 ug/L		
		Fluorene	12 ug/L		
		Naphthalene	11 ug/L		
		Phenanthrene	2.0 ug/L (M); 1.4 ug/L		
		Pyrene	ID		
		Cadmium	(G,X)		
		Chromium	11 ug/L		
		Lead	(G,X)		
		Bicarbonate Alkalinity	no GSI criterion		
		Carbonate Alkalinity	no GSI criterion		
		Chloride	(FF)		
		Arsenic	10 ug/L		
		Cyanide, Total	5.2 ug/L		
		DRO Total	no GSI criterion		

Appendix J - Performance Criteria Values

Program	Well(s)	Compound	Performance Criteria Value	Type	Background Dataset Submitted
Ash Pond	all monitoring wells listed in Table 2-G	all VOAs on target list in Table 2-G	RL, see Appendix B	Background Value	Not Applicable
	6165	Arsenic	Addressing under Corrective Action		-Original submittal in 2008 Fourth Quarter Environmental Monitoring report, submitted on Feb. 28, 2009. -UTL for boron in MW-6165 was updated in the 2011 First Quarter Environmental Monitoring report, submitted on May 31, 2011.
	6165	Boron	1000 ug/L	UTL	
	6166	Arsenic	7.1 ug/L	UTL	
	6166	Boron	1000 ug/L	UTL	
	6167	Arsenic	1.4 ug/L	UTL	
	6167	Boron	370 ug/L	UTL	
	6168	Arsenic	6.4 ug/L	UTL	
	6168	Boron	420 ug/L	UTL	
	6169	Arsenic	Addressing under Corrective Action		
	6169	Boron	480 ug/L	UTL	

Appendix J - Performance Criteria Values

Program	Well(s)	Compound	Performance Criteria Value	Type	Background Dataset Submitted
Former 47 Building	F47-MW-11 & F47-MW-12	Dichlorodifluoromethane	ID	Cleanup Criteria (MDEQ Generic GSI Criteria R 299.5744)	Not Applicable
		1,2-Dichloroethane	360 ug/L (X)		
		1,2-Dichloropropane	230 ug/L (X)		
		Tetrachloroethene	60 ug/L (X)		
Northeast Perimeter Corrective Action Monitoring	Corrective Action monitoring wells 5385, 6176, 6177, 4355, 4363	All Primary Constituents on target list in Corrective Action Monitoring section of Table 2-I	RL, see Appendix B	Background Value	Not Applicable
Northeast Perimeter Corrective Action Plum Sentinel Monitoring	MW-H & MW-10	1,1,1-Trichloroethane	89 ug/L	Cleanup Criteria (MDEQ Generic GSI Criteria R 299.5744)	Not Applicable
		1,1-Dichloroethane	130 ug/L		
		Chlorobenzene	25 ug/L		
		Cis-1,2-Dichloroethene	620 ug/L		
		Tetrachloroethene	60 ug/L (X)		
		Trichloroethene	200 ug/L (X)		
		Vinyl Chloride	13 ug/L (X)		
		Manganese	Reviewed for continuing natural attenuation	Ongoing natural attentuation indicators	
		Sodium			
		Zinc			
		Ammonia			
		Carbon dioxide			
		Chloride			
		Ethane			
		Ethene			
		Ferrous iron			
		Nitrate			
		Nitrite			
		Phosphorus			
		Sulfate			
		Sulfides			
		Total Organic Carbon			

Appendix J - Performance Criteria Values

Program	Well(s)	Compound	Performance Criteria Value	Type	Background Dataset Submitted
West Plant Perimeter	all monitoring wells listed in Table 2-J	Carbon Tetrachloride	45 (X)	Cleanup Criteria (MDEQ Generic GSI Criteria R 299.5744)	Not Applicable
		Chloroform	350 ug/L		
Poseyville Landfill Leak Detection Chemical Monitoring	all monitoring wells in Table 2-N Leak Detection Chemical Monitoring	All Primary Constituents on target list in Table 2-N	RL, see Appendix B	Background Value	Not Applicable
Poseyville Landfill Corrective Action Chemical Monitoring	5925	Chloroform	RL, see Appendix B	Background Value	Not Applicable
	5925	Ethylbenzene	RL, see Appendix B	Background Value	Not Applicable
	5925	Benzene	11 ug/L	UPL	Letter submitted 9/21/15
	5925	Chlorobenzene	107 ug/L	UPL	
	6174	Benzene	11 ug/L	UPL	
	6174	Chlorobenzene	3.69 ug/L	UPL	
	6174	Chloroform	RL, see Appendix B	Background Value	Not Applicable
	6174	Ethylbenzene	RL, see Appendix B	Background Value	Not Applicable
	All other Corrective Action monitoring wells listed in Table 2-N of the SAP	All Primary Constituents on target list in Corrective Action Table 2-N	RL, see Appendix B	Background Value	Not Applicable
Tertiary Pond Recovery Monitoring	3795	Benzene	4.3 ug/L	UTL	letter submitted 10/10/2010
	3795	Chlorobenzene	8.2 ug/L	UTL	

Summary of applicable footnotes and abbreviations (for complete footnote, see DEQ, RRD, Operational Memorandum No. 1: ***Footnotes for Part***

ID = insufficient data to develop criteria
G = GSI criterion depends on the pH or water hardness, or both, of the receiving surface water. The final chronic value (FCV) for protection of aquatic life
M = Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.
X = The GSI criterion shown in the generic cleanup criteria tables is not protecive for surface water that is used as a drinking water source.
CC = Groundwater: The generic GSI criteria are based on the toxicity of unionized ammonia (NH3); the criteria are 29 ug/L and 53 ug/L for cold ater and warm water surface water, respectively. As a result, the GSI criterion shall be compared to the percent of the total ammonia concentration in the groundwater whtat will become NH3 in the surface water.
EE = Applicable generic GSI criteria as required by Section 20120a(15) of NREPA.

FF = The chloride GSI criterion shall be 125 mg/l when the discharge is to surface water of the state designated as public water supply sources or 50 mg/l
UPL = Upper prediction limit
UTL = Upper tolerance limit
RL = Reporting limit

APPENDIX K

Well Abandonment and Replacement Specification
The Dow Chemical Company
Michigan Operations, Midland Plant Facility

Section 1 APPLICABILITY

This specification applies to replacement of existing wells that have been damaged or rendered inoperable. Replacement of historic wells that were installed using materials of construction or design details that do not confirm with current agency guidance and regulations (galvanized steel, screen lengths over 10 feet for monitoring wells, etc.), will be completed in accordance with the design included in this specification. Upgrading of the replacement well design in accordance with this specification is considered functionally equivalent to the damaged or inoperable well provided the well is screened at the same depth within the relevant formation, and located within 15 feet radially of the damaged or inoperable well it is replacing. Prior notification must be given to MDEQ in accordance with License Condition X.B.1.(g)(i). Upon replacement, the SAP shall be modified as identified in License Condition X.A.2.(c).

This specification does not apply to replacement or relocation of existing functional wells to allow for facility expansion, construction, or otherwise facilitate unrelated work. Such a change must be submitted to MDEQ for prior approval. Upon approval and installation, the SAP and License shall be updated as identified in the table in License Condition X.A.2.(b).

Section 2 BOREHOLE GROUTING

Section 2.1 GENERAL

- This specification describes materials, workmanship, and procedures required to supply and place grout in all drilled excavations including, but not limited to, soil borings, cathodic protection wells, and groundwater wells.
- In addition to drilled boreholes, cone penetrometer test holes shall also be filled according to this specification.
- Materials and procedures shall be as described in this specification. Exceptions to this specification are noted in the design drawings and details.

Section 2.2 MATERIALS

- Grout for boreholes shall:
    - Be a single component mixture with a permeability of less than or equal to 1x10-7 cm/sec in fresh water.
    - Be contaminant free, chemically stable, physically stable, and will not flow through highly permeable soils.
    - Conform with the special provisions in Section 2.3.2 of this specification.
- Grout shall be selected based on the following:
    - Grout mixture for shallow and deep application shall be mixed to be between 15-25% solid.
    - Pelletized, chipped or powdered bentonite shall be used for shallow boreholes only (<15 feet deep).
- Mixing water shall be potable, have less than 100 ppm chloride and less than 100 mg/l calcium.

Section 2.3 FIELD PROCEDURES

- All boreholes and cone penetrometer test holes shall be filled upon completion of work.
- Grout shall be mixed and installed according to the manufacturer's written instructions, API Specification 10, or ASTM C 150, as applicable.
- The lower end of grout pipe (tremie pipe) shall be cut at an angle to allow for the side discharge of the grout.
- Drilled excavations and test holes shall be filled for their full depth to be level with surrounding existing grade.
- Pump grout in a continuous operation using a tremie pipe until thick, undiluted grout appears at the surface. The tremie shall reach to the full depth of the grout and grouting shall be done from the bottom up. The tremie pipe may be raised during grouting of deep boreholes to avoid excessive pumping pressure, but shall always remain 10 feet below the grout surface.
- Top off grout after initial settlement using a material from the same company as grout sealant to form a permanent, downhole seal. The grout sealant shall have the same general requirements as noted above. The topping off grout sealant shall be poured slowly into hole to prevent bridging or binding and per the manufacturer's recommendations.
- After 24 hours, repeat Section 2.3 as required or fill in any remaining hole with native soil and remove spoil from surrounding area.

Section 2.3.1 Shallow Boreholes

- Shallow boreholes, i.e., less than 15 feet deep, may be filled with dry bentonite chip or pellets, except as prohibited by Section 2.3.2 of this specification.
- Check that borehole remains open to drilled depth if not being filled through drill tooling.
- Tamp or rod while filling to compact pellets and prevent bridging in the hole.

Section 2.3.2 SPECIAL APPLICATIONS

- Conditions requiring moderate to high sulfate resistance shall use American Petroleum Institute (API) Class B Neat Cement.
- In the presence of moderate to elevated brines (identifiable by chloride >1,500 mg/L or hardness over 500 mg/L), bentonite powder, chip or pellets shall not be used. Conditions requiring moderate to high chloride resistance (in the presence of brines) shall use API Class A Neat Cement, with Baroid IDP Polymer.
- In the presence of dense or light non-aqueous phase liquids (LNAPLs or DNAPLs), bentonite powder chip or pellets shall not be used as oils coat the grains and prevent hydration. Use API Class A Neat Cement with Baroid IDP Polymer.

Section 3 STANDARD WELL DESIGN

Section 3.1 GENERAL

- Well installation methods shall comply with ASTM D 5092 (R 299.9506(2)(b)).
- Traffic protection (bollards) shall be provided for new wells.
- Attached Drawing 1 presents the standardized well design.

Section 3.2 MATERIALS

Section 3.2.1 Filter Pack

- Washed uniformly graded silica sand shall be used as a default filter material.
- Custom-graded filters are allowed, provided they are designed in conjunction with a well screen, and must consider grading of the aquifer.
- Any filter media must be low-carbonate and chemically inert to allow for possible future acid cleaning.

Section 3.2.2 Well Screens

- Well screens shall have the same inside diameter as the well riser pipe.
- Stainless steel well screen must be the same type of stainless steel as the riser pipe.
- Well screens must tightly seal with a threaded or welded connection to the riser pipe.
- PVC or stainless steel screens may be utilized.
- Screen materials shall be selected to sustain heat of hydration of grout selected for each application and must have a crush strength that exceeds the ground pressure (to prevent screen collapse).
- Pre-pack screens may be used provided the filter materials conform with Section 3.2.1 of this specification.
- Well screens shall be free from contaminants.

Section 3.2.3 Well Risers

- Riser materials shall be selected to sustain heat of hydration of grout selected for each application and must have a crush strength that exceeds the ground pressure (to prevent riser collapse).
- Well riser shall be the same diameter of the well screens.
- Stainless steel well riser must be the same type of stainless steel as the well screen.
- Well riser must tightly seal with a threaded or welded connection to the well screen.
- PVC or stainless steel well riser may be utilized.
- Well riser shall be free from contaminants.

Section 3.2.4 Above-grade Well Riser Protection

- Above-grade well protectors must be lockable.
- Provisions must be in place to drain moisture from the above-grade annulus.
- Protectors must be secured in place per Detail A on Drawing 1 (attached).

Section 3.2.5 Flush-grade Well Protection

- Well protection manholes shall be secured in place per Detail B on Drawing 1 (attached).

Section 3.2.6 Bollards

- Bollards shall include 4" steel posts, filled with cement or concrete.
- Bollards must be embedded for 75% of the total length.

Section 3.3 INSTALLATIONS AND WORKMANSHIP

- Soil boring equipment, tooling and materials should be steam-cleaned prior to use at the site.
- Final installation shall be in accordance with Drawing 1 (attached), using either a stick-up protector (Section 3.2.4) or a flush-grade well protector (Section 3.2.5).

Section 3.3.1 Glacial Aquifer Groundwater Monitoring Well

- Wash water, drilling water, or water for drilling mud shall be obtained from the Regional Aquifer.
- Only bio-degradable lubricants shall be used on augers, rods or downhole tooling.
- Open boreholes should not be left overnight (if augers, rods or casings are withdrawn from a borehole that may allow shallow contaminants to progress to a lower aquifer); boreholes shall be grouted that same day.
- A filter pack shall be installed around the well screen (see Drawing 1, attached).
- An annular seal composed of coated bentonite pellets or fine sand shall be place above the filter pack to prevent grout intrusion into the filter.
- Grout entire annular space between the boring wall and the casing wall, from the top of the annular seal to ground surface, in accordance with Section 2.

Section 3.3.2 Shallow Monitoring Well

- Wash water, drilling water or water for drilling mud shall be potable.
- Using grout (selected according to Section 2), fill entire annular space between the boring wall and the casing wall, from the top of the annular seal to ground surface, in accordance with Section 2.

Section 3.4 DOCUMENTATION

- A well installation log shall be completed by a field geologist
- The well installation log will note:
    - The borehole depth
    - The bottom of screen
    - The length of screen
    - The material of screen construction
    - The amount of riser pipe
    - The material of screen construction
    - The filter material
    - The top of filter
    - The grout and/or seal material
    - The bottom of filter
    - Soil descriptions (and source of descriptions – e.g., field observation)
    - Location of descriptions of any soil samples collected
    - Surface completion
    - Date of installation

Section 4 STANDARD WELL ABANDONMENT

Section 4.1 GENERAL

Well abandonment methods shall comply with ASTM D 5299 (R 299.9506(2)(b)).

Attached Drawing 2 presents standardized well abandonment practice.

Section 4.2 MATERIALS

All materials shall be consistent with Section 2.2.

Section 4.3 ABANDONMENT

Section 4.3.1 Records Review

- Review all available records and information relating to use and/or prior installation of the well, including drilling method, lithology, developing and/or sampling logs, and repair records.
- When closing or removing monitoring wells, extraction wells or geophysical wells, an attempt must be made to determine the diameter of the equipment used to install them so holes may be filled to the same diameter as the original installation borehole.

Section 4.3.2 Verification of Field Data

The well shall be inspected prior to closure to verify the field situation and/or measurements, including the wellhead integrity, the presence of pumps or additional surface casings and the currently measured depth, and grout settling.

Section 4.4 FIELD PROCEDURES

- The geologist or engineer shall be on-site during well abandonment.
- Remove any pumps or dedicated sampling equipment from the well.
- Remove casing from the ground by either pulling or overdrilling (see Detail A, Drawing 2). If annulus does not stay intact when pulling a casing, the borehole shall be over-drilled.
- Depending on the construction, it may be necessary to leave the casing in place (see Detail B, Drawing 2).
- Where removal of the casing is not possible or required, cut the well off 12 inches below finished ground elevation.

- Determine the volume of the borehole (or casing) by:

  $V=\pi r^2 L$

  Where:

  V = Volume

  L = length of the borehole or well to be plugged

  R = radius of the hole

  This volume is the minimum required for actual conditions due to possible loss of plugging material into the formation.

- Grouting shall proceed in accordance with Section 2.3.

Section 4.4.1 Abandoning Glacial Aquifer Groundwater Monitoring Well

- The geologist or engineer shall be on-site during well abandonment.
- Remove casing from the ground by either pulling or overdrilling (see Detail A, Drawing 2).
- Depending on the construction, it may be necessary to leave the casing in place (see Detail B, Drawing 2).
- Where removal of the casing is not possible or required, cut the well off 12 inches below finished ground elevation.
- The entire ungrouted annulus/remaining casing shall be grouted, in accordance with Section 2.
- Wash water, drilling water, or water for drilling mud may be obtained from the Regional Aquifer, or be potable (if potable water is used, it shall have less than 100 ppm chloride and less than 100 mg/l calcium).
- Only bio-degradable lubricants shall be used on augers, rods or downhole tooling.
- Open boreholes should not be left overnight (if augers, rods or casings are withdrawn from a borehole that may allow shallow contaminants to progress to a lower aquifer); boreholes shall be grouted that same day.

Section 4.4.2 Abandoning Shallow Wells

- The geologist or engineer shall be on-site during well abandonment.
- Remove casing from the ground by either pulling or overdrilling (see Detail A, Drawing 2).
- Depending on the construction, it may be necessary to leave the casing in place (see Detail B, Drawing 2).
- Where removal of the casing is not possible or required, cut the well off 12 inches below finished ground elevation.
- Ungrouted annulus/remaining casing shall be filled with dry pelletized, chipped or powdered bentonite.

- The bentonite pellets shall be tamped or rodded while filling to compact pellets and prevent bridging in the hole.

Section 4.5 DOCUMENTATION

- The well abandonment log will note:
  - The borehole depth.
  - The bottom of screen.
  - The length of screen.
  - Type and quantities of materials pulled.
  - Type and materials of grout pumped into the borehole.
  - Note quantities and configuration of any casing left in place.
  - Date of abandonment.