Appendix 1:

Sampling and Analysis Plan (SAP) For the Salzburg Landfill Operating License

(Parts 111 & 115 of Act 451)

The Dow Chemical Company

Revision 2
May 2015

Table of Contents

TABLES

FIGURES

ATTACHMENTS

1.0 Introduction and Scope

This Sampling and Analysis Plan (SAP) was created as a requirement for The Dow Chemical Company (Dow) Salzburg Landfill (the Landfill) Operating License under Act 451, Part 111 and post-closure under Act 451, Part 115. This SAP describes and lists procedures for monitoring of the following media at the Landfill (reference Figures 1 and 1A for monitoring location maps):

- Groundwater;
- Leachate;
- Leak Detection;
- Surface Water;
- Ambient Air; and
- Soil.

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, leachate, leak detection, surface water, ambient air, and soil monitoring programs can be found in subsequent sections.

2.1 Pre-Sampling Procedures

1. Review Table 2-A to determine when a sample event is to occur and what samples are required;
2. Notify team members and customers of planned sampling dates;
3. Prepare labels with facility identification (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):
   - Field Blank Media
   - Necessary preservatives
   - Filtering equipment
   - Field Data Sheet
   - Adapter fittings for wells
   - Chains-of-custody
   - Old field data
   - Cell phone
   - Tweezers
   - Tubing
   - Deionized water
   - Buckets for purging
   - Extra bottles
   - Generators
   - Sampling Procedures
   - Static Water Level meter
   - Map of sampling locations
   - Stainless steel spoon
   - 0.25-inch stainless steel Sieve
   - Pump Controllers
   - Stainless steel bowl or disposable aluminum pan
   - One-inch diameter stainless steel soil survey probe
   - Ice chests w/ice
   - Field instruments (e.g. pH/Conductivity)
   - Dedicated/disposable bailers and string
   - Gas/oil for generators
   - Sample bottles
   - Sample labels
   - Copy of SAP
   - Personal Protection Equipment (PPE)
   - Re-sealable plastic bags
   - Well Inspection Logs
   - Safety cutters or guarded scissors
   - Safe Work Plan (SWP)
7. Field instruments will be calibrated, per manufacturer’s instructions, prior to use each day and noted on a field data sheet. The pressure gauge 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;
- Chain-of-custody form (example in Attachment D); and
- Field data sheet (example in Attachment G).

A person who has samples in custody must comply with these Chain-of-Custody Procedures. During collection, analysis and final disposition, samples are 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 attached 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;
- Analysis to be performed on the sample; and
- Chemical preservative used.

Information pertinent to a field survey or sampling will be recorded on a field data sheet, included in Attachment G. It is essential that all samples be collected properly and that actual conditions during each sample collection are completely documented. Field parameters shall be taken immediately after the sample has been collected and recorded on a field data sheet. 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 well was purged and sampled;
- 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, 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 an 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 sampling equipment is used then an equipment blank must be obtained. 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. up gradient before down gradient). 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 the 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. Wash using hot water and 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. Wash using hot water and 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. The current practice is to use pre-preserved bottles. 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 any time 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 in-line filter. Prior to filling bottles, allow liquid to discharge through filter briefly. 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 field parameters can be measured before or after sample collection and recorded on the field data sheet. The proper collection order is as follows:

1. Volatile Organics
2. Semi-Volatiles Organics;
3. Total Organic Carbon (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 on 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 landfill technical advisor.

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 Attachment G). Other media will also be inspected and findings will be documented on the respective field data sheets. Lift stations and collection sumps may be inspected for damaged or missing manhole lids, locks, and/or labels. 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 documented and reported to the landfill technical advisor 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 Attachment A. In addition, the Dow Environmental Laboratory Quality Assurance Program is located in Attachment C.

2.11 Data Analysis & Reporting

All data collected per this SAP will be analyzed and reported according to the respective section of Table 2-A, Sample Collection Chart.

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 of that congener will be used to calculate the WHO-TEC for that sample.

Four reports will be submitted to the MDEQ: (1) First, Second, and Third Quarter Reports and (2) Fourth Quarter Report and Annual Summary. The First, Second, and Third Quarter Reports will include analytical summary tables; quality control data; sampling map; brief narrative of sampling events for all environmental media, including sampling event dates, identification of any significant problems with respect to SAP procedures; copies of field data sheets; any problems in sampling, testing, or results; summary of statistical tests and any follow up required. The Fourth Quarter Report and Annual Summary will include all of the above, plus the following: copies of field data sheets, if not already provided; hydrographs or other hydraulic diagram; a summary of environmental monitoring data results, including a narrative summary of results, trends and Stiff diagrams of tracking parameters; and discussion of lab and field related QA/QC information.

2.12 Future Updates to SAP Procedure

This SAP may need to be updated periodically and submitted to the DEQ for review and approval. If approved, the revisions to the SAP shall become part of the Operating License without the need for a minor license modification. 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 9, Record of SAP Revisions.

3.0 Groundwater Monitoring Field Procedures

The Groundwater Monitoring Field Procedures section includes guidelines for obtaining hydraulic reading/static water levels from groundwater wells, well purging, and collecting samples. 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 will be protected by a locking protective casing with a Dow lock. The wells will be inspected for physical damage and any problems that may have occurred will be documented on the well inspection sheet (see Attachment G).

Static water level (SWL) readings will be obtained prior to purging. SWLs from all wells will be obtained during a single 24-hour period, according to the locations and frequency specified in Table 2-A, Sample Collection Chart. The SWL will be recorded on the field data sheet (see Attachment G). There are two techniques used to obtain 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 5 feet of head) is attached to a valve stem and the water level will be read in feet of head (measured to 0.01 feet). 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.
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. An 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. 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 rinsing after every SWL reading.
7. Store the SWL indicator in a clean dry place when not in use (See section 2.3.2).

3.2 Well Reference Elevations

Well casings will be referenced to a USGS reference datum elevation. See Table 3 for monitoring well specifications. Wells will be surveyed after new installations, upgrades, repairs, or every three years, beginning in 2009.

3.3 Well Purging

Purging and sampling will be completed as specified in Table 2-A. 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. The procedure used at Salzburg Landfill is to remove three well casing volumes of water. This is done by 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 Table 4. 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 0.636 (gallons per foot for a 4” diameter well) for a total volume of water in the well casing. Multiply this sum by 3 (the number of well volumes to be removed) which is the minimum recommended. Refer to Table 3 for a list of pre-determined purge volumes.

3.3.1 Equation for Purge Volumes

For non-flowing wells:

Well Depth – SWL = Feet of Water
Feet of Water x 0.636 = Total Water in a 4” diameter well casing (in gallons)
Total Amount of Water x 3 = Purge Volume prior to sampling (in gallons)

For flowing wells (pressure reading):

Well Depth x 0.636 x 3 = Purge Volume for a 4” diameter well casing prior to sampling (in gallons)

Specific procedures used to purge a well are listed below, in Sections 3.3.2-3.3.4.

3.3.2 Flowing Wells

Flowing wells are positive pressure wells. Since the well casing is full, the well volume has already been calculated and is on the field data sheet. 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.

3.3.3 Submersible Pump Wells

Each well has an electrical fitting on the well head that is to be connected to the appropriate pump controller (110 VAC or 12 VDC). Purge the well using the following steps:

110 Volt AC Pump

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 a low flow rate to minimize re-suspension of fine particles and disturbance of the filter pack.
6. Sampling may commence after purging is complete. If a well is effectively pumped dry, the well will be sampled within a 24 hour period.

12 Volt DC Pump

1. Connect cables to truck battery or battery pack.
2. Plug the other end of the cable into pump controller.
3. Turn controller on, if necessary (some controllers automatically turn on hooked up to the battery).
4. Adjust controller until desired flow rate is reached. Maintain a low flow rate to minimize re-suspension of fine particles and disturbance of the filter pack.

5. Sampling may commence after purging is complete. If a well is pumped dry, the well will be sampled within a 24-hour period.

3.3.4 Pumping Rates

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. The purge rate for clay wells should not exceed 1 gal/min (gallons per minute) unless purging to dryness is the goal. The purge rate for Regional Aquifer wells should not exceed 3 gal/min. Excessive purge rates and/or filter pack dewatering can result in increased turbidity of water samples and could diminish the sample quality. Purging can be considered complete after 3 well volumes have been purged or if the well has been pumped to dryness. Sampling will commence after purging or within 24 hours if the well is pumped to dryness.

3.4 Sampling Procedures

Field data and samples shall be obtained according to the location, frequency, parameters, and analytical requirements as specified in Table 2-A, Sample Collection Chart, and Table 2-B, Primary Chemical Constituent, Analytical Method, and Reporting Limit List. The complete Dow Analytical Chemical Constituent, Analytical Method, and Reporting Limit List can be referenced in Attachment B. Complete a field data sheet and well inspection log for each well, as indicated in Section 2.2.

Sampling may commence after purging is complete. If wells are effectively purged dry, wells should be sampled within 24 hours. Sampling will be done at the lowest continuous flow rate possible, which is generally between 500 and 1,000 milliliters per minute. 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 in the well inspection log.

3.5 Equipment, Trip and Field Blanks

Trip blanks will be prepared according to the Quality Control Table in Attachment 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 for the parameters being sampled, according to the blank schedule in Attachment A, and the time they were prepared will be recorded on the field data sheet. Preservatives (if necessary) will be added 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 water free of constituents in question. Untested trip blanks will be discarded.

One field blank will be prepared according to the Quality Control Table in Attachment 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 water that is free of constituents in question.

In the event that non-dedicated and non-disposable sampling equipment is used, an equipment blank will be submitted for each parameter and treated in the exact same manner as the rest of the samples (See Quality Control Table in Attachment A). Equipment blanks are not required for new, disposable equipment. Equipment blanks 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 Attachment A.

3.7 Well Installation Cross-Contamination Prevention Procedures

A work plan for replacement of monitoring wells designated for periodic groundwater monitoring at the landfill will be submitted to MDEQ for review and approval. Additional or replacement wells at Salzburg Landfill should be installed in a manner which prevents cross-contamination, in accordance with ASTM D5092, 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 Salzburg Landfill, or 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.

3.8 Updates to Background Data and Statistics

Annually, results of the monitoring data shall be reviewed to determine if the background data should be updated for a program or sample location. If it is determined that background data should be updated for either individual sample locations or an entire program, the MDEQ should be notified of the intent to update the background data and revise the Performance Criteria. Once the background data is re-evaluated, the updated statistics will be sent to the MDEQ for review and approval. Any update to the background data and/or Performance Criteria will not require a license modification. Plans to update the background/statistics should be discussed in the annual report.

4.0 Leachate Monitoring Field Procedures

The Leachate Monitoring Field Procedures section includes guidelines for collecting samples of leachate from the waste disposal cells at Salzburg Landfill. 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 2-A, Sample Collection Chart, and Table 2-B, Primary Chemical Constituent, Analytical Method, and Reporting Limit List. 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.

Prior to sampling the lift stations, notify the landfill technical advisor that sampling is going to be conducted. This notification is required to prevent triggering the automated alarms for the lift stations.

Lift stations are sampled with disposable Teflon or polyethylene bailers, or by sample port. To obtain a sample using a bailer, 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, the sump pumps can be manually activated, and sampling can begin immediately, as the discharge lines will drain between pump cycles and no purging is necessary. 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 Flow Volume Checks

Leachate flow volumes will be recorded using flow meters. Data will be obtained and reported according to the location and frequency requirements as specified in Table 2-A, Sampling Collection Chart.

4.3 Equipment, Trip and Field Blanks

Trip blanks and field blanks are not required for Leachate sampling events (see the Quality Control Table in Attachment A)

In the event that non-dedicated sampling equipment is used, equipment blanks must be collected during the sampling event according to the Quality Control Table in Attachment A. New, disposable equipment does not require equipment blanks. If equipment blanks are required, they will be collected by pouring de-ionized or distilled water over or through the sampling equipment and collecting the rinsate into sample bottles.

4.4 Duplicate Samples

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

5.0 Leak Detection System Monitoring Field Procedures

The hazardous waste cells at Salzburg Landfill are equipped with secondary liners that are used as the Leak Detection System (LDS). The Leak Detection System Monitoring Field Procedures section includes guidelines for collecting samples from the secondary liner lift stations. General procedures and guidelines for all sampling media are discussed in the General Procedures and Guidelines section.

5.1 Sampling Procedures

Samples shall be obtained according to the location, frequency, parameters, and analytical requirements as specified in Table 2-A, Sample Collection Chart, and Table 2-B, Primary Chemical Constituent, Analytical Method, and Reporting Limit List.

Prior to sampling the lift stations, notify the landfill technical advisor that sampling is going to be conducted on that day. This notification is required to prevent triggering the automated alarms for the lift stations.

Secondary liner lift stations are sampled with disposable Teflon or polyethylene bailers, or by pump and controller (at the West LDS Drainage Header Cleanout only) for Cells 20-22. To obtain a sample using a bailer, the lift station cover is removed. The bailer will be slowly lowered into the lift station and allowed to fill with liquid. After filling, the bailer is retrieved through the opening. Sample bottles are filled directly from the bailer. The bailer and retrieval string shall be 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.

Samples from the LDS for cells 20-22 will be obtained from the header cleanout on the west side of Cell 20 using a dedicated submersible pump. No liquid should be stagnant in the discharge line, as the pump is not equipped with a check-valve. Prior to obtaining samples, sufficient volume will be purged to account for one volume of discharge tubing. Purge water will be containerized and discharged to a plant sewer manhole or catch basin at Salzburg Landfill.

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.

5.2 Equipment, Trip and Field Blanks

Trip blanks will be prepared according to the Quality Control Table in Attachment 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. Untested trip blanks will be discarded. Bottles shall be prepared for the parameters being sampled, according to the blank schedule in Attachment A, and the time they were prepared will be recorded on a field data sheet. Preservatives (if necessary) will be added 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 as appropriate. Trip blanks for liquid samples should be water free of constituents in question.

One field blank will be prepared according to the Quality Control Table in Attachment 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 water that is free of constituents in question.

In the event that non-dedicated sampling equipment is used, equipment blanks must be collected during the sampling event according to the Quality Control Table in Attachment A. New, disposable equipment does not require equipment blanks. If equipment blanks are required, they will be collected by pouring de-ionized or distilled water over or through the sampling equipment and collecting the rinsate into sample bottles.

5.3 Duplicate Samples

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

5.4 Establishing System Baseline

Before waste is placed in any new cell or unit, a baseline concentration for constituents will be established. The system baseline will be determined by collecting at least 8 representative samples from the system that will be analyzed for the constituents in 40 CFR 264 Appendix IX.

During the first year following issuance of the licensee, flow rates will be monitored on a monthly basis and at least eight background samples of liquid from the leak detection system sumps will be collected for any parameters for which backgrounds is unavailable. Within 60 days after the last background sample is collected, the licensee shall submit a report to the Division Chief for review and approval that includes: a complete tabular summary of the statistical results, a tabular summary of flow rates, a proposed program for monthly monitoring, and an update to the SAP that incorporates the proposed program.

Annually, results of the monitoring data shall be reviewed to determine if the background data should be updated for a program or sample location. If it is determined that background data should be updated for either individual sample locations or an entire program, the MDEQ should be notified of the intent to update the background data and revise the Performance Criteria. Once the background data is re-evaluated, the updated statistics will be sent to the MDEQ for review and approval. Any update to the background data and/or Performance Criteria will not require a license modification. Plant to update the background/statistics should be discussed in the annual report.

5.5 Flow Rate Screening Criteria

The purpose of a flow rate screening criterion is to assist in the early detection of a failure in the landfill cell primary liner, through evaluations of the underlying leak detection system (LDS). A flow rate screening criterion is used under the assumption that a breach in the primary liner should result in higher flow within the LDS. The flow rate screening criterion is an attempt to recognize unusual increases in flow from normal or baseline conditions.

The flow rate screening criterion (FRSC) for each LDS will be established as the 95% upper tolerance limit (UTL) of the previous 24 months on a rolling average basis. Measured flow for each cell will be tabulated monthly and compared to the FRSC. Response actions are included in Table 2-A.

6.0 Surface Water Monitoring Field Procedures

Stormwater at the landfill is discharged off site through the engineered conveyances shown in Figure 1. The Surface Water Monitoring Field Procedures section includes guidelines for collecting samples from those outfalls. General procedures and guidelines for all sampling media are discussed in the General Procedures and Guidelines section.

6.1 Sampling Procedures

Sampling will be completed according to the location, frequency, parameters, and analytical requirements specified in Table 2-A, Sample Collection Chart, and Table 2-B, Primary Chemical Constituent, Analytical Method, and Reporting Limit List. Complete a field data sheet, as described in Section 2.2.

During each quarter, if there is a rain event greater than or equal to 0.5 inches and flow is observed through the outfall, surface water grab samples will be obtained. Samplers will receive an automated e-mail notification that a rain event of 0.5 inches has occurred. Grab samples will be obtained from the flow actively discharging from the outfalls within 24 hours of accumulation of 0.5 inches of rain, if enough flow exists. Samples will be obtained by either using a sampling cup or by filling new sample bottles directly at the outfall. Once a sample has been obtained during a quarter, no further sampling will be required during that quarter.

6.2 Field Blanks

Field blanks will be prepared according to the Quality Control Table in Attachment 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. At the end of the sample event, field blanks will remain with the samples collected and will be analyzed as appropriate. Field blanks for liquid samples should be water that is free of constituents in question.

In the event that non-dedicated sampling equipment is used, equipment blanks must be collected during the sampling event according to the Quality Control Table in Attachment A. New, disposable equipment do not require equipment blanks. If equipment blanks are required, they will be collected by pouring de-ionized or distilled water over or through the sampling equipment and collecting the rinsate into sample bottles.

6.3 Duplicate Samples

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

6.4 Performance Criteria

Metals are screened against Michigan Rule 57 Final Chronic Values (FCVs) for surface waters, with the understanding that the ditches into which Salzburg Landfill discharges are not considered ‘Waters of the State’ as defined by R 324.3101(z). The FCV for copper value is calculated based on site-specific receiving water hardness. In September 2011, site-specific hardness was measured in the Tittabawassee River and surrounding waterways (Lingle Drain, Bullock Creek, etc). Samples were obtained via grab samples directly from surface water bodies selected for sampling. Surface water samples were obtained 1 foot below water surface and further than five feet from any shoreline to ensure they were free of any sediment or vegetation. Hardness values were measured as CaCO3 per U.S. EPA Method 130.2. A summary of results and a map indicating sampling locations are provided in Attachment E. The site-specific FCV for copper is calculated using the *Calculation of Generic Facility-Specific Part 201 Groundwater Surface Water Interface (GSI) Criteria for {G} Footnoted Hazardous Substances* spreadsheet, provided by DEQ via their website, last updated on September 28, 2012. The minimum value detected for hardness was used as it yields the most conservative screening criteria.

The trigger levels are provided for reference below:

Constituent	Trigger Level (ug/L)
Cobalt	100
Copper	17
Cyanide	5.2
Selenium	5
Vanadium	27

Constituent	UPL (ug/L)
TOC Site 001-B	18,300
TOC Site 001-D	15,900
TOC Site 001-E	15,800

7.0 Ambient Air Monitoring Program

The formal Ambient Air Monitoring Program that was approved in 2006 is included as Attachment F of this SAP.

7.1 Sampling Procedures

Ambient Air sampling will be completed according to the location, frequency, parameters, and analytical requirements specified in Table 2-A, Sampling Collection Chart, and Table 2-B, Primary Chemical Constituent, Analytical Method, and Reporting Limit List.

8.0 Soil Monitoring Program

Surface soil at the landfill is monitored on an annual basis to evaluate potential for release to the surface soils of waste constituents from the facility. The Soil Monitoring Program includes guidelines for sampling and reporting the data. The Soil Box Data Evaluation Procedure is included as Attachment H of this SAP for reference.

8.1 Sampling Procedures

Soil samples will be obtained according to the location, frequency, parameters and analytical requirements as specified in Table 2-A, Sample Collection Chart, and Table 2-C, Primary Chemical Constituent List for Soil Monitoring. Complete a field data sheet, as described in Section 2.2.

A composite of the top one inch of surface soil samples will be collected from fifteen equally proportioned, equidistant cores within the test soil box. Soils will be composited in a stainless steel bowl and homogenized by hand-mixing. All cores will be included in the composite to provide the sample for analysis. The cores will be obtained by moving around a three feet radius circle at fifteen inch intervals for a total of fifteen cores. A ‘hoop’ template will be used to indicate the spacing intervals around which the composite samples are collected. Soil samples will not be collected if the ground is frozen or during rain events.

8.2 Equipment, 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. Sample bottles shall be prepared for the parameters being sampled, according to the blank schedule in Attachment A, and the time they were prepared will be recorded on a field data sheet. Preservatives (if necessary) will be added 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 as appropriate. Laboratory testing of trip blanks is optional, and may be conducted if unusual or unexpected results are obtained during laboratory testing of soil samples. 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).

8.3 Duplicate Samples

Field duplicate samples will be obtained for environmental monitoring projects according to the Quality Control Table in Attachment 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
Pesticides/PCBs	Pesticides & PCBs 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	Poly or Glass	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	Glass Teflon-lined cap	Sulfuric Acid to a pH of <2	28 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

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

Table 2-A. Sample Collection Chart

Identifier	Site Information	Frequency	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response	Reporting
Salzburg Landfill Groundwater Wells Monitoring							
4829	Till Clay Well	Semi- Annual (2nd and 4th qtrs.)	pH, Temp, Cond, & SWL	VOA, EOA, TOC, DISSOLVED METALS (filtered), ANIONS	See Table 2-B. Primary Chemical Constituent List Tracking Parameters used for trend evaluation: Sodium, Potassium, Iron, Magnesium, Calcium, Chloride, Bicarbonate (HCO3), Carbonate (CO3), Sulfate (SO4) Primary Chemical Constituent List (Table 2-B) will be evaluated and updated every 5 years beginning in 2010, based on the annual and every 5 year leachate analysis. MW-4832 is to be analyzed for bromide in addition to Primary Chemical Constituents and Tracking Parameters.	**Evaluation:** Within 60 days of the sampling event the licensee shall determine if statistically significant increase has occurred compared to the background levels for each primary parameter listed in Table 2-B of this SAP. Concentrations of VOAs and EOAs are compared to their respective reporting limits (RLs). Concentrations of metals and anions are statistically evaluated using Upper Prediction Limits (UPLs) (See Table 5 and Appendix I). Tracking Parameters: Stiff diagrams or other geochemical graphical representations will be developed and reviewed annually. Sudden and/or unexpected changes in TOC may be further investigated, depending on results of other routine monitoring. **Response:** *If concentrations of VOAs or EOAs are less than the RL; and metals and anions are less than their respectiveUPLs, in all wells, then the sample period is over.* *If the concentration of a constituent in any well is equal to or greater than the respective RL orUPL then the following actions must take place:* •Notify the Chief of the MDEQ, Office of Waste Management and Radiological Protection (WMRP) within one business day. •Schedule and perform a confirmation sample of the well(s), for the constituent(s) in question as soon as possible and within 30 days of the notification, taking at least four replicates. •If the statistically significant increase is confirmed (2 or more replicate samples are at or above the RL or UPL), notify the Chief of the MDEQ, WMRP within one business day and provide written notification within 7 business days. •As soon as possible, sample the groundwater in the well where the statistically significant increase occured and other GlacialTtill and Regional Aquifer detection monitoring wells within 1,000 feet of the affected well and determine the concentration of all parameters identified in Appendix IX of 40 CFR, Part 264, that are present in the groundwater. **Develop Background Data:** UPLs will be developed for metals and anions without a UPLs after a minimum of eight results have been collected to establish a background dataset. Annually, results of monitoring data will be reviewed to determine if the background data and/or Performance Criteria should be updated. If Perforamnce Crtieria are updated, the new criteria will need to be reviewed and approved by the MDEQ.	Data and statistical analyses will be submitted within 60 days after the end of the quarter in which the samples were analyzed (in the Quarterly Monitoring Reports). An evaluation that includes a descriptive summary of tracking parameter testing results is required by Condition IV.A.4.(f). Tracking parameter constituents results and/or trends for wells 4832, 4833, 4834, over time will be specifically discussed to evaluate groundwater quality with respect to historic dust management at the facility in the Annual report. Hydraulic monitoring evaluation inlcuding hydrographs and Tracking parameter Stiff diagrams will be submitted in Annual report.
4830	Till Clay Well						
4831	Till Clay Well						
4832	Till Clay Well						
4833	Till Clay Well						
4834	Till Clay Well						
4836	Till Sand Well						
4837	Till Sand Well						
4838	Till Clay Well						
4839	Till Clay Well						
4840	Till Clay Well						
5949	Till Clay Well						
5780	Till Clay Well						
4666	Till Clay Well						
4667	Till Clay Well						
5213	Till Clay Well						
5594	Till Clay Well						
3013*	Regional Aquifer Well						
2708*	Regional Aquifer Well						
3011*	Regional Aquifer Well						

Table 2-A. Sample Collection Chart

Identifier	Site Information	Frequency	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response	Reporting
3138	Regional Aquifer Well	Semi-Annual (2nd and 4th qtrs.)	SWL only			**Evaluation:** Use static water level data to develop a contour map of the piezometric surface and determine the hydraulic gradient in the monitored zone(s). *Calculate the groundwater flow rate *Create hydrographs and/or diagrams of data to show the horizontal and vertical components of the monitored zone(s).	Hydraulic gradient evaluation of the Regional Aquifer wells will be submitted in the Annual Report
3137	Regional Aquifer Well						
3858	Regional Aquifer Well						
3859	Regional Aquifer Well						
3860	Regional Aquifer Well						
3861	Regional Aquifer Well						
3862	Regional Aquifer Well						
3065	Regional Aquifer Well						
3066	Regional Aquifer Well						
2745	Regional Aquifer Well						
8614B	Regional Aquifer Well						
8264I	Regional Aquifer Well						
8265G	Regional Aquifer Well						
C9-296	Regional Aquifer Well						

* Wells are used for both chemical and hydraulic monitoring purposes

Table 2-A. Sample Collection Chart

Identifier	Site Information	Frequency	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response	Reporting
Salzburg Landfill Leachate Monitoring							
Cell 1 - 5	Closed Hazardous Waste Cells/ Lift Station 2A	Chemical Monitoring: Active Cells - annually (dependant upon flow); Closed Cells - every 5 years beginning in 2010. Flow volume checks: Active Cells - monthly; Closed Cells - quarterly	pH, Temp, Cond	VOA, EOA, TOC, DISSOLVED METALS (filtered), ANIONS, dioxins and furans	40 CFR, Part 264, Appendix IX list; 17 2005 World Health Organization Toxic Equivalency Factor (WHOTEF) dioxin and furan isomers and total tetra- through octa-dioxin and furan congener groups	**Leachate Chemical Monitoring** Data will be used for the purposes of evaluating Table 2-B, Primary Chemical Constituent List for the Groundwater Monitoring, Leak Detection System Monitoring and Surface Water Monitoring programs. If new constituents are found in the leachate they will be evaluated based on frequnecy of detection, the concentrations detected, the risk to human health, and the mobility of the constituent. **Quarterly Flow Volume Monitoring** The licensee shall tabulate and monitor the volume of leachate pummped from each leachate removeal lift stations and the facility and record the volume by month. This data will be reported quarterly in the Quarterly Monitroing Reports. **Annual Leachate Evaluations:** *The annual leachate evaluation shall include; *Volume of leachate pumped from each leachate removeal station *A graphical comparison between leachate quantities pumped/generated from each leachate removal lift station during the reported year and previous years *A description of changes in leachate quantities including system performance evaluation or cause for changes.	All leachate data collected during the year will be submitted in the Annual report. All information included in the Annual leachate evaluation will be submitted in the annual report as well as the quartery leachate flow volume evaluation. Flow volume data will be reported quarterly.
Cell 6 - 8	Closed Hazardous Waste Cells/ Lift Station 5						
Cell 9 - 10	Closed Hazardous Waste Cells/ Lift Station 7						
Cell 11-12	Closed Hazardous Waste Cells/ Lift Station 9						
Cell 13-14	Closed Hazardous Waste Cells/ Lift Station 13						
Cell 15-16	Closed Hazardous Waste Cells/ Lift Station 19						
Cell 17-19	Closed Hazardous Waste Cells/ Lift Station 23						
Cell 20-22	Active Hazardous Waste Cells/ Lift Station 25						
Cell 38-39	Closed Non-Hazardous Cells/ Lift Station 38						
Cell 40-43	Closed Non-Hazardous Cells/ Lift Station 22						

Table 2-A. Sample Collection Chart

Salzburg Landfill Leak Detection System (LDS) Monitoring

Identifier	Site Information	Frequency	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response	Reporting
Cell 3 - 5	Lift Station 3A	Quarterly	pH, Temp, Cond	VOA, EOA, TOC , DISSOLVED METALS (filtered), ANIONS	See Table 2-B. Primary Chemical Constituent List Primary Tracking parameters: all metals (dissolved) and TOC Primary Chemical Constituent List will be evaluated and updated every 5 years beginning in 2010, based on the annual and 5 year leachate analysis.	Within 60 days of the sampling event the licensee shall determine if statistically significant increase has occurred compared to the background levels for each primary parameter listed in Table 2-B of this SAP. **Evaluation** Within 60 days of the sampling event the licensee shall determine if there is a statistically significant increase in Primary Constituents listed in Table 2-B. For the non-naturally ocurring (VOCs and EOAs) Primary Chemical Constituents listed in Table 2-B, any occurence above the RL for constituent(s) shall be considered statistically significant. For metals and anion constituents, a statistically significant increase shall be determined by compasrison to established UPLs. TOC will be evaluated as a tracking parameter and seperately from the other constituents listed in Table 2-B of this SAP. TOC concentrations will be qualitatively evaluated using time-series charts. If sudden and/or unexpected changes occur TOC may be further investigated, depending on results of other routine monitoring. **Response:** If the non-naturally occuring (VOCs and EOAs) Primary Chemical Constituents listed in Table 2-B are less than the RL; and metals and anions are less that the established UPLs in all samples, then sample period is over. If the the non-naturally occuring Primary Chemical constituents listed in Table 2-B are equal to or greater that the RL; or metals and anions are greater than the establsihed UPLs in any sample, then the result is a considered statistically significant increase and the the following actions must take place: •Notify the Chief of the MDEQ, Office of Waste Management and Radiological Protection (WMRP) immediately. •Schedule and perform a confirmation sample for the constituent(s) in question as soon as possible, taking at least four replicate samples; or if a Table 2-B tracking parameter is detected above its UPL you can do the following: *Resample for both primary constituents and tracking parameters in the affected lift station(s) to confirm if a statistically significant increase for primary constituents exists. *If the licensee confirms that a statistically significant increase in a primary constituent exists, the actions identified in Condition IV.F.8 must be taken. •In the event that the affected lift station(s) has been resampled for primary constituents pursuant to Condition IV.F.11.(b). and a statistically significant increase in primary constituents is not identified, the licensee shall provide the results of the resampling within 30 days of sampling and may propose a change to the background for tracking parameters or an alternate means to perform the evaluation required by Condition IV.F.11 for Office review and approval. •If the statistically significant increase is confirmed (two of the confirmation samples are at or above the respective RL or UPL) the following actions must take place: *Notify the Chief of the MDEQ, WMRP within one business day by contacting the office project geologist or permit engineer for the site and provide written notification within five days of the intial contact in accordance with Condition II.I.5 of this license. *Begin immediate action to implement the current contingency plan, as appropriate. *Determine, within 30 days of notification, whether a failure in the liner system has occurred. *Provide the Office Chief, or his or her designee, with weekly updates and written reports every two weeks regarding the process to date in determining the cause of the statistically significant increase and the results of all samples from environmental monitoring conducted by the license. If a failure in the LDS has occurred, implement Operating License Condition IV.F.9. *(contined on next page)*	Analytical results and results of statistical evaluation will be submitted to the MDEQ within 60 days of the completed sampling event. All data will be submitted within 60 days after the end of the quarter in which samples were analyzed (in the Quarterly Monitoring Report).
Cell 6 - 8	Lift Station 6	Quarterly					
Cell 9 - 10	Lift Station 8						
Cell 11-12	Lift Station 11						
Cell 13-14	Lift Station 12						
Cell 15-16	Lift Station 20						

Table 2-A. Sample Collection Chart

Identifier	Site Information	Frequency	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response	Reporting
Salzburg Landfill Leak Detection System (LDS) Monitoring (continued)							
Cell 17-19	Lift Station 21	Quarterly	pH, Temp, Cond	VOA, EOA, TOC , DISSOLVED METALS (filtered), ANIONS	See Table 2-B. Primary Chemical Constituent List Tracking parameters: all metals (dissolved) and TOC Primary Chemical Constituent List will be evaluated and updated every 5 years beginning in 2010, based on the annual and 5 year leachate analysis.	*(continued from above)* **Flow Rate Screening Criteria (FRSC)** Measured flow for each cell will be tabulated monthly and compared to the FRSC for all monitored LDS cells. **FRSC Response Action** If monthly flow exceedes the FRSC: •Verbally notify the Chief of the MDEQ, WMRP within five business days of the determination; •Schedule and perform a confirmation resample of the cell(s), for the constituent(s) in Table 2-B; •Results of re-sampling will be evaluated and response will be according to the description above. If the monthly flow continues to exceed the established FRSC, and a statistically significant increase has not been detected, further investigation will be performed to determine if the FRSC should be revised for that LDS. **Develop Background Data:** UPLs will be developed for Metals and Anions using a minimum of eight results to establish a background dataset. Annually, results of monitoring data will be reviewed to determine if the background data and/or Performance Criteria should be updated. If Perforamnce Crtieria are updated, the new criteria will need to be reviewed and approved by the MDEQ. **Develop FRSC:** For future cells, a FRSC will be established within 24 months after the use of the new cells begin. The FRSC for each LDS will be established as the 95% upper tolerance limit (UTL) of the previous 24 months on a rolling average basis.	same as above
Cell 20-22 West LDS Drainage Header Cleanout	Active Cells/ West LDS Drainage Header Cleanout	Quarterly					
Cells 20-22	Active Cells/Lift Station 26	Monthly flow volumes only		No chemical analysis required, Cells are monitored via the Cleanout Header (see above)	None	Compare monthly flow volumes to the FRSC, as described above.	
Future Cells		Eight samples collected prior to placing waste in the cell.	pH, Temp, Cond	VOA, EOA, TOC, DISSOLVED METALS (filtered), ANIONS, DIOXINS AND FURANS	40 CFR, Part 264, Appendix IX list; 17 2005 Worl Health Organization Toxic Equivalency Factor (WHOTEF) dioxin and furan isomers and total tetra- through octa-dioxin and furan congener groups	The background sampling period shall not extend beyond one year following the initial operation date. Background shall be calcualted by inlcuding the collection of a series of atleast four samples from each leak detection sump prior to placement of waste.	

Table 2-A. Sample Collection Chart

Identifier	Site Information	Frequency	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response	Reporting
Salzburg Landfill Surface Water Monitoring							
001-B	Ditch Water	Quarterly, dependent on rainfall	pH, Temp, Cond,	TOC, TOTAL METALS (unfiltered), ANIONS	See Metals and Anions section of Table 2-B. Primary Chemical Constituent List Tracking parameters: TOC Primary Chemical Constituent List will be evaluated and updated every 5 years beginning in 2010, based on the annual and 5 year leachate analysis.	**Evaluation:** Within 60 days of each sampling event, the license shall determine if a statistically significant increase has occured compared to baseline levels for each parameter. Duplicate samples shall be collected from each sampling location. Initially, analyze only one of the two samples, and hold the duplicate sample pending the results of the initial sample. TOC will be compared to an UPL developed for each sampling location. For metals and anions, the results from each sample location will be screened against Michigan Rule 57 Final Chronic Values for surface water. If a result exceeds Rule 57 Criteria it is considered a statistically significant increase. If a statistically significant increase is detected in a monitoring parameter(s), the duplicate sample shall be analyzed for confirmation purposes. The 1 of 2 retesting strategy is used to confirm an statistically significant increase. **Response:** If a statistically significant increase in TOC metals or anions is confirmed, notify MDEQ within one business day and in writing within seven (7) days. Within 30 days of the statistically significant increase determine whether a discharge to surface waters is occurring, determine the source, and take immediate steps to eliminate and prevent any such discharge.	Data and trend charts will be submitted within 60 days after the end of the quarter in which the samples were analyzed (in the Quarterly Monitoring Report).
001-D	Ditch Water						
001-E	Ditch Water						

Table 2-A. Sample Collection Chart

Identifier	Site Information	Frequency	Field Parameters	Analysis Parameters	Specific Constituents	Data Evaluation/Response	Reporting
Salzburg Landfill Ambient Air Monitoring							
914	Air Monitoring Station	Every 6 days	Total Solids Particulate (TSP)	NONE	NONE	**Evaluation:** The data evaluation is performed by Results compared to National Ambient Air Quality Standard Limits to ensure results are within acceptable concentrations.	Data will be summarized and submitted within 60 days after the end of the quarter in which the samples were analyzed, to the Air Quality Division (placeholder in the Quarterly Monitoring Report which is submitted to the Chief of WMRP).
917	Air Monitoring Station						
918	Air Monitoring Station						
Salzburg Landfill Soil Monitoring							
SLFSB-01	Soil Box	Annually	DIOXINS AND FURANS	17 World Health Organization Toxic Equivalency Factor (WHOTEF) dioxin and furan isomers and total tetra- through octa-dioxin and furan congener groups	See Table 2-C. Primary Chemical Constituent List for Soil Monitoring	**Evaluation:** Within 60 days of the sampling event the licensee shall determine if statistically significant increase has occurred compared to the background levels for each primary parameter listed in Table 2-C of this SAP. Results will be evaluated according to the Salzburg Landfill Soil Monitoring Data Evaluation Plan, submitted on November 21, 2011 and approved **on___** (See attachment H).	Data will be submitted within 60 days after the end of the quarter in which samples were analyzed (in the Quarterly Monitoring Report).
SLFSB-02	Soil Box						
SLFSB-03	Soil Box						

Table 2-B. Primary Chemical Constituent List for Groundwater Protection and Leak Detection System Monitoring [1]

Volatile Organics

- Acetone
- Acetonitrile; Methyl cyanide
- Benzene
- Bromochloromethane
- Carbon tetrachloride
- Chlorobenzene
- Chloroform
- 1,2-Dibromoethane; Ethylene dibromide
- m-Dichlorobenzene
- o-Dichlorobenzene
- p-Dichlorobenzene
- 1,1-Dichloroethane
- 1,2-Dichloroethane; Ethylene dichloride
- 1,1-Dichloroethylene; Vinylidene chloride
- trans-1,2-Dichloroethylene
- 1,2-Dichloropropane
- Cis-1,3-Dichloropropene
- 1,4-Dioxane
- Ethylbenzene
- 2-Hexanone
- Isobutyl alcohol
- Methyl chloride; Chloromethane
- Methylene bromide; Dibromomethane
- Methylene chloride; Dichloromethane
- Methyl ethyl ketone; MEK
- 4-Methyl-2-pentanone; Methyl isobutyl ketone
- Styrene
- 1,1,2,2-Tetrachloroethane
- Tetrachloroethylene; Tetrachloroethene
- Toluene
- 1,1,1-Trichloroethane; Methylchloroform
- Trichloroethylene; Trichloroethene
- Trichlorofluoromethane
- Vinyl chloride
- o-Xylene
- m-Xylene
- p-Xylene

Semi-volatile Organics

- Aniline
- Benzyl alcohol
- 2-Chlorophenol
- 3-Chlorophenol
- p-Chloro-m-cresol
- o-Cresol
- m-Cresol
- p-Cresol
- 2,4-D; 2,4-Dichlorophenoxyacetic acid
- Hexachlorobenzene
- Bis (2-chloroisopropyl) ether
- 2,4-Dichlorophenol
- 2,6-Dichlorophenol
- Diethyl phthalate
- Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol
- Hexachlorophene
- o-Nitrophenol
- Pentachlorophenol
- 2-Picoline
- 2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid
- 2,3,4,6-Tetrachlorophenol
- 1,2,4-Trichlorobenzene
- 2,4,5-Trichlorophenol
- 2,4,6-Trichlorophenol
- Naphthalene
- 4-Nitroquinoline 1-oxide
- Phenol
- Phorate
- Pyridine
- Silvex; 2,4,5-TP

o- and p-dichlorobenzene removed

Metals and Anions [2]

- Cobalt†
- Copper†
- Selenium†
- Vanadium†
- Cyanide
- Total Organic Carbon†

---

[1] Refer to Attachment B for analytical methods and reporting limits.

[2] Surface Water Monitoring includes only metals and anions analysis, with total organic carbon monitored as a Tracking Parameter.

† Primary Tracking Parameter for Leak Detection System Monitoring Program.

Table 2-C. Primary Chemical Constituent List for Soil Monitoring[1]

Common Name [2]

2378-TCDD
Total TCDD
12378-PeDD
Total PeCDD
123478-HxCDD
123678-HxCDD
123789-HxCDD
Total HxCDD
1234678-HpCDD
Total HpCDD
OCDD
2378-TCDF
Total TCDF
12378-PeCDF
23478-PeCDF
Total PeCDF
123478-HxCDF
123678-HxCDF
234678-HxCDF
123789-HxCDF
Total HxCDF
1234678-HpCDF
1234789-HpCDF
Total HpCDF
OCDF

[1] Refer to Attachment B for analytical method and reporting limits.

[2] This category contains congener chemicals, including tetrachlorodibenzofurans, pentachlorodibenzofurans, and hexachlorodibenzofurans.

Table 3. Well Purging Information

	Identifier	Pump Type	Purge Method	Containerize Purge Water?	Min. Volume	Equipment Needs
Groundwater Monitoring						
	4829	submersible centrifugal or appropriate alternative	fixed volume	no	3 well volumes	controller; generator; SWL meter; multi-probe meter; flow through cell, as necessary
	4830					
	4831					
	4832					
	4833					
	4834					
	4836					
	4837					
	4838					
	4839					
	4840					
	5949					
	5780					
	4666					
	4667					
	5213					
	3011					
	3013					
	5594					
	2708					

Table 4. Monitoring Well Specifications

Well ID	X	Y	Casing Elevation	Top of Screen Elevation	Bottom Elevation	Well Depth	Formation Monitored
4829[1]	13158100.0	767954.3	625.70	584.7	581.7	44.0	Till Clay
4830[1]	13159804.4	765850.9	625.14	585.2	582.1	43.0	Till Clay
4831[1]	13160154.8	765113.9	627.07	592.9	587.9	39.0	Till Clay
4832[1]	13165636.7	760038.8	627.40	598.5	595.0	32.4	Till Clay
4833[1]	13168179.5	759133.2	625.86	584.9	581.9	44.0	Till Clay
4834[1]	13167884.9	758988.4	625.38	584.4	581.4	44.0	Till Clay
4836[1]	13168086.3	758347.4	627.10	574.1	564.1	63.0	Till Sand
4837[1]	13168265.5	758391.7	630.38	575.4	562.4	68.0	Till Sand
4838[1]	13168995.4	757344.8	630.99	591.0	588.0	43.0	Till Clay
4839[1]	13169604.7	756817.2	629.32	589.3	586.3	43.0	Till Clay
4840[1]	13170412.2	757089.3	631.00	590.0	587.0	44.0	Till Clay
5949[1]	13170477.9	757492.7	628.54	567.9	557.9	70.6	Till Clay
5780[1]	13170530.5	758091.3	628.81	568.8	558.8	70.0	Till Clay
4666[1]	13170534.4	758774.3	628.27	568.3	558.3	70.0	Till Sand
4667[1]	13169533.7	759199.7	623.55	563.6	553.6	70.0	Till Clay
5213[1]	13170333.6	759202.3	624.26	586.3	581.3	43.0	Till Clay
5594[1]	13169190.2	759203.3	625.07	579.6	576.6	48.5	Till Clay
2708[1]	13168970.9	759204.3	625.57	487.6	482.6	143.0	Regional Aquifer
3011[1]	13168498.4	759184.8	627.35	507.4	502.4	125.0	Regional Aquifer
3013[1]	13170043.2	756661.7	623.87	430.7	427.7	196.2	Regional Aquifer
3137[2]	13169488.5	757153.6	628.98	433.98	428.98	200	Regional Aquifer
3138[1]	13167529.24	758856.5043	641.88	415.0	412.0	227.0	Regional Aquifer
3858[2]	13170528.0	759029.6	616.14	433.1	428.1	188.0	Regional Aquifer
3859[2]	13166220.3	758643.4	630.70	385.7	380.7	250.0	Regional Aquifer
3860[4]	13164101.0	767674.8	627.56	449.6	444.6	183.0	Regional Aquifer
3861[2]	13170591.6	763286.0	632.14	370.1	365.1	267.0	Regional Aquifer
3862[2]	13158379.4	764451.4	625.19	427.2	422.2	203.0	Regional Aquifer
3065[2]	13160765.0	766500.8	602.45	382.5	377.5	225.0	Regional Aquifer
3066[2]	13161183.2	764799.7	617.56	457.6	452.6	165.0	Regional Aquifer
2745[2]	13164800.7	765573.0	609.64	489.6	486.6	123.0	Regional Aquifer
8614-A[2]	13164219.2	761810.1	632.50	366.5	361.5	271.0	Regional Aquifer
8264-I[3]	13160396.4	761769.8	623.64	373.6	368.6	255.0	Regional Aquifer
8265-G[3]	13155694.3	761057.1	624.97	410.0	405.0	220.0	Regional Aquifer
C9-296[4]	13157674.6	763861.0	620.57	329.6	324.6	296.0	Regional Aquifer

[1] Well Casings surveyed by Wade-Trim 2012

[2] Well Casings surveyed by URS in 2011

[3] Well Casings surveyed by URS in 2012

[4] Well casing surveyed by URS in 2013

XY coordinates are in State Plane US Feet

Table 5. Grounwater Monitoring Statistics

Media	Location	Constituent	Unit	No. of Outliers / Earlier Samples Excluded	No. of Samples Used	Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	First Sample Date	Last Sample Date	Mann-Kendall S Statistic	p-value	Trend Test Result	Normality Test p-value	Distribution	*K* -Multiplier	UPL with Retesting Strategy	Note
GW	MW-2708	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-2708	Copper	ug/L	0	54	26%	1.51	1.76	0.65	6	0.5	3	3/6/1987	10/31/2012	-131	0.091	No Trend	-	Non-parametric	-	**6**	
GW	MW-2708	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-2708	Selenium	ug/L	0	8	0%	-	-	-	-	1	1	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-2708	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-3011	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/28/2009	10/30/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-3011	Copper	ug/L	0	53	19%	1.19	1.18	1	4	0.5	3	3/6/1987	10/30/2012	-	-	-	-	Non-parametric	-	**4**	
GW	MW-3011	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/28/2009	10/30/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-3011	Selenium	ug/L	0	8	0%	-	-	-	-	1	1	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-3011	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/28/2009	10/30/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-3013	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/28/2009	10/29/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-3013	Copper	ug/L	0	26	19%	0.784	0.901	1.1	3.9	0.5	2.29	4/18/2000	10/29/2012	-	-	-	-	Non-parametric	-	**3.9**	
GW	MW-3013	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/28/2009	10/29/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-3013	Selenium	ug/L	0	8	0%	-	-	-	-	1	1	4/28/2009	10/29/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-3013	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/28/2009	10/29/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4666	Cobalt	ug/L	0	8	100%	10.2	3.5	5.61	15.7	-	-	4/28/2009	10/31/2012	4	0.355	No Trend	0.280	Normal	3.4	**22.0**	
GW	MW-4666	Copper	ug/L	13	34	26%	0.834	1.134	0.65	5.6	0.5	1	4/30/1996	10/31/2012	27	0.280	No Trend	-	Non-parametric	-	**5.6**	
GW	MW-4666	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4666	Selenium	ug/L	0	8	0%	-	-	-	-	1	1	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4666	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4667	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4667	Copper	ug/L	13	34	29%	0.759	0.747	0.5	4.2	0.5	1	4/30/1996	10/31/2012	-73	0.053	No Trend	-	Non-parametric	-	**4.2**	
GW	MW-4667	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4667	Selenium	ug/L	0	7	0%	-	-	-	-	1	1	4/28/2009	10/31/2012	-	-	-	-	-	-	**-**	Baseline development in progress
GW	MW-4667	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4829	Cobalt	ug/L	0	8	13%	2.75	1.92	7	7	0.032	5	4/28/2009	12/12/2012	-	-	-	-	Non-parametric	-	**7**	
GW	MW-4829	Copper	ug/L	1	66	29%	2.15	2.60	0.52	10	0.5	3	2/23/1982	12/12/2012	-88	0.260	No Trend	-	Non-parametric	-	**10**	
GW	MW-4829	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/28/2009	12/12/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4829	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	12/12/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4829	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/28/2009	12/12/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4830	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4830	Copper	ug/L	1	67	27%	2.49	3.25	0.65	12.2	0.5	3	2/23/1982	10/31/2012	9	0.477	No Trend	-	Non-parametric	-	**12.2**	
GW	MW-4830	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4830	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4830	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4831	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4831	Copper	ug/L	0	7	14%	-	-	1.4	1.4	0.572	1	10/20/2010	10/29/2013	-	-	-	-	-	-	***replaced 9/2010***	under development thru 2014
GW	MW-4831	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4831	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4831	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4832	Cobalt	ug/L	0	14	0%	-	-	-	-	0.032	5	4/11/2006	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4832	Copper	ug/L	1	68	29%	2.47	3.19	0.78	13	0.5	3	2/23/1982	10/31/2012	-39	0.398	No Trend	-	Non-parametric	-	**13**	
GW	MW-4832	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4832	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4832	Vanadium	ug/L	0	14	0%	-	-	-	-	0.142	5	4/11/2006	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4833	Cobalt	ug/L	0	14	0%	-	-	-	-	0.032	5	4/11/2006	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4833	Copper	ug/L	1	68	40%	3.11	3.90	0.55	13.8	0.5	3	2/23/1982	10/31/2012	-126	0.191	No Trend	-	Non-parametric	-	**13.8**	
GW	MW-4833	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4833	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4833	Vanadium	ug/L	0	14	0%	-	-	-	-	0.142	5	4/11/2006	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4834	Cobalt	ug/L	0	14	0%	-	-	-	-	0.032	5	4/11/2006	10/30/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4834	Copper	ug/L	0	70	36%	2.23	2.42	0.6	10	0.5	3	2/23/1982	10/30/2012	-102	0.231	No Trend	-	Non-parametric	-	**10**	
GW	MW-4834	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/27/2009	10/30/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4834	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	10/30/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4834	Vanadium	ug/L	0	14	0%	-	-	-	-	0.142	5	4/11/2006	10/30/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4836	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/27/2009	10/29/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4836	Copper	ug/L	1	67	27%	1.77	1.68	0.5	7.3	0.5	3	2/23/1982	10/29/2012	9	0.475	No Trend	-	Non-parametric	-	**7.3**	
GW	MW-4836	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/27/2009	10/29/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4836	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	10/29/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4836	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/27/2009	10/29/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4837	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4837	Copper	ug/L	1	68	24%	1.78	2.00	0.51	9	0.5	3	2/23/1982	10/31/2012	-	-	-	-	Non-parametric	-	**9**	
GW	MW-4837	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4837	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4837	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4838	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4838	Copper	ug/L	2	66	15%	4.05	2.28	0.58	7	0.5	3	2/23/1982	10/31/2012	-	-	-	-	Non-parametric	-	**7**	
GW	MW-4838	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4838	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4838	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects

Table 5. Grounwater Monitoring Statistics

Media	Location	Constituent	Unit	No. of Outliers / Earlier Samples Excluded	No. of Samples Used	Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	First Sample Date	Last Sample Date	Mann-Kendall S Statistic	p-value	Trend Test Result	Normality Test p-value	Distribution	*K*-Multiplier	UPL with Retesting Strategy	Note
GW	MW-4839	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4839	Copper	ug/L	1	67	9%	1.19	1.29	0.74	10	0.5	3	2/23/1982	10/31/2012	-	-	-	-	Non-parametric	-	**10**	
GW	MW-4839	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4839	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4839	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4840	Cobalt	ug/L	0	8	13%	3.13	2.91	10	10	0.032	5	4/28/2009	10/31/2012	-	-	-	-	Non-parametric	-	**10**	
GW	MW-4840	Copper	ug/L	3	64	5%	1.43	0.40	1.2	1.9	0.5	3	2/23/1982	10/31/2012	-	-	-	-	Non-parametric	-	**3**	
GW	MW-4840	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4840	Selenium	ug/L	0	23	0%	-	-	-	-	1	10	2/23/1982	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-4840	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5213	Cobalt	ug/L	0	24	17%	3.89	3.57	9.88	14	0.032	5	4/18/2000	10/31/2012	-	-	-	-	Non-parametric	-	**14**	
GW	MW-5213	Copper	ug/L	0	43	56%	2.07	2.42	0.5	10	0.5	3	9/24/1992	10/31/2012	-97	0.137	No Trend	-	Non-parametric	-	**10**	
GW	MW-5213	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/27/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5213	Selenium	ug/L	0	8	0%	-	-	-	-	1	1	4/27/2009	10/30/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5213	Vanadium	ug/L	0	24	4%	1.98	0.82	3	3	0.142	5	4/18/2000	10/31/2012	-	-	-	-	Non-parametric	-	**3**	
GW	MW-5594	Cobalt	ug/L	2	21	14%	12.00	1.73	11	14	5	5	4/18/2000	10/30/2012	-	-	-	-	Non-parametric	-	**14**	
GW	MW-5594	Copper	ug/L	4	24	8%	0.92	0.40	0.64	1.2	0.5	1	11/13/1996	10/30/2012	-	-	-	-	Non-parametric	-	**1.2**	
GW	MW-5594	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/27/2009	10/30/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5594	Selenium	ug/L	0	8	0%	-	-	-	-	1	1	4/27/2009	10/30/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5594	Vanadium	ug/L	0	23	4%	2.09	1.17	6	6	0.142	5	4/18/2000	10/30/2012	-	-	-	-	Non-parametric	-	**6**	
GW	MW-5780	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5780	Copper	ug/L	0	31	26%	0.650	0.561	0.64	2.6	0.5	1	12/10/1997	10/31/2012	-7	0.430	No Trend	-	Non-parametric	-	**2.6**	
GW	MW-5780	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5780	Selenium	ug/L	0	8	0%	-	-	-	-	1	1	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5780	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5949	Cobalt	ug/L	0	8	0%	-	-	-	-	0.032	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5949	Copper	ug/L	1	26	15%	0.521	0.284	0.5	1.4	0.5	1	10/12/1999	10/31/2012	-	-	-	-	Non-parametric	-	**1.4**	
GW	MW-5949	Cyanide	ug/L	0	8	0%	-	-	-	-	3.6	5	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5949	Selenium	ug/L	0	8	0%	-	-	-	-	1	1	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects
GW	MW-5949	Vanadium	ug/L	0	8	0%	-	-	-	-	0.142	2	4/28/2009	10/31/2012	-	-	-	-	-	-	**RL**	All baseline data are nondetects

Table 6. Statistics for Surface Water

Analyte	Units	Site	Action Trigger Level	Sample Size	% Nondetect	Mean	Standard Deviation	Coefficient of Variation	Minimum	Lower Quartile	Median	Upper Quartile	Maximum	Distribution
Total Organic Carbon	ug/L	Site B	18,300	38	0%	12984	3766	0.290	5700	10625	12650	15250	24000	Normal
Total Organic Carbon	ug/L	Site D	15,900	41	0%	9430	4335	0.460	4260	5700	8950	12200	20200	Lognormal
Total Organic Carbon	ug/L	Site E	15,800	41	0%	9600	4406	0.459	1700	6135	9060	11900	21000	Normal

Constituent	Units	Outfall(s)	Rule 57 Criteria
Cobalt	ug/L	B,D & E	100
Copper	ug/L	B,D & E	17
Cyanide	ug/L	B,D & E	5.2
Selenium	ug/L	B,D & E	5
Vanadium	ug/L	B,D & E	27

Notes:

╪ Total organic carbon data from 2000-2011 are used in this analysis as the intrasite baseline data.

╪ A total organic carbon outlier (collected 11/4/2003) is excluded from all three sites.

╪ TOC is a tracking parameter. TOC will be evaluated for trends and significant changes but its not considered a primary constituent. If a trend or significant change is identified, an investigation into the cause of the occurence will be performed.

╪ The site-specific Michigan Rule 57 Final Chronic Value for copper is calculated using the Calculation of Generic Facility-Specific Part 201 Groundwater Surface Water Interface (GSI) Criteria for {G} Footnoted Hazardous Substances spreadsheet, provided by DEQ via their website, last updated on September 28, 2012. The minimum value detected for hardness was used as it yields the most conservative screening criteria. See Attachment E for more information.

Table 7. Leak Detection System Monitoring Statistics

							Summary Statistics						Sample Date Range		Shapiro-Wilk W Test		Upper	Current Trend Analysis				
Media	Location	Constituent	Unit	No. of Outliers / Earlier Samples	No. of Samples Used	Detection Rate	Mean	Std Dev	Min Detected Value	Max Detected Value	Min RL of NDs	Max RL of NDs	First Sample Date	Last Sample Date	Mann-Kendall S Statistic	p-value	Trend Test Result	Normality Test p-value	Distribution	*K*-Multiplier	UPL with Retesting Strategy	Note
LDS	Cells 11-12	Cobalt	ug/L	0	15	33%	4.12	2.51	5.53	9.12	5	5	4/21/2009	11/17/2011	-20	0.129	No Trend	-	Non-parametric	-	9.12	
LDS	Cells 11-12	Copper	ug/L	0	15	73%	1.14	0.47	1.03	2.14	1	1	4/21/2009	11/17/2011	11	0.308	No Trend	-	Non-parametric	-	2.14	
LDS	Cells 11-12	Cyanide	ug/L	0	15	0%	-	-	-	-	5	5	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 11-12	Selenium	ug/L	0	14	0%	-	-	-	-	1	1	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 11-12	Vanadium	ug/L	0	15	0%	-	-	-	-	2	2	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 13-14	Cobalt	ug/L	0	15	40%	4.53	2.64	6.53	8.97	5	5	4/21/2009	11/17/2011	-17	0.184	No Trend	-	Non-parametric	-	8.97	
LDS	Cells 13-14	Copper	ug/L	1	14	93%	1.97	0.62	1.13	2.71	1	1	4/21/2009	11/17/2011	12	0.273	No Trend	-	Non-parametric	-	2.71	
LDS	Cells 13-14	Cyanide	ug/L	0	15	0%	-	-	-	-	5	5	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 13-14	Selenium	ug/L	0	12	0%	-	-	-	-	1	1	5/19/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 13-14	Vanadium	ug/L	0	15	0%	-	-	-	-	2	2	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 15-16	Cobalt	ug/L	1	14	29%	4.25	2.93	7.18	9.85	5	5	5/19/2009	11/17/2011	-16	0.15	No Trend	-	Non-parametric	-	9.85	
LDS	Cells 15-16	Copper	ug/L	0	15	100%	3.44	1.73	1.5	9.1	-	-	4/21/2009	11/17/2011	7	0.383	No Trend	0.0003	Non-parametric	-	9.1	
LDS	Cells 15-16	Cyanide	ug/L	0	15	0%	-	-	-	-	5	5	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 15-16	Selenium	ug/L	0	14	0%	-	-	-	-	1	1	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 15-16	Vanadium	ug/L	0	15	0%	-	-	-	-	2	2	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 17-19	Cobalt	ug/L	0	15	33%	4.11	2.52	4.55	8.51	5	5	4/21/2009	11/17/2011	-20	0.112	No Trend	-	Non-parametric	-	8.5	
LDS	Cells 17-19	Copper	ug/L	0	15	100%	2.05	0.58	1.03	3	-	-	4/21/2009	11/17/2011	27	0.0991	No Trend	0.4726	Normal	2.515	3.5	
LDS	Cells 17-19	Cyanide	ug/L	0	15	0%	-	-	-	-	5	5	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 17-19	Selenium	ug/L	0	14	0%	-	-	-	-	1	1	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 17-19	Vanadium	ug/L	0	15	0%	-	-	-	-	2	2	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 20-22	Cobalt	ug/L	0	15	13%	3.02	1.38	6.18	6.64	5	5	4/21/2009	11/17/2011	-	-	-	-	Non-parametric	-	6.6	
LDS	Cells 20-22	Copper	ug/L	0	15	100%	3.19	0.65	2.25	4.43	-	-	4/21/2009	11/17/2011	-3	0.461	No Trend	0.6941	Normal	2.515	4.8	
LDS	Cells 20-22	Cyanide	ug/L	0	15	0%	-	-	-	-	5	5	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 20-22	Selenium	ug/L	0	14	100%	3.90	1.36	2.2	6.6	-	-	4/21/2009	11/17/2011	-12	0.273	No Trend	0.1412	Normal	2.57	7.4	
LDS	Cells 20-22	Vanadium	ug/L	0	15	0%	-	-	-	-	2	2	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	lls 20-22 Clean	Cobalt	ug/L	1	9	33%	3.44	1.43	5.06	5.82	5	5	10/20/2009	11/26/2012	-15	0.0397	Downward	-	Non-parametric	-	5.8	Marginal downward trend in baseli
LDS	lls 20-22 Clean	Copper	ug/L	0	10	90%	3.56	1.64	1.93	6.61	1	1	10/20/2009	11/26/2012	19	0.0537	No Trend	-	Non-parametric	-	6.6	
LDS	lls 20-22 Clean	Cyanide	ug/L	0	9	0%	-	-	-	-	5	5	10/20/2009	11/26/2012	0	0.54	No Trend	-	-	-	RL	All baseline data are nondetects
LDS	lls 20-22 Clean	Selenium	ug/L	0	8	100%	4.16	1.81	1.8	6.4	-	-	10/20/2009	10/25/2012	6	0.268	No Trend	0.391	Normal	3.24	10.0	
LDS	lls 20-22 Clean	Vanadium	ug/L	0	10	0%	-	-	-	-	2	2	10/20/2009	11/26/2012	0	0.5	No Trend	-	-	-	RL	All baseline data are nondetects
LDS	Cells 3-5	Cobalt	ug/L	0	16	13%	3.39	2.45	8.75	10.5	5	5	4/21/2009	11/17/2011	-	-	-	-	Non-parametric	-	10.5	
LDS	Cells 3-5	Copper	ug/L	0	16	56%	1.41	1.63	1.02	6.87	1	1	4/21/2009	11/17/2011	11	0.318	No Trend	-	Non-parametric	-	6.9	
LDS	Cells 3-5	Cyanide	ug/L	0	16	0%	-	-	-	-	5	5	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 3-5	Selenium	ug/L	0	15	0%	-	-	-	-	1	1	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 3-5	Vanadium	ug/L	0	16	0%	-	-	-	-	2	2	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 6-8	Cobalt	ug/L	0	16	31%	4.20	2.73	5.11	9.02	5	5	4/21/2009	11/17/2011	-19	0.16	No Trend	-	Non-parametric	-	9.0	
LDS	Cells 6-8	Copper	ug/L	0	16	69%	1.08	0.46	1.05	2.08	1	1	4/21/2009	11/17/2011	15	0.26	No Trend	-	Non-parametric	-	2.1	
LDS	Cells 6-8	Cyanide	ug/L	0	16	6%	2.74	0.95	6.3	6.3	5	5	4/21/2009	11/17/2011	-	-	-	-	Non-parametric	-	6.3	
LDS	Cells 6-8	Selenium	ug/L	0	15	0%	-	-	-	-	1	1	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 6-8	Vanadium	ug/L	0	16	0%	-	-	-	-	2	2	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 9-10	Cobalt	ug/L	0	16	19%	3.54	2.27	6.68	8.98	5	5	4/21/2009	11/17/2011	-	-	-	-	Non-parametric	-	9.0	
LDS	Cells 9-10	Copper	ug/L	0	16	69%	1.08	0.47	1.03	1.9	1	1	4/21/2009	11/17/2011	5	0.427	No Trend	-	Non-parametric	-	1.9	
LDS	Cells 9-10	Cyanide	ug/L	0	16	0%	-	-	-	-	5	5	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 9-10	Selenium	ug/L	0	15	0%	-	-	-	-	1	1	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects
LDS	Cells 9-10	Vanadium	ug/L	0	16	0%	-	-	-	-	2	2	4/21/2009	11/17/2011	-	-	-	-	-	-	RL	All baseline data are nondetects

Notes:
(1) If duplicates existed, the average of the duplicate results was used as a single data point.
(2) Nondetects were substituted by half of reporting limit (RL) for the computation of summary statistics.
(3) The UPL with restesting strategy was based on the "1-of-2 Retesting" for intrawell prediction limits on observations, 1 COC, quarterly sampling, and site-wide annual false positive rate of 10% (USEPA, 2009, Table 19-19). If the initial sample exceeds the 95% UPL, one resample will be collected, and if the resample result exceeds the 95% UPL, the exceedance is confirmed. Otherwise, it is not considered to be an exceedance.

* Reporting limit (RL) is used as UPL where all results in background dataset were ND.

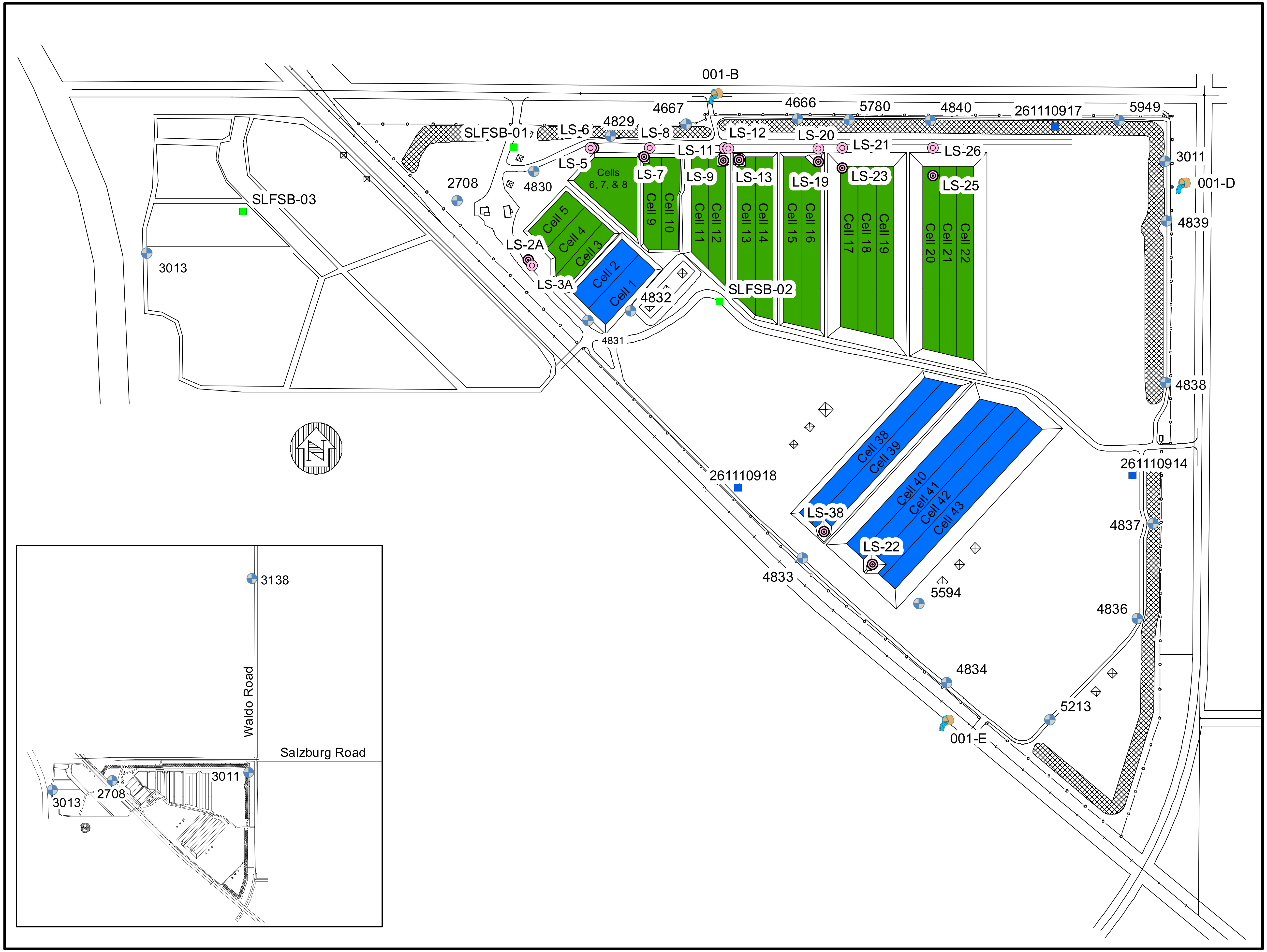
Table 8. Inspection Schedule for Environmental Monitoring Programs

Inspected Item	Frequency	Inspection Items
Monitoring Wells:	Inspect when sampled:	Intact (not bent or broken) No excessive silting No pooling around base Secured/Labeled Pump operational (if present)
Piezometers:	Inspect when measured:	Intact (not bent or broken) No excessive silting No pooling around base Secured/Labeled
Purge Wells:	Inspect when monitored:	Well intact Pump operational Maintaining adequate purge rates

All findings should be documented on the Field Data Sheet (see Attachment G).

Table 9. Record of SAP Revisions

Revision Submittal Date	Revision Number	Summary Description of Revision	Approval Date
10/1/2008		initial revisions after reapplication submittal as part of operating license negotiation	Mar-2009
9/16/2009 (additional changes submitted Dec. 2009)	1	Changed sample point for LDS Cells 20-22; revised LDS Cells 1-5 evaluation language; updated field data sheet; other minor changes to mirror facility SAP	
4/19/2010 (additional changes submitted Sept. 2010)	1a	Continuation of Rev. 1; new top of casing data for GW wells; updated LDS data evaluation based on LDS Background Summary Report (submitted in conjunction with this SAP revision)	
6/20/12	2	*Changed location of well 4831 and updated any relevent documents to reflect this change. *pH and Specific Conductance removed from Table 5. Removed Bicarbonate and Carbonate Alkalinity from Table 6. *Updated re-testing startegy to reflect the current strategy used. *Table 4 updated to include correct top of screen data and most recent top of casing elevation. *Updated language in Soil Monitoring section to reflect revised soil data evalaution plan. added to Table 2-A. *Removed o-and p-dichlorobenzene from SVOC list on table 2-B because constituents were already analyzed for under VOC.	
3/22/13	2	*Attachment B the RL for phthalates was changed from 1ug/L to 5ug/L. *Table 2-A updated to include additional regional aquifer wells from RCRA Facility monitoring used at SLF for SWL and contour mapping *Updated analytical method for semi-volatiles from 8270C to 8270C/8270D *Revised sampling location for Cells 20-22 Cleanout *Removed chlorobenzene investigation and evaluation for Cells 3-5 from Table 2-A. *Table 2-A updated to reflect new SW criteria and for metals and anions *Tables 5 and 7 updated with new UPLs for both GW and LDS *LDS flow rate monitoring and flow rate screening criteria evaluation and response inlcuded in Table 2-A	
8/12/2013	2	*Changed "Routine" to "Primary" for chemical constituents. *Removed "who samples" and "miscellaneous" from 2-A. *TOC was added as a tracking parameter in applicable programs. *Evaluation within 60 days of sampling requirement was added to 2-A in all applicable sections.	
12/1/2013	2	*Statistics were updated with more conservative UPLs for groundwater monitoring wells whose UPL's were deemed too high for detection monitoring purposes. *Surface Water Rule 57 trigger level for vanadium was changed to new Rule 57 criteria of 27 ug/L. *Performance Criteria Tables was added as an attachment to the SAP *Changed Carbonate and Bicarbonate Alkalinity method from 310.1 to SM 2320	
4/6/2015	2	*Changed metals listed in Table 2-B of the SAP to Primary Tracking Parameters for the LDS Program. *Made edits to Table 2-B and 2-A to clarify what is considered a tracking parameter and which programs it applies to. *Changed Table 2-A LDS and GW section to discuss new protocol for statistically significant increases in tracking parameters. *Updated Table 2-A GW section to differentiate between tracking parameters used to determine long term trends and the primary tracking parameters. *Updated Table 4 to refelct changfes in TOCs *Fixed grammatical mistakes in SAP text and changed the Leachate section to say that we use disposable bailers instead of dedicated. *Removed the one re-sample directions in the LDS and GW programs and replaced it with four replicate re-samples.	



THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS
MIDLAND, MICHIGAN

URS

Drawn: M. Crook	Date: 01/09/2006
Review: K. Cosan	Date: 01/09/2006
Revision:	Date:
Revision:	Date:
Revision:	Date:
Revision:	Date:
Issued:	Date:
Issued	Date:
Issued:	Date:
Issued:	Date:

Legend:

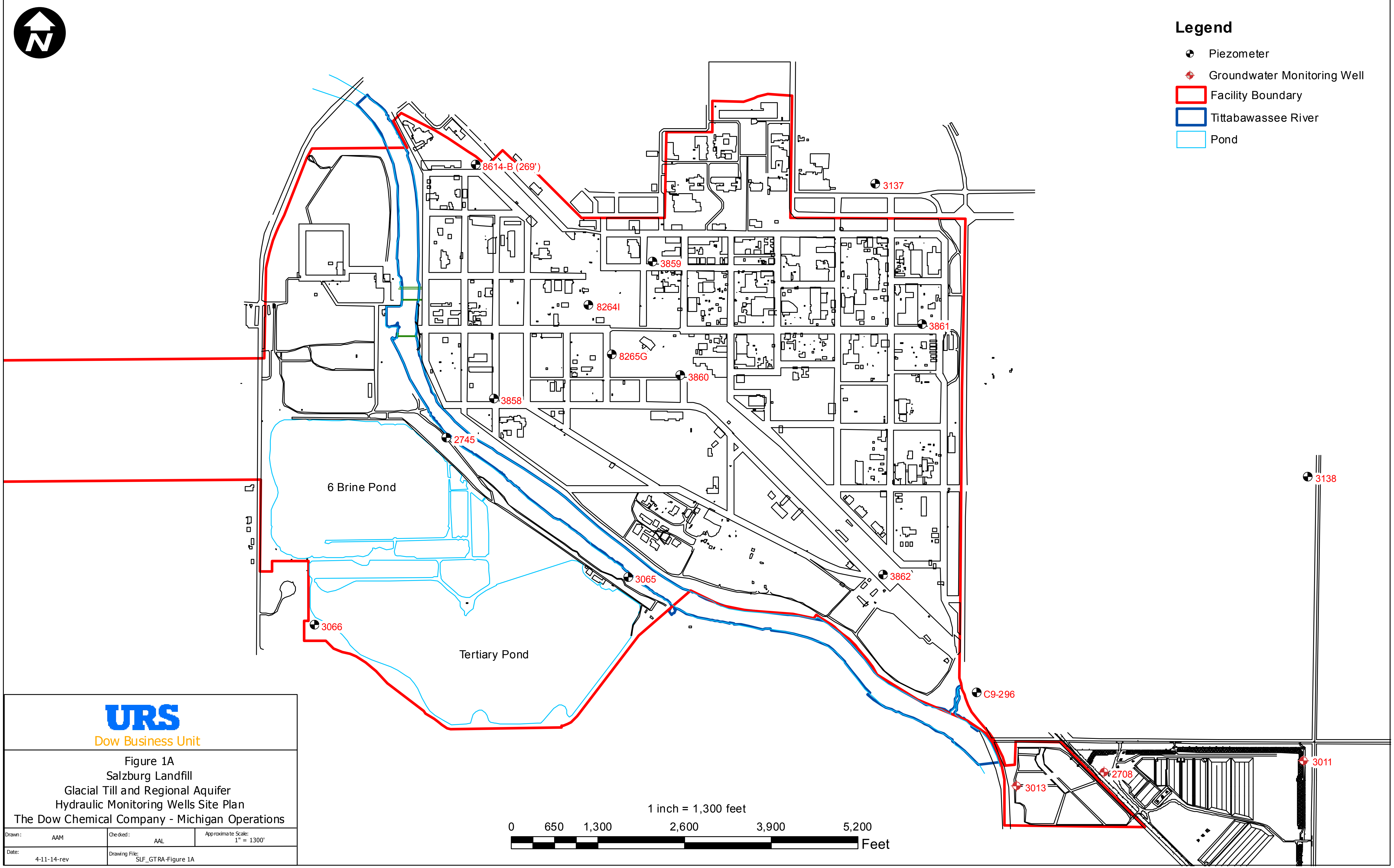
Monitoring Points

- ■ Air Monitoring Location
- 🟩 Soil Boxes
- ◐ Groundwater Monitoring Well
- ◎ Leachate Collection Sump
- ◎ Leak Detection Sump
- Surface Water Outfall
- 🟩 HAZARDOUS
- 🟦 NON-HAZARDOUS

Drawing Scale: 0 100 200 400 600 800 Feet

Drawing Title:

Figure 1
SALZBURG LANDFILL
ENVIRONMENTAL MONITORING PLAN
THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS
MIDLAND, MICHIGAN



URS
Dow Business Unit

Figure 1A
Salzburg Landfill
Glacial Till and Regional Aquifer
Hydraulic Monitoring Wells Site Plan
The Dow Chemical Company - Michigan Operations

Drawn: AAM	Checked: AAL	Approximate Scale: 1" = 1300'
Date: 4-11-14-rev	Drawing File: SLF_GTRA-Figure 1A	

Attachment 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 Waste and Hazardous Materials Division 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 analyzed as described in the tables below as a quality control check. The purpose of the checks is to detect sampling or laboratory contamination. Trip blanks may be collected, but only analyzed if necessary. Equipment blanks will be collected only if non-dedicated equipment is used. New, disposable equipment is not considered non-dedicated and does not require an equipment blank. 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	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
Leak Detection System (LDS)	VOA	One per sample event	One per sample event (analysis optional)	One per sample event		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
	D/F *		One per sample event (analysis optional)	One per sample event		One for each set of 20 samples
Surface Water	TOC	Collect one for each sample point (analysis dependent on results, see Section IV.D.3 of Operating License)	Not Required	One per sample event		One for each set of 20 or fewer samples
	Metals/ Inorganics					One for each set of 20 or fewer 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 8.2.		One for each set of 20 samples

Attachment B

Chemical Constituent, Analytical Method and Reporting Limit List

Attachment B

Chemical Constituent, Analytical Method, and Reporting Limit List

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. A different method than what is stated in this document may be used with prior approval from the MDEQ.

(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. The first RL is for soil samples and the second RL is for water samples.

* Note refers to Michigan Operations, Operating License Glacial Till and Regional Aquifer Monitoring Program. This reference is included in an effort to standardize the Chemical Constituent, Analytical Method, and Reporting Limit List between the Michigan Operations Sampling and Analysis Plan and the Salzburg Landfill Sampling and Analysis Plan.

Table I
Volatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
Acetone................................	67-64-1	2-Propanone....................	8260B	25
Acetonitrile; Methyl cyanide...........	75-05-8	Acetonitrile...................	8260B	10
Acrolein...............................	107-02-8	2-Propenal.....................	8260B	5
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
Carbon disulfide.......................	75-15-0	Carbon disulfide...............	8260B	5
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
1,2-Dichloropropane....................	78-87-5	Propane, 1,2-dichloro-.........	8260B	1

Table I (Continued)
Volatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
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	10
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
Toluene................................	108-88-3	Benzene, methyl-...............	8260B	1
1,1,1-Trichloroethane; Methylchloroform.	71-55-6	Ethane, 1,1,1-trichloro-.......	8260B	1

Table I (Continued)
Volatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
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	1
1,2,3-Trichloropropane.................	96-18-4	Propane, 1,2,3-trichloro-......	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

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/8270D	1
Acenaphthylene	208-96-8	Acenaphthylene	8270C/8270D	1
Acetophenone	98-86-2	Ethanone, 1-phenyl-	8270C/8270D	10
2-Acetylaminofluorene; 2-AAF	53-96-3	Acetamide, N-9H-fluoren-2-yl-	8270C/8270D	10
4-Aminobiphenyl	92-67-1	[1,1'-Biphenyl]- 4-amine	8270C/8270D	10
Aniline	62-53-3	Benzenamine	8270C/8270D	4
Anthracene	120-12-7	Anthracene	8270C/8270D	1
Aramite	140-57-8	Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester.	8270C/8270D	10
Benzo[a]anthracene; Benzanthracene	56-55-3	Benz[a]anthracene	8270C/8270D	1
Benzo[b]fluoranthene	205-99-2	Benz[e]acephenanthrylene	8270C/8270D	2
Benzo[k]fluoranthene	207-08-9	Benzo[k]fluoranthene	8270C/8270D	2
Benzo[ghi]perylene	191-24-2	Benzo[ghi]perylene	8270C/8270D	2
Benzo[a]pyrene	50-32-8	Benzo[a]pyrene	8270C/8270D	2
Benzoic acid	65-85-0	Benzoic acid	8270C/8270D	10
Benzyl alcohol	100-51-6	Benzenemethanol	8270C/8270D	20
Bis(2-chloroethoxy)methane	111-91-1	Ethane, 1,1'-[methylenebis (oxy)]bis [2-chloro-.	8270C/8270D	2
Bis(2-chloroethyl)ether	111-44-4	Ethane, 1,1'-oxybis[2-chloro-	8270C/8270D	1
Bis(2-chloro-1-methylethyl) ether; 2,2'-Di- chlorodiisopropyl ether.	108-60-1	Propane, 2,2'-oxybis[1-chloro-.	8270C/8270D	10
Bis(2-ethylhexyl) phthalate	117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl)ester.	8270C/8270D	5
4-Bromophenyl phenyl ether	101-55-3	Benzene, 1-bromo-4-phenoxy-	8270C/8270D	2
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester.	8270C/8270D	5
p-Chloroaniline	106-47-8	Benzenamine, 4-chloro-	8270C/8270D	20
Chlorobenzilate	510-15-6	Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester.	8270C/8270D	10
p-Chloro-m-cresol	59-50-7	Phenol, 4-chloro-3-methyl-	8270C/8270D	10
2-Chloronaphthalene	91-58-7	Naphthalene, 2-chloro-	8270C/8270D	2
2-Chlorophenol	95-57-8	Phenol, 2-chloro-	8270C/8270D	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/8270D	10
4-Chlorophenyl phenyl ether............	7005-72-3	Benzene, 1-chloro-4-phenoxy-...	8270C/8270D	10
Chrysene...............................	218-01-9	Chrysene.......................	8270C/8270D	1
m-Cresol...............................	108-39-4	Phenol, 3-methyl-..............	8270C/8270D	20
o-Cresol...............................	95-48-7	Phenol, 2-methyl-..............	8270C/8270D	10
p-Cresol...............................	106-44-5	Phenol, 4-methyl-..............	8270C/8270D	20
2,4-D; 2,4-Dichlorophenoxyacetic acid...	94-75-7	Acetic acid, (2,4-Dichlorophenoxy)-.	8270C/8270D	10
Diallate...............................	2303-16-4	Carbamothioic acid, bis(1-Methylethyl)- , S- (2,3-Dichloro-2-propenyl) ester.	8270C/8270D	10
Dibenz[a,h]anthracene..................	53-70-3	Dibenz[a,h]anthracene..........	8270C/8270D	2
Dibenzofuran...........................	132-64-9	Dibenzofuran...................	8270C/8270D	5
1,2-Dibromo-3-chloropropane; DBCP.......	96-12-8	Propane, 1,2-dibromo-3-chloro-.	8270C/8270D	10
Di-n-butyl phthalate...................	84-74-2	1,2-Benzenedicarboxylic acid, Dibutyl ester.	8270C/8270D	1
o-Dichlorobenzene......................	95-50-1	Benzene, 1,2-dichloro-.........	8270C/8270D	1
m-Dichlorobenzene......................	541-73-1	Benzene, 1,3-dichloro-.........	8270C/8270D	1
p-Dichlorobenzene......................	106-46-7	Benzene, 1,4-dichloro-.........	8270C/8270D	1
3,3'-Dichlorobenzidine.................	91-94-1	[1,1'-Biphenyl]- 4,4'- diamine, 3,3'-dichloro-.	8270C/8270D	20
2,4-Dichlorophenol.....................	120-83-2	Phenol, 2,4-dichloro-..........	8270C/8270D	10
2,6-Dichlorophenol.....................	87-65-0	Phenol, 2,6-dichloro-..........	8270C/8270D	10
Diethyl phthalate......................	84-66-2	1,2-Benzenedicarboxylic acid, Diethyl ester.	8270C/8270D	5
O,O-Diethyl O-2-pyrazinyl phosphorothioate; Thionazin	297-97-2	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester.	8270C/8270D	10
Dimethoate.............................	60-51-5	Phosphorodithioic acid, O,O-Dimethyl S-[2-(methylamino)-2-Oxoethyl] ester.	8270C/8270D	10
p-(Dimethylamino)azobenzene............	60-11-7	Benzenamine, N,N-dimethyl-4-(phenylazo)-.	8270C/8270D	10
7,12-Dimethylbenz[a]anthracene..........	57-97-6	Benz[a]anthracene, 7,12-Dimethyl-.	8270C/8270D	10
3,3'-Dimethylbenzidine.................	119-93-7	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-.	8270C/8270D	10
alpha, alpha-Dimethylphenethylamine.....	122-09-8	Benzeneethanamine, α,α-dimethyl-.	8270C/8270D	50

Table II (Continued)
Semivolatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
2,4-Dimethylphenol......................	105-67-9	Phenol, 2,4-dimethyl-..........	8270C/8270D	10
Dimethyl phthalate......................	131-11-3	1,2-Benzenedicarboxylic acid, Dimethyl ester.	8270C/8270D	5
m-Dinitrobenzene........................	99-65-0	Benzene, 1,3-dinitro-..........	8270C/8270D	10
4,6-Dinitro-o-cresol....................	534-52-1	Phenol, 2-methyl-4,6-dinitro-..	8270C/8270D	50
2,4-Dinitrophenol.......................	51-28-5	Phenol, 2,4-dinitro-...........	8270C/8270D	50
2,4-Dinitrotoluene......................	121-14-2	Benzene, 1-methyl-2,4-dinitro-.	8270C/8270D	5
2,6-Dinitrotoluene......................	606-20-2	Benzene, 2-methyl-1,3-dinitro-.	8270C/8270D	5
Dinoseb; DNBP; 2-sec-Butyl- 4,6-dinitrophenol	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-.	8270C/8270D	10
Di-n-octyl phthalate....................	117-84-0	1,2-Benzenedicarboxylic acid, Dioctyl ester.	8270C/8270D	5
Diphenylamine...........................	122-39-4	Benzenamine, N-phenyl-.........	8270C/8270D	10
2,6-Diphenylphenol......................	2432-11-3	....	8270C/8270D	10
Disulfoton..............................	298-04-4	Phosphorodithioic acid, O,O-Diethyl S-[2-(ethylthio)ethyl]ester	8270C/8270D	10
Ethyl methanesulfonate..................	62-50-0	Methanesulfonic acid, ethyl Ester.	8270C/8270D	10
Famphur.................................	52-85-7	Phosphorothioic acid, O-[4-[(dimethylamino)sulfonyl]phenyl]-O,O-dimethyl ester.	8270C/8270D	10
Fluoranthene............................	206-44-0	Fluoranthene...................	8270C/8270D	1
Fluorene................................	86-73-7	9H-Fluorene....................	8270C/8270D	1
Hexachlorobenzene.......................	118-74-1	Benzene, hexachloro-...........	8270C/8270D	2
Hexachlorobutadiene.....................	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-Hexachloro-.	8270C/8270D	2
Hexachlorocyclopentadiene..............	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-.	8270C/8270D	10
Hexachloroethane........................	67-72-1	Ethane, hexachloro-............	8270C/8270D	1
Hexachlorophene.........................	70-30-4	Phenol, 2,2'-methylenebis[3,4,6-Trichloro-.	8270C/8270D	75
Hexachloropropene.......................	1888-71-7	1-Propene, 1,1,2,3,3,3-Hexachloro-.	8270C/8270D	10
Indeno(1,2,3-cd)pyrene..................	193-39-5	Indeno[1,2,3-cd]pyrene.........	8270C/8270D	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/8270D	10
Isophorone	78-59-1	2-Cyclohexen-1-one, 3,5,5-Trimethyl-.	8270C/8270D	1
Isosafrole	120-58-1	1,3-Benzodioxole, 5-(1-Propenyl)-.	8270C/8270D	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/8270D	25
Methapyrilene	91-80-5	1,2,Ethanediamine, N,N-dimethyl-N'-2- pyridinyl- N'-(2-Thienylmethyl)-.	8270C/8270D	10
3-Methylcholanthrene	56-49-5	Benz[j]aceanthrylene, 1,2-Dihydro-3-methyl-.	8270C/8270D	10
Methyl methanesulfonate	66-27-3	Methanesulfonic acid, methyl Ester.	8270C/8270D	10
2-Methylnaphthalene	91-57-6	Naphthalene, 2-methyl-	8270C/8270D	5
Methyl parathion; Parathion methyl	298-00-0	Phosphorothioic acid, O,O-Dimethyl O-(4-nitrophenyl) Ester.	8270C/8270D	10
Naphthalene	91-20-3	Naphthalene	8270C/8270D	1
1,4-Naphthoquinone	130-15-4	1,4-Naphthalenedione	8270C/8270D	10
1-Naphthylamine	134-32-7	1-Naphthalenamine	8270C/8270D	10
2-Naphthylamine	91-59-8	2-Naphthalenamine	8270C/8270D	10
o-Nitroaniline	88-74-4	Benzenamine, 2-nitro-	8270C/8270D	50
m-Nitroaniline	99-09-2	Benzenamine, 3-nitro-	8270C/8270D	50
p-Nitroaniline	100-01-6	Benzenamine, 4-nitro-	8270C/8270D	50
Nitrobenzene	98-95-3	Benzene, nitro-	8270C/8270D	2
o-Nitrophenol	88-75-5	Phenol, 2-nitro-	8270C/8270D	10
p-Nitrophenol	100-02-7	Phenol, 4-nitro-	8270C/8270D	50
4-Nitroquinoline 1-oxide	56-57-5	Quinoline, 4-nitro-, 1-oxide	8270C/8270D	10
N-Nitrosodiethylamine	55-18-5	Ethanamine, N-ethyl-N-nitroso-.	8270C/8270D	10

Table II (Continued)
Semivolatile Organics

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
N-Nitrosodimethylamine	62-75-9	Methanamine, N-methyl-N-nitroso-	8270C/8270D	5
N-Nitrosodi-n-butylamine	924-16-3	N-Nitrosodi-n-butylamine	8270C/8270D	10
N-Nitrosodiphenylamine	86-30-6	Benzenamine, N-nitroso-N-phenyl-	8270C/8270D	2
N-Nitrosodipropylamine; Di-n-propylnitrosamine.	621-64-7	1-Propanamine, N-nitroso-N-Propyl-.	8270C/8270D	2
N-Nitrosomethylethylamine	10595-95-6	Ethanamine, N-methyl-N-nitroso-	8270C/8270D	10
N-Nitrosomorpholine	59-89-2	Morpholine, 4-nitroso-	8270C/8270D	10
N-Nitrosopiperidine	100-75-4	Piperidine, 1-nitroso-	8270C/8270D	10
N-Nitrosopyrrolidine	930-55-2	Pyrrolidine, 1-nitroso-	8270C/8270D	10
5-Nitro-o-toluidine	99-55-8	Benzenamine, 2-methyl-5-nitro-.	8270C/8270D	10
Parathion	56-38-2	Phosphorothioic acid, O,O-Diethyl-O-(4-nitrophenyl) Ester	8270C/8270D	10
Pentachlorobenzene	608-93-5	Benzene, pentachloro-	8270C/8270D	10
Pentachloroethane	76-01-7	Ethane, pentachloro-	8270C/8270D	10
Pentachloronitrobenzene	82-68-8	Benzene, pentachloronitro-	8270C/8270D	10
Pentachlorophenol	87-86-5	Phenol, pentachloro-	8270C/8270D	50
Phenacetin	62-44-2	Acetamide, N-(4-ethoxyphenyl)	8270C/8270D	10
Phenanthrene	85-01-8	Phenanthrene	8270C/8270D	1
Phenol	108-95-2	Phenol	8270C/8270D	10
p-Phenylenediamine	106-50-3	1,4-Benzenediamine	8270C/8270D	25
[4-(2-phenylisopropyl)phenol]	599-64-4	Phenol, 4-Cumyl	8270C/8270D	10
o-Phenylphenol	90-43-7	Phenol, 2-phenyl-	8270C/8270D	10
Phorate	298-02-2	Phosphorodithioic acid, O,O-Diethyl S- [(ethylthio)methyl] Ester	8270C/8270D	10
2-Picoline	109-06-8	Pyridine, 2-methyl-	8270C/8270D	10
Pronamide	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-Dimethyl-2-propynyl)-.	8270C/8270D	10
Pyrene	129-00-0	Pyrene	8270C/8270D	1
Pyridine	110-86-1	Pyridine	8270C/8270D	10
Safrole	94-59-7	1,3-Benzodioxole, 5-(2-Propenyl)-.	8270C/8270D	10
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5-Trichlorophenoxy)-.	8270C/8270D	2
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid.	93-76-5	Acetic acid, (2,4,5-Trichlorophenoxy)-.	8270C/8270D	2
1,2,3,4-Tetrachlorobenzene	634-66-2	Benzene, 1,2,3,4-tetrachloro-	8270C/8270D	10

Table II (Continued)
Semivolatile Organics

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

Table III
Metals

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL/RL (ug/L)
Aluminum	(Total)	Aluminum	6020	100
Antimony	(Total)	Antimony	6020/7040	2/1
Arsenic	(Total)	Arsenic	6020/7060A	1
Barium	(Total)	Barium	6020/6010B	5/5
Beryllium	(Total)	Beryllium	6020/6010B	1/3
Cadmium	(Total)	Cadmium	6020/6010B	0.2/5
Calcium	(Total)	Calcium	6020/6010B	300/1000
Chromium	(Total)	Chromium	6020/6010B	1/20
Cobalt	(Total)	Cobalt	6020/6010B	5/15
Copper	(Total)	Copper	6020/6010B	1/10
Iron	(Total)	Iron	6020/6010B	50/20
Lead	(Total)	Lead	6020/7421	1
Lithium	(Total)	Lithium	6010B	8
Magnesium	(Total)	Magnesium	6020/6010B	250/1000
Manganese	(Total)	Manganese	6020/6010B	5/5
Mercury	(Total)	Mercury	7470A	0.2
Nickel	(Total)	Nickel	6020/6010B	2/25
Potassium	(Total)	Potassium	6020*/6010B	250/100
Selenium	(Total)	Selenium	6020/7740	2/1
Silver	(Total)	Silver	6020/7761	0.5
Sodium	(Total)	Sodium	6020/6010B	250/1000
Thallium	(Total)	Thallium	6020/7841	1/2
Tin	(Total)	Tin	6020/7870	10/8000
Vanadium	(Total)	Vanadium	6020/6010B	2/10
Zinc	(Total)	Zinc	6020/6010B	10/10

Table IV
Anions

Common Name	CAS #	Chemical Abstract Service Index Name	Method	RL (ug/L)
Ammonia	7664-41-7	Ammonia	350.1	50
Bicarbonate.......................	(Total)	Bicarbonate...................	SM2320	10,000
Carbonate.........................	(Total)	Carbonate.....................	SM2320	10,000
Chloride..........................	(Total)	Chloride......................	9056	1000
Cyanide...........................	57-12-5	Cyanide.......................	9012A	5
Fluoride..........................	(Total)	Fluoride......................	9056	1000
Sulfate...........................	(Total)	Sulfate.......................	9056	2000
Sulfide...........................	18496-25-8	Sulfide.......................	376.2	100

Table V
Other Constituents

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)
Other Constituents

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)

Other Constituents

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&be,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
Polychlorinated biphenyls; PCBs.........	See Note 4	1,1'-Biphenyl, chloro (derivatives)	8082	0.1
Total Organic Carbon (TOC)...............			9060*	1000
Toxaphene..............................	8001-35-2	Toxaphene.....................	8081	0.2

Table V (Continued)
Other Constituents

Common Name	CAS #	Chemical Abstract Service Index Name	Method	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

Attachment C

Quality Assurance Program

DOW ENVIRONMENTAL LABORATORY

QUALITY ASSURANCE PROGRAM (QAP)

TABLE OF CONTENTS

Section

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, field, and reagent), 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 QSDs are 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 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).

Attachment D

Chain of Custody Example

CHAIN OF CUSTODY RECORD

PROJECT ID / NUMBER	LABORATORY	RECHARGE ACCOUNT

SAMPLERS (Print Name(s) and Signature(s))

SHIPPING INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (If applicable)

Date		Fed Ex		UPS		DHL		Courier		Tracking Number	
Date		Fed Ex		UPS		DHL		Courier		Tracking Number	
Date		Fed Ex		UPS		DHL		Courier		Tracking Number	
Date		Fed Ex		UPS		DHL		Courier		Tracking Number	

RELINQUISHED BY (Print & Signature)	DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)	DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME
RELINQUISHED BY (Print & Signature)	DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)	DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME

COMMENTS (Preservation, etc.)

REPORTING TO

LINE NO.	BAR CODE/ LIMS CODE	DATE	TIME	COMP.	GRAB	STATION LOCATION/ SAMPLE DESCRIPTION	NO. OF CONTAINERS	PRIORITY NUMBER	ANALYSIS											MATRIX Indicate Soil/Water/Air Sediment/Sludge Extract
1.																				
2.																				
3.																				
4.																				
5.																				
6.																				
7.																				
8.																				
9.																				
10.																				
11.																				
12.																				
13.																				
14.																				
15.																				
16.																				
17.																				
18.																				
19.																				
20.																				
21.																				

Note: this is an example COC Only

Attachment E

Background Data and Statistically Methodology

Statistical Methodology

Statistical Methodology

The statistical methods to analyze background data are described in the U.S. EPA guidance document, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance* (USEPA 2009). The overall approach was to derive a background threshold value (BTV) for each analyte based on a statistical evaluation of a given background (baseline) data set. Future monitoring concentrations would then be compared against the BTV. Any monitoring concentrations that exceed the BTV may be considered to be indications of potential contamination or release from the landfill operation. The intra-well method was used to compare monitoring concentrations at each sampling location against the BTV derived from the historic baseline data at that location.

The main steps in deriving BTVs were:

1. Establish baseline data sets.
2. Check for potential outliers.
3. Calculate summary statistics.
4. Perform trend analysis.
5. Derive BTVs.

1.0 Establishing Background Data Set

R 299.9612 requires collection of a series of groundwater samples to determine background concentrations. A minimum of eight samples were used to determine the background concentrations of inorganic constituents in the different environmental monitoring systems/media. Results from analyses of these samples were evaluated as discussed below. Additional sampling may be performed for including in the background data set if needed. Existing data are included in Appendix E of the Environmental Monitoring Plan.

Sampling data were collected in three different media/system; the Leak Detection System, groundwater monitoring wells, and surface water locations. A separate baseline data set was established for each medium. The baseline periods used for the three media were as follows:

- Leak Detection System (LDS) – from 2000 to 2011 (except Cells 20-22 Cleanout; due to limited historic sample sizes, the baseline period for Cells 20-22 Cleanout extended through 2012)
- Groundwater (GW) – from 2006/2009 to 2012 (due to limited historic sample sizes for many wells/analytes, the baseline period for all GW extended through 2012)
- Surface water (SW) – from 2000 to 2011

For LDS and GW, total organic carbon and concentrations of five inorganic constituents (cobalt, copper, cyanide, selenium, and vanadium) were evaluated statistically using the methods described below. For SW, only total organic carbon was evaluated statistically, as inorganic constituents from SW were assessed based on trigger levels from Michigan Rule 57.

A series of LDS, GW, and SW samples were collected to determine background/baseline concentrations and presented in Table 1. A minimum of eight samples were required to determine the background/baseline concentrations of inorganic constituents and total organic carbon. Results from analyses of these samples were evaluated statistically as discussed below. Additional quarterly or semi-annual sampling will be performed in the future, and if these future samples are consistent with the baseline condition, they will be included in the future baseline data set. The baseline data set and the associated baseline statistics will be updated overtime, with limitations as discussed in Section 2.4 (i.e., the baseline updating will be performed after eight new additional samples) (USEPA 2009).

GW Monitoring Well 4831 was replaced in September of 2010, and collection of a background dataset began in 4th quarter of 2010 (October). The minimum number of background results should be evaluate for establishing statistical background after 4th Quarter of 2014.

2.0 Outliers Evaluation

Prior to calculating summary statistics, each baseline data set was screened for potential outliers. Anomalous (high or low) values in the baseline data sets were reviewed and excluded when appropriate. Baseline data were tested for outliers using Dixon's Test at 1 percent significance level (99% confidence level), followed by manual inspection/outlier determination of the data set (USEPA 2006).

Dixon's Test was used when the number of detected results in the sample dataset was > 25 detected results. In the majority of cases, this was sufficiently conservative. For GW, the resulting UPLs for copper averaged 17.5 ug/L, with a median of 10 ug/L. This suggested a few higher results may be skewing the average. On inspection, the computed UPLs for copper for wells 4838, 4840 and 5594 ranged from 40-80 ug/L, which are significantly higher than the UPLs for the remaining site GW wells. Wells 4838, 4840 and 5594 had a low detection frequency (< 25 detected results) for copper and the resulting UPL was driven by one or two high detections which were never replicated, and in some cases, coincided (suggesting lab contamination or similar sampling or analytical issue related to specific events). Based on these findings, Dixon's test was run on these datasets, and the higher values were eliminated from the dataset as a result of the test. In these special cases, there were at least 25 results, however; only a few represented detected values.

The same procedure was followed for cobalt in well 5594, which had an initial computed UPL of 31, and the average for all GW at the site was 8 ug/L. The cobalt background dataset for 5594 also had a low detection frequency (< 25 detected results) and applying Dixon's test also eliminated a small number of high values that were never replicated, resulting in a UPL that more closely matched the remaining GW wells at the site.

Tables 5, 6 and 7 identify the number of statistically-confirmed outliers in each baseline data set.

It should be noted that excluding high-value outliers would lower the baseline limit against which future sample values would be compared. This would reduce the probability of failing to detect the future monitoring concentrations that exceed the baseline condition.

2.3 Calculate Summary Statistics

After removing outliers from the baseline data as described above, summary statistics for each data set (i.e., the results for each analyte from each location) were calculated and are shown in Table 2. The summary statistics include the sample size, detection rate, mean, standard deviation, minimum and maximum detected values, minimum and maximum reporting limits of non-detects, first and last sample dates, and upper prediction limits (UPLs). The methodology to derive UPL is described in Section 2.5.

For calculating summary statistics, numerical results were needed for every analytical measurement, even if the analytical measurement was non-detectable. When a result was defined as “not detected”, half of the reporting limit was used as an estimated value.

For SLF Surface water, metals are screened against Michigan Rule 57 Final Chronic Values (FCVs). The FCV for copper value is calculated based on site-specific receiving water hardness. In September 2011, site-specific hardness was measured in the Tittabawassee River and surrounding waterways (Lingle Drain, Bullock Creek, etc). A summary of results and a map indicating sampling locations are provided in this Attachment as Table 1 and Figure 1, respectively. The site-specific FCV for copper is calculated using the *Calculation of Generic Facility-Specific Part 201 Groundwater Surface Water Interface (GSI) Criteria for {G} Footnoted Hazardous Substances* spreadsheet, provided by DEQ via their website, last updated on September 28, 2012. The minimum value detected for hardness was used as it yields the most conservative screening criteria.

2.4 Perform Trend Analysis

The baseline data used to derive BTVs should not exhibit any time trends (i.e., a stable condition). A non-parametric test for trends called the Mann-Kendall test was used to detect an upward or downward trend for the data set. The Mann-Kendall trend test is based on the ranks of the data, and therefore, does not require a distributional assumption (e.g. normality). The use of the ranked observations rather than the observations themselves help to minimize the potential impact of outliers on the results and allows the test to detect trends that are monotonically increasing or decreasing, though not necessarily in linear fashion. Computational details for this test are provided in Gilbert (1987). The test was performed at the 0.05 significance level (i.e., *p*-values smaller than 0.05 were required before the test was concluded to be significant). This means that strong evidence (95% confidence) was required before a trend was labeled as “significant.” The Mann-Kendall trend test was performed for data sets with a detection frequency of at least 25%.

If a significant upward or downward trend was concluded by the Mann-Kendall test (using the entire data history), but the recent portion (i.e., latter periods) of the data set did not exhibit significant trend (based on visual inspection of time-series plots), this recent portion of the data set was evaluated again using the Mann-Kendall test to determine if there was any significant trend. If it was confirmed no significant trend existed, this recent portion of the data set was used to derive the BTV, this can be observed with the TOC data from earlier monitoring events.

The data from the baseline period are required to be stationary over time in order for intrawell UPL testing. For some well-analytes with very long history (and particularly for TOC), the concentrations appear to be higher in the earlier periods (i.e., 80s and 90s), and thus, creating a downward trend. The concentrations in many cases are more stable in recent periods (i.e., 2000s), and hence, only data from the recent periods are used. It should be noted that excluding high values (from the earlier periods) would result in a lower UPL, which is a more environmentally conservative approach.

2.5 Calculate Background Threshold Values Using Upper Prediction Limit (UPL)

In the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance* published in March 2009 (USEPA 2009), one of the recommended statistics to derive BTVs is the upper prediction limit (UPL). The UPL is an estimate of an upper boundary on the concentrations of future samples, with a prescribed confidence level if drawn from the baseline population. In the 2009 USEPA guidance, the annual site-wide false positive error is recommended to be 10% (i.e., 90% confidence level). Based on this guidance, the 90% confidence level for the next sample was assumed for this evaluation. The resulting UPL can be represented as the 90% UPL.

To control both the false positive and false negative probability error rates, the USEPA Unified Guidance recommends using a retesting strategy for groundwater detection monitoring program. This strategy involves comparing a monitoring concentration at a sampling location to the UPL. If the monitoring concentration exceeds the UPL, one or more resamples are taken and again compared to the UPL. If the resamples also exceed the UPL, the sampling location is considered to have a concentration significantly higher than the background/baseline. Otherwise, it is not considered to be an exceedance of the baseline condition.

For this evaluation, the “1-of-2” retesting strategy was assumed. This strategy means that if the original monitoring sample is below the applicable background UPL, the monitoring location is considered to be no different than the background/baseline. If the original sample exceeds the UPL, one resample is taken and compared against the same UPL. If the resample is below the UPL, the monitoring location is again considered to be no different than the background/baseline. If the resample exceeds the UPL, the monitoring location is considered to be significantly higher than the background/baseline. For confirmation purposes in the field; however, four replicate samples will be collected and two of them fail to be considered statistically different from the background.

To calculate the UPL, the statistical distribution (e.g., “normal” distribution) for each data set (i.e., the results for each analyte from each location) had to be evaluated. The following methodology was used to determine each statistical distribution:

- If fewer than eight results were available, no distribution was defined (i.e., baseline development was still in progress and no further statistical evaluation would be performed at this time);

- If at least eight results were available and there were no non-detects (i.e., 100% detected), then the data set was tested for normality using raw data with the Shapiro-Wilk W test (USEPA 2006), with a significance level of 0.05. If the Shapiro-Wilk W test showed no evidence against normality, then the distribution was assumed to be normal and a parametric UPL based on normal distribution was calculated. Otherwise, the normal distribution assumption was rejected, and a non-parametric UPL was calculated; and

- If at least eight results were available and there were non-detect(s) (i.e., not 100% detected), a non-parametric UPL was calculated.

The following equation from the USEPA Unified Guidance was used for the calculation of a parametric UPL at a given sampling location for a given analyte:

$$\text{UPL} = \text{sample mean} + K \times \text{sample standard deviation}$$

in which K = a factor selected from Table 19-10 in the USEPA Unified Guidance.

For intra-well comparison method, the selection of the factor K requires assumptions about the number of constituents to be monitored, the number of sampling locations, the background sample size, the retesting strategy, and the sampling frequency. Tables 5,6 and 7 show the values of these parameters for each of the sampling locations.

If a data set could not be assumed to be normally distributed, or if it contained at least one non-detect, a non-parametric UPL was calculated. Following the USEPA Unified Guidance (Table 19-19), the non-parametric UPL was set to either the highest or the second highest detected concentration. The achieved site-wide false positive rate for the non-parametric UPL depends on the background sample size and the other parameters specified in Table 5, 6, and 7 of the SAP. If the target false positive rate and power are achieved with the second highest detected concentration, that concentration is taken as the non-parametric UPL. If the target false positive rate and power are not achieved with the second highest detected concentration, the highest detected concentration is selected as the UPL.

For analytes with all baseline data consisted of non-detects, the "Double Quantification Rule" described in Chapter 6 of the 2009 USEPA Unified Guidance was used, as follows:
"A confirmed exceedance is registered if any well-constituent pair in the '100% non-detect' group exhibits quantified measurements (i.e., at or above the reporting limit [RL]) in two consecutive sample and resample events." In other words, for these previously non-detect parameters, an exceedance is confirmed if and only if both initial and confirmatory sample results were detected above the respective RLs. This approach is analogous of using the RL as the UPL.

The results of the Shapiro-Wilk W test, the method used to calculate the UPL (parametric or non-parametric), and the calculated UPLs are shown in Tables 5, 6 and 7 of SAP, for each of the sampling locations/analytes. For parametric (i.e., normal-based) UPL, the minimum background sample sizes required to achieve sufficient statistical power were 16 and 10, for GW and LDS, respectively, and some location-analytes had not reached this minimum sample size, therefore, future updating of these background statistics is important. For SW, the minimum background sample size for parametric UPL has been attained.

For non-parametric UPL, the highest detected concentration was selected for GW and LDS. However, it should be noted that the target per-constituent significance level, as listed in Table 19-19 of the 2009 USEPA Unified Guidance, was not achieved. The minimum sample sizes for non-parametric UPL (using the highest detected value) were 70 and 60, for GW and LDS, respectively. Hence, the annual site-wide false positive error is likely higher than the recommended 10%, which is a more conservative approach (i.e., more protective of the environment and public health). Again, as additional samples will be collected, future updating of these background statistics will be beneficial with a larger sample size. For SW, because of the larger background sample size and fewer statistical comparisons, the second highest value was selected as the UPL, while both target significance level and power of detection were achieved.

References

Gilbert, Richard O. *Statistical Methods for Environmental Pollution Monitoring*. New York: Van Nostrand Reinhold Company. 1987.

Shapiro, S. S. and M. B. Wilk, 1965. "An Analysis of Variance Test for Normality (complete samples)," *Biometrika*, 52, 591-611.

USEPA. 2006. *Data Quality Assessment: Statistical Methods for Practitioners (EPA QA/G-9S).* Office of Environmental Information, U.S. Environmental Protection Agency, Report No. EPA/240/B-06/003.

USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance.* Office of Resource Conservation and Recovery, U.S. Environmental Protection Agency, Report No. EPA 530-R-09-007.

Table 1: Summary of Surface Water Results

Midland Area Soils Leachability Testing Study
Surface Water - Chemical Monitoring Data

Location	Sample Date	Constituent	Unit	RL	Result	Comments
PSW1	9/28/2011	Calcium	ug/L	500	54,000	
PSW1	9/28/2011	Hardness	ug/L	2000	210,000	
PSW1	9/28/2011	Magnesium	ug/L	200	18,000	
PSW1	9/28/2011	pH	S.U.		8.19	
PSWTWO	9/28/2011	Calcium	ug/L	500	70,000	
PSWTWO	9/28/2011	Hardness	ug/L	2000	250,000	
PSWTWO	9/28/2011	Magnesium	ug/L	200	19,000	
PSWTWO	9/28/2011	pH	S.U.		7.88	
PSW3	9/28/2011	Calcium	ug/L	500	61,000	
PSW3	9/28/2011	Hardness	ug/L	2000	220,000	
PSW3	9/28/2011	Magnesium	ug/L	200	15,000	
PSW3	9/28/2011	pH	S.U.		7.39	
PSW4	9/28/2011	Calcium	ug/L	500	78,000	
PSW4	9/28/2011	Hardness	ug/L	2000	250,000	
PSW4	9/28/2011	Magnesium	ug/L	200	14,000	
PSW4	9/28/2011	pH	S.U.		7.29	

Abbreviations:
RL = Reporting Limit
ug/L = Microgram per Liter
S.U. = Standard Units

URS
Dow Business Unit

Surface Water Sampling Locations
The Dow Chemical Company
Salzburg Landfill
Figure 1

Drawn: JH	Checked: MC	Approximate Scale: 1" = 1215'
Date: 11 Oct 2013	Drawing File: COM/2013Annual/LeachabilityTestingStudy	

Attachment F

Ambient Air Monitoring Program

Table of Contents

Tables

Attachments

1.0 Overview of Program

The primary objective of this Ambient Air Monitoring Program (AAMP) is to characterize the air concentrations of selected parameters and to fulfill the regulatory requirements of the Salzburg Landfill (SLF) Hazardous Waste Management Operating License.

The airborne parameter to be monitored is Total Suspended Particulate (TSP).

2.0 Objectives

The following are the objectives of the SLF AAMP:

1. Characterize the concentrations of selected monitoring parameters at SLF;

2. Supplement existing programs being used to set priorities for emission reduction projects;

3. Fulfill the regulatory requirements of:
    a. Part 111 MID 980 617 435, and
    b. Demonstrate compliance with National Ambient Air Quality Standards (NAAQS) for TSP/PM-10. Note: If TSP results meet the PM-10 limits, Dow will be in compliance since PM-10 is a subset of TSP.

3.0 Parameters, Methods, and Sampling Frequencies

3.1 Parameters and Methods

Table 4-1 summarizes the parameter to be monitored in this AAMP. The rationale for selecting this parameter is described in Attachment F.1. The methods used will be based on current EPA methods or slight modifications with approval.

3.1.1 Total Suspended Particulate

Attachment F.3 describes the Dow environmental monitoring methods for TSP. The frequency of TSP sampling is every 6 days at the three sites. Concentrations will be determined on HI-VOL TSP samplers using glass filters.

3.1.2 Meteorological Data

Hourly meteorological data for the Midland area will be collected at SLF each day. The location of this station is shown in Figure 1 of the Sampling and Analysis Plan (SAP). Meteorological data will be kept on site and will be made available upon request.

Attachment F.2 includes a description of the meteorological measurement station. Volumes of air sampled will be corrected to EPA Standard Conditions (25°C, 760 mm Hg) through use of average daily temperatures and pressures.

3.2 Sampling Frequency

Samples will be taken according to the NAAQS 6 day schedule as determined by the EPA. If the sample is invalidated for any reason (e.g. loss of power, equipment malfunction, etc.) the sampler will be reset and a sample will be obtained during the next regularly scheduled monitoring event. Dow will ensure that a minimum of 75 percent of the scheduled TSP samples per quarter are taken and are valid. If necessary, makeup samples may be taken to meet the 75 percent threshold.

Table 3-1. Parameters, Methods, and Associated Limits

Sampling Parameter	Total Suspended Particulates (TSP)
Sampling Apparatus	HI-VOL TSP (Glass Filter)
Sampling Duration	24-Hour
Sample Frequency	6-Day for sites 261110914, 261110917, and 261110918
Sample Volume	1600-2400 m^3 (57,000-86,000 ft^3)
Analytical Method(s)	40 CFR Part 58 Attachment F.2
Limit	150 ug/m^3 TSP*

*Limit is for PM-10. As long as TSP meets this limit, the PM-10 limit can not be exceeded.

4.0 Location and Description of Sample Collection Sites

Figure 1 of the SAP shows the location of the three monitoring stations around SLF. All sites represent off-site ambient air. Sampling equipment will be located at a height of three to ten meters.

Site # 26111914 – This monitoring site is located on the eastern most perimeter of SLF inside the fenceline south of the #93 gate.

Site # 26111917 – This monitoring site has been located along the north perimeter of SLF inside the fenceline and is closest to the current active hazardous waste cells. A minor modification to the operating license was issued which approved moving this monitoring location to the east to account for site development.

Site # 26111918 – This monitoring site is located on the southwestern perimeter of SLF inside the fenceline and is closest to the recently capped non-hazardous waste cells. This station is also located in relatively close proximity to the daily cover storage piles and to the CSX Railway.

5.0 Results and Evaluations

The overall implementation of the AAMP is described in Attachment F.4. Since the implementation of the AAMP involves several different organizational tasks, sample collection procedure documentation, vendor selection, and monitoring method documentation, the team that developed the AAMP will also coordinate its implementation.

5.1 Reports

Dow will submit the AAMP results within 60 days of the end of each quarter to the Michigan Department of Environmental Quality (MDEQ) Air Quality Division Air Monitoring Unit. Meteorological measurements will be maintained on file by Dow and made available for inspection upon request.

5.2 Quality Assurance (QA)

Within 60 days of the close of each quarter, a QA audit will be performed. Explanations for "out-of-control" analytical systems and samples collected outside specified conditions will be recorded with explanation of the corrective measures employed. This information will be available upon request.

At a minimum, one audit will be performed each quarter for air flow. "Audit" as defined by Dow's Environmental QA Program is designed to provide data of known and documented quality. The program covers aspects of quality control (QC), personnel qualifications and training, sample collection, preservation, storage, analysis, records generation, and records review. Details of this QA/QC program are described in Dow's Analytical Science's Quality System Elements, and relevant Environmental Analytical Chemistry System Documents.

5.2.1 QA Coordinator

The QA coordinator or designee is responsible for providing reports to management, keeping track of documents, evaluating and storing data, audit procedures, documenting corrective action, and approving and documenting any deviations from the published sampling and analytical methods.

5.2.2 Sampling Apparatus QA

Samplers will be calibrated and maintained according to the operating instructions provided by the manufacturer and Dow Chemical Standard Operating Procedures (SOPs). Field records will cover all field observations, required equipment and sampling information.

Complete records will be maintained. These records will include, but are not limited to, the following:

A. Apparatus name, serial number, and location;

B. Date of maintenance, persons doing the maintenance, and what maintenance was done;

C. All sampler calibration data, including the date, the time, the name of the person doing the calibration, and the results; and

D. All observations and data required are in the sampling SOPs. Strict chain-of-custody procedures will be maintained to assist with the identification and tracing of the sample from the time of collection through the time of analysis and disposal. Samples will be labeled with the same description, number or location, samplers name or initials, date and time of sampling, a list of the preservatives added, and any applicable hazard information;

5.2.3 Analytical QA

Samples will be logged into the laboratory system and their condition noted. The receiving person will note any discrepancies or losses of samples before signing the chain-of-custody. Analysts will acknowledge the receipt of samples by signing the chain-of-custody forms. Samples will be stored according to the appropriate analytical method or SOP.

The standard analytical methods have very specific requirements for QA/QC and these requirements are detailed in the methods. The exact requirements for demonstrating the reliability of a developed method are normally dictated by the specific program.

Equipment calibration, maintenance records and raw data will be maintained, and standards will be traceable to the EPA or a manufacturer by name and lot number.

5.2.4 Data Reduction and Storage

The specific equations that will be used to calculate all results are included in the sampling and analytical methods.

Several stages of data confirmation will occur. All field and analytical data will be compared to the acceptance criteria of the reference method. All reports will be peer-reviewed. Data submitted to the agency will be reviewed by the QA/QC Coordinator or designee. QA/QC outliers will be treated on a case-by-case basis with appropriate action taken. Any action concerning outliers will be reported to MDEQ. Data will be retained in accordance with Part 111 Operating License records retention requirements. SOPs will be retained according to Dow records retention policies.

5.2.5 Sampler Accuracy

All sampling equipment will be audited at least once per calendar quarter. The audit will consist of a one-point flow rate check within the normal operating range of the sampler. The equipment and personnel used for auditing will be different than those used for normal equipment operation. The standards used for auditing will be traceable to NIST whenever possible. The percentage difference between the actual and measured values is used to assess accuracy of the sampling equipment. Acceptable results will be within ± 7 percent for high volume air sampler. Audit results will be maintained on file by Dow and made available for inspection upon request.

5.3 Data Evaluation Criteria

Total Suspended Particulate (TSP)	NAAQS Limits for TSP
24-Hour	150 ug/m^3
Yearly Average	50 ug/m^3

5.3.1 Exceedances

Dow will notify the MDEQ of any exceedance in the regularly scheduled quarterly report. This notification will include results of the investigation and any corrective actions that are proposed.

6.0 Criteria for Revising

6.1 Revision of SOPs, Changes to EPA Methods, and Availability of SOPs

Dow will collect and analyze samples according to the methods listed in Attachment F.3. Dow will submit proposed revisions to the AAMP to the MDEQ Chief of the Waste and Hazardous Materials Division for approval prior to implementation and shall revise any other affected document accordingly. If approved, the revision(s) to the AAMP shall become part of this license without the need for a minor license modification. Dow agrees to have their SOPs available during an audit. Contract laboratory SOPs will also be made available provided sufficient advance notice is given to obtain the documents (30 days).

Attachment F.1

Meteorological Data

Wind speed and wind direction data is gathered at the Meteorological station. It is equipped with monitors sensitive to 9.2 m/s changes in wind speed (range of 0-30 m/s) and 5° changes in wind direction (with minimum speed of 0.6 m/s). Temperature (to 0.1°C ± 0.5°C), relative humidity, and barometric pressure (to 0.5 mb ± 3 mb) are measured at Salzburg Landfill.

The following meteorological data will be collected in accordance with EPA guidance:*

1. Mean Horizontal Velocity (mean and standard deviation);
2. Mean Wind Direction (mean and standard deviation);
3. Temperature (high and low);
4. Wind Stability Class; and
5. Relative Humidity.

A spreadsheet of these data with date, time, and weather parameters will be kept on-site and available for review upon request. These data will be used to assign and “upwind” and “downwind” of sampling stations relative to SLF.

* “Quality Assurance Handbook for Air Pollution Measurement Systems,” EPA 600/4-82-060, August 1989 Revision.

Attachment F.2

Dow Environmental Monitoring Method for the Determination of TSP

The sampling procedure for TSP is titled, “High Volume Atmospheric Suspended Particulate Matter Sampler Operating Procedures.” The analytical methods used to determine the metals in the particulate samples are listed below:

Total Suspended Particulates:	40 CFR Part 58 Attachment F.2

Attachment F.3

Project Management Plan

D.1 Key Personnel

The overall responsibility for the AAMP resides with the Environmental Manager of the Dow Midland Analytical Sciences Laboratory. The responsibility for collecting and analyzing samples and generating the quality assurance data will reside with some combination of the Environmental Services Department, the Analytical Sciences Laboratory, and contract laboratories.

The responsibility for evaluating the adequacy of the quality assurance information associated with the program and compiling a quarterly interpretative report resides with the Environmental Analytical Sciences QA Team.

D.2 Occupational Health and Safety

As a condition of employment, Dow's Standards, practices, and guidelines for protecting the health and safety of its employees must be followed at all times by all Dow employees. These practices include, but are not limited to using appropriate protective equipment when handling hazardous materials, exercising caution when climbing ladders, and driving defensively. Each of Dow's Environmental Monitoring methods will contain a section describing any special safety considerations associated with the method. Although names and positions/titles may change over time, these changes will not require modification of the AAMP.

Attachment G

Field Data Sheet

Field Data Sheet

Salzburg Landfill Sampling Form

Project: Salzburg Landfill	**Sample Location ID:**	**Weather:** Ambient Temp:
Monitoring Program:	**Purge Start:**	Wind (speed/direction):
Field Personnel:	**Sample Time:**	General Weather Conditions:
Date:	**Pumped Dry (circle): Y / N**	
		Ground Conditions (circle): wet / dry / snow (amount) / ice

Time (24HR)	**Volume Purged** (L) or (gal)	**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**

SAMPLE DESCRIPTION:	**Bottle**	**Preservative**	**Required**	**Collected**	**Analyses/Method**	**Analytical Lab**
Clarity:	40 ml Glass Vial	Sulfuric Acid			VOA / 8260	
Other Info:	1 L Amber Glass	N/A			EOA / 8270	
Color:	250 ml Amber Gl.	Sulfuric Acid			TOC /9060 or 5310	
Odor: (circle and describe) Y / N	120 ml Amber Gl.	N/A			Carbonates / 310.1	
	120 ml Poly	N/A			Ions / 9056	
Calibration: Y / N	250 ml Poly	Nitric Acid			Metals / 6202 (Filtered)	
Method: Full / Bump / QuickCal®						
Sonde Info: Model:						
Serial No.:						
Other Instrumentation Notes/Info:						
Other Info:						
Analytical Lab: D = Dow, TA = Test America, O = Other______________						

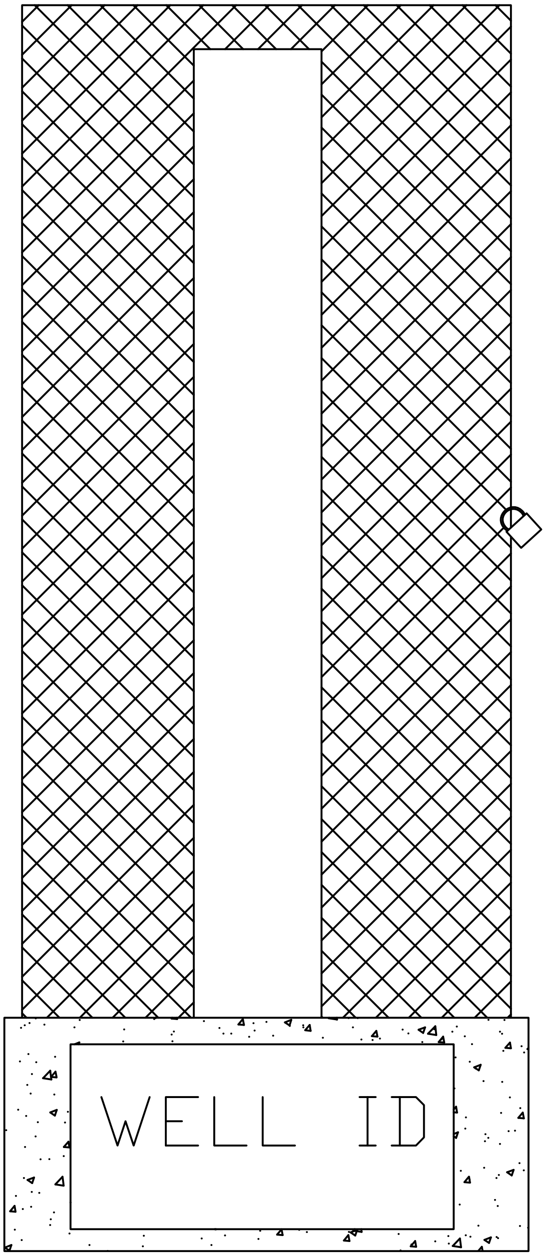
Additional Notes:

DOW CHEMICAL COMPANY - SALZBURG LANDFILL

MONITORING WELL ID:

DATE INSPECTED:

INSPECTOR(S):



PUMP FUNCTIONING:

WELL CAP LOCKED (UNLESS LOCKABLE CAGE):

WELL CASING CONDITION:

PROTECTIVE BARRIER POSTS:

SAMPLE PORT(IF APPLICABLE):

CAGE LOCKED (Y/N) - IF APPLICABLE:

CONCRETE PAD:

WELL SIGN (TAG):

FROST HEAVING (Y/N):

STANDING WATER (Y/N):

COLLISION DAMAGE (Y/N):

WELL SUBSIDENCE (Y/N):

WELL SURVEY MARK PRESENT (Y/N):

ADDITIONAL NOTES:

MAINTENANCE / CORRECTIVE MEASURES:

DATE OF MAINTENANCE / CORRECTIVE MEASURES:

Attachment H

Soil Box Data Evaluation Plan

SALZBURG LANDFILL
REVISED SOIL BOX DATA EVALUATION PLAN

THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS
MIDLAND, MICHIGAN

Submitted: November 21, 2011

Table of Contents

Section Title **Page**

Figures

Appendix

1.0 INTRODUCTION

This Revised Salzburg Landfill Soil Box Data Evaluation Plan (Plan) is being submitted pursuant to the environmental monitoring conditions outlined in The Hazardous Waste Management Facility Operating License for The Dow Chemical Company Salzburg Landfill (License), dated March 18, 2009.

Section IV.C.1 of the License stipulates that Dow shall "conduct a soil monitoring program as described in the SAP, Attachment 9 of this license." Section IV.C.2 of the License states that Dow shall "*propose a process for determining whether a statistically significant increase has occurred in comparison to background levels*", within 60 days of the original issuance of the License. That Plan was submitted on May 18, 2009. This Plan presents a revised soil monitoring program and describes the detailed approach for the evaluation of the data collected. The Sampling and Analysis Plan (SAP), Attachment 9 of the License will be updated to reflect this revision.

The following text outlines the history and objectives of the soil monitoring program and outlines the existing soil box monitoring data through June 2011. It is important to note that this document contains the methodology for handling and analyzing the data gathered, defining the historic data sets, evaluating the analytical results of the annual monitoring events, establishing the appropriate action levels based on rate of change ("flux rate"), and actions to be undertaken should those levels be observed. Upon approval of this Plan, data evaluation for subsequent monitoring events will be submitted in the corresponding Salzburg Landfill Quarterly Environmental Monitoring Reports.

1.1 History

Three soil boxes were constructed at Salzburg Landfill in 2002, as part of the T-Pond Transportation Monitoring Program. This program monitored conditions during disposal of T-Pond solids in the Salzburg Landfill, for the T-Pond Solids Removal Project at The Dow Chemical Company, Michigan Operations Facility, Midland, Michigan, MID 000 724 724. The T-Pond Transportation Monitoring Program provided verification that the operational practices and safeguards used during the transportation and landfilling of T-

Pond solids were effective in preventing dispersal of the solids and constituents of concern.

Sampling of the soil boxes under the T-Pond Transportation Monitoring Program started in October 2002 and was completed in May 2006. Sampling was conducted on a semi-annual basis, usually occurring in May and October of each year. Upon the completion of T-Pond Solids Removal Project in October 2006, Dow was no longer required to conduct the semi-annual sampling of the Soil Boxes at the landfill. However, from October 2006 to October 2008 Dow continued the semi-annual sampling of the Soil Boxes as a good faith effort to maintain a congruent dataset, in anticipation of the new Operating License being issued in 2009.

1.2 Purpose

The objective of a soil monitoring program is to evaluate the potential for a release of waste constituents to the surface soils from the facility. The purpose of this Plan is to determine whether a significant change in dioxin and furan concentrations occurred in comparison to the baseline levels in the soil boxes. The following sections describe the components of the Plan.

1.3 Overview of Soil Box Monitoring

Three Soil Boxes were constructed in 2002, and placed adjacent to transportation routes at the landfill (See Figure 1). SLF Soil Box 1 (SLFSB-01) is located along the internal landfill road north of the recently closed cell and the truck wash station; SLF Soil Box 2 (SLFSB-02) is located on the downwind side of the road just inside Gate 90 (based on the prevailing westerly wind direction); and SLF Soil Box 3 (SLFSB-03) is located in the upwind direction from the landfill. The boxes are located a minimum of eight feet from the road shoulder to insure that they are not disturbed during snow removal or other maintenance activities.

The Soil Boxes are approximately eight inches high and ten feet square. They were constructed using non-treated wood or cement blocks. The boxes were lined with a geotextile fabric before being filled with clean topsoil. Grass was planted to establish a vegetative cover. The boxes are maintained without the use of commercial fertilizer or herbicides. Vegetation height is maintained through the use of electrically powered cutting equipment. 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 annual basis and analyzed for the 17 2,3,7,8-substituted dioxin and furan isomers and for the total tetra- through octa-dioxin and furan congener groups, as specified in the SAP. Data 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 or isomer is not detected, one-half the detection limit of that congener or isomer will be 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. The Salzburg Landfill SAP should be referenced for the target analyte list, detection limits, and sampling protocols.

2.0 METHODS FOR DETECTING CHANGES FROM BASELINE CONDITIONS

In accordance with Section IV.C.3 of the License, *“within 60 days of each sampling of each soil box, the licensee shall determine if a statistically significant increase has occurred compared to background levels…”*

Data analysis for detecting a consistent change in dioxin and furan concentrations from historic 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

Facility characterization is a necessary first step before an appropriate data set can be identified for comparison to a criterion. Spatially-dependent concentrations, if identified, must be handled separately. This is necessary to avoid averaging or diluting the samples from contiguous areas of elevated or lower concentration. Adherence to these assumptions is necessary if an accurate conclusion is to be drawn.

Characterization of Salzburg Landfill Soil Boxes was conducted using the historical data collected from each location. The baseline data for the Soil Boxes includes results from the semi-annual samples collected from October 2002 through October 2008, and an annual sampling schedule from 2009 to the present.

2.2 Constructing Time Plots

Time plots were constructed for each of the three existing Soil Boxes. The following time plots were prepared, based on the data collected up to June 2011, and are shown in Appendix A (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); and
- 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.

In the future, on at least an annual basis, samples will be collected from each of the three locations and plotted onto the aforementioned time plots.

2.3 Data Evaluation for the 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 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 Operating License Condition IV.C.4, 5, and 6) will be considered and taken. A detailed description 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 5.0 ppt and 2.0 ppt, respectively, per an annual period. More frequent monitoring (i.e, 6-month period or semi-annual) will utilize screening levels of 2.5 ppt for the flux rate and 1.0 ppt for the rolling average flux rate. This screening level is identical to the Michigan Operations Soil Box Data Evaluation Plan after adjusting for the different monitoring period.

In addition, a conservative value of 30 ppt will also be used as a “threshold value.” This threshold value is approximately 60% below the current Act 451, Part 201 Residential Direct Contact to soil criterion (RDCC) of 90 ppt. The flux rate screening level and the threshold value will be reevaluated and revised, as appropriate, based on future changes to the RDCC.

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 2 depicts a flowchart of the decision process described below:

Tier I

a. if the flux rate for a Soil Box exceeds 5.0 ppt (per an annual 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 semi-annual (i.e., two times a year) for this particular location.

b. if the rolling average flux rate for a Soil Box exceeds 2.0 ppt (per an annual period), the sampling frequency will increase to semi-annual (i.e., two times a year) for this particular location.

Tier II

1. After a minimum of four semi-annual monitoring events (i.e., at the increased sampling frequency in Tier II), the sampling frequency will revert to annually if at any given monitoring event, the flux rate returns to less than 2.5 ppt (per a 6-month period) and the rolling average flux rate is less than 1.0 ppt (per a 6-month period).
2. During the increased sampling frequency period (i.e., at Tier II), if the flux rate exceeds 2.5 ppt (per a 6-month period), <u>or</u> the rolling average flux rate exceeds 1.0 ppt (per a 6-month period), <u>consecutively</u> for four semi-annual events (two years), 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 occur.

2.5 Tier III Trend Analysis and Additional Evaluation

In the event that a location reaches Tier III, further evaluation will be conducted. Within 7 calendar days of the identification of a location reaching Tier III, Dow will provide a written notification (e.g., via e-mail) to the MDEQ which will include a proposed schedule for submittal for review and approval of an Evaluation Plan. The Evaluation Plan will include, as appropriate, comparison of data to regional background levels, previous sample results, results from other Soil Boxes, whether the fingerprint is distinguishable from historic samples, and additional soil sampling and analysis. 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.

In accordance with Condition IV.C.5 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 compliance monitoring and corrective action program will be proposed for review and approval by MDEQ.

In accordance with Condition IV.C.6 of the License, if it has been determined that off-site migration has occurred, or has the potential to occur, at concentrations that may exceed an environmental protection standard, Dow will comply with the requirements of the License. Also according to IV.C.6, a demonstration may be made that a source other than the licensed facility or an error in sampling, analysis, or evaluation solely caused the identification of a statistically significant increase.

3.0 SUMMARY OF EXISTING MONITORING DATA

Appendix A shows the data collected for the Soil Boxes (through June 2011) and the associated time plots.

3.1 SLF Soil Box 1

The flux rate and rolling average flux rate for dioxin and furan WHO-TEC concentrations collected from the SLF Soil Box 1 location were within the screening levels during the entire monitoring period.

3.2 SLF soil Box 2

The flux rate and rolling average flux rate for dioxin and furan WHO-TEC concentrations collected from the SLF Soil Box 2 location were within the screening levels during the entire monitoring period.

3.3 SLF Soil Box 3

The flux rate and rolling average flux rate for dioxin and furan WHO-TEC concentrations collected from the SLF Soil Box 3 location were within the screening levels during the entire monitoring period.

4.0 SCHEDULE

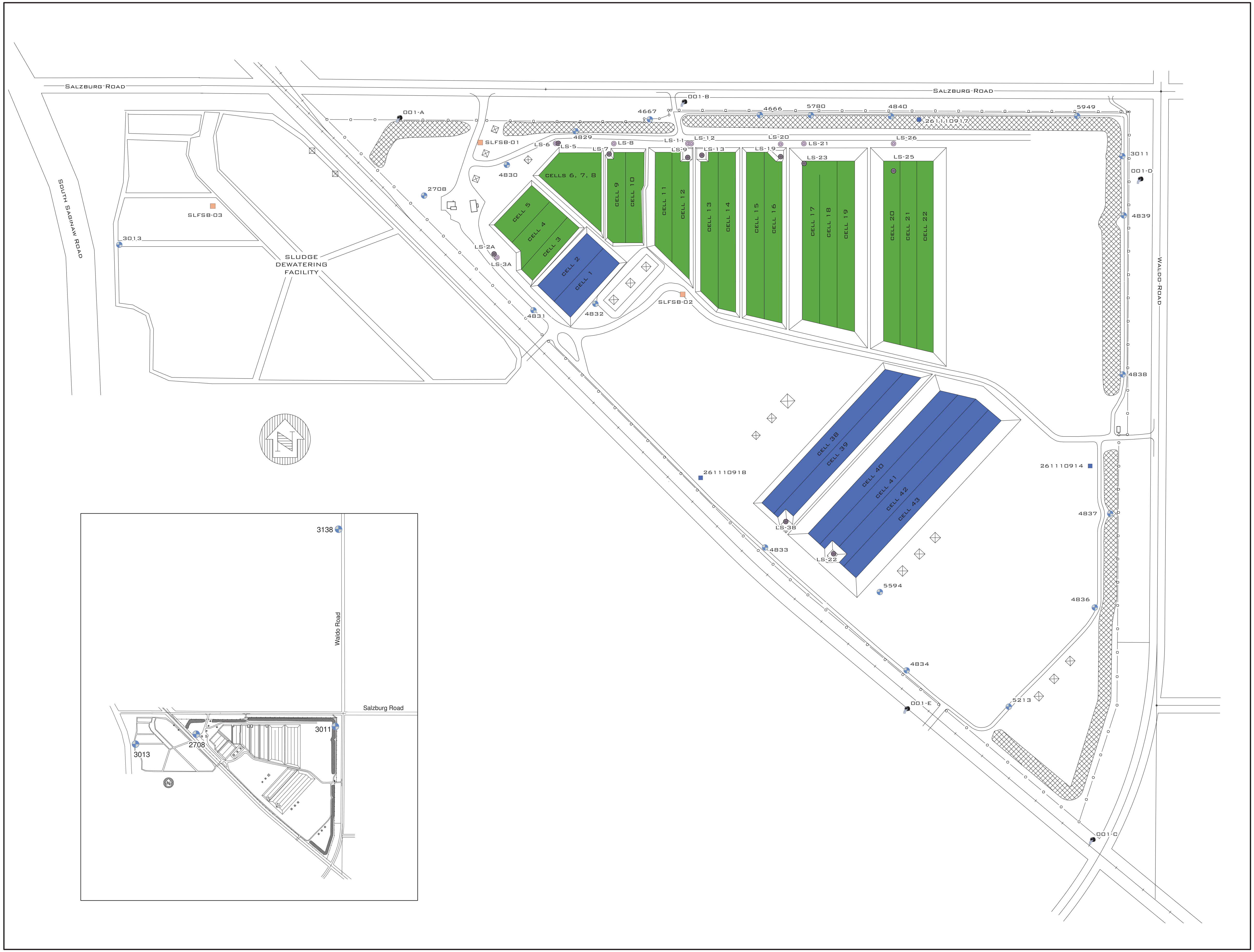
In accordance with Section IV.C.2 of the License, *"within 60 days of the approval of this process by the Division Chief, the licensee shall evaluate existing soil box monitoring data and submit a report on this evaluation to the Division."* Subsequent annual sampling events will be collected in the second quarter. Data evaluation will take place within 60 days of each soil box monitoring event. The monitoring data, time plots and determinations will be submitted in the corresponding Salzburg Landfill Quarterly Environmental Monitoring Reports, in accordance with the SAP.

The Soil Monitoring Program, including this Data Evaluation Plan and its associated screening levels will be re-evaluated in 2015 to determine if the program meets the purpose of *"evaluating the potential for a release of waste constituents to the surface soils from the facility"*. Dow will 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.

5.0 REFERENCES

1. *Soil Box and Greenbelt Data Evaluation Plan*, The Dow Chemical Company, November 23, 2005, Revised March 27, 2009.
2. *Statistics for Analytical Chemists*, Roland Caulcutt and Richard Boddy, 1989.
3. *Implementing Control Charts*, The Dow Chemical Company, 1992, Form No. 314-00224-92.
4. *Statistical Methods for Environmental Pollution Monitoring*, Richard O. Gilbert, 1987.
5. *Introduction to Statistical Quality Control*, 2nd ed., Montgomery, D.C., John Wiley, New York, 1991.
6. *U.S. EPA Statistical Analysis of Ground-Water Monitoring Data At RCRA Facilities*, Interim Final Guidance, April 1989.
7. *DEQ Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria*, 2002.

FIGURES



N
W E
S

THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS
MIDLAND, MICHIGAN

URS

Drawn: M. Crook	Date: 01/09/2006
Review: K. Cosan	Date: 01/09/2006
Revision:	Date:
Revision:	Date:
Revision:	Date:
Revision:	Date:
Issued:	Date:
Issued	Date:
Issued:	Date:
Issued:	Date:

Legend:

- ■ Air Monitoring Locations
- ● Groundwater Monitoring Well
- ● Leachate Collection Location
- ○ Liner Failure Detection Location
- ● Surface Water Outfalls
- ■ Soil Box Location
- ☒ Utility Tower
- ▨ Perimeter Berm
- Perimeter Fence
- Rail Lines

Landfill Cell Type

- 🟩 Hazardous
- 🟦 Non-Hazardous

0 200 400 800 Feet

Drawing Scale: 1:2,263

Drawing Title:

SALZBURG LANDFILL
ENVIRONMENTAL MONITORING PLAN

SALZBURG-012.MXD

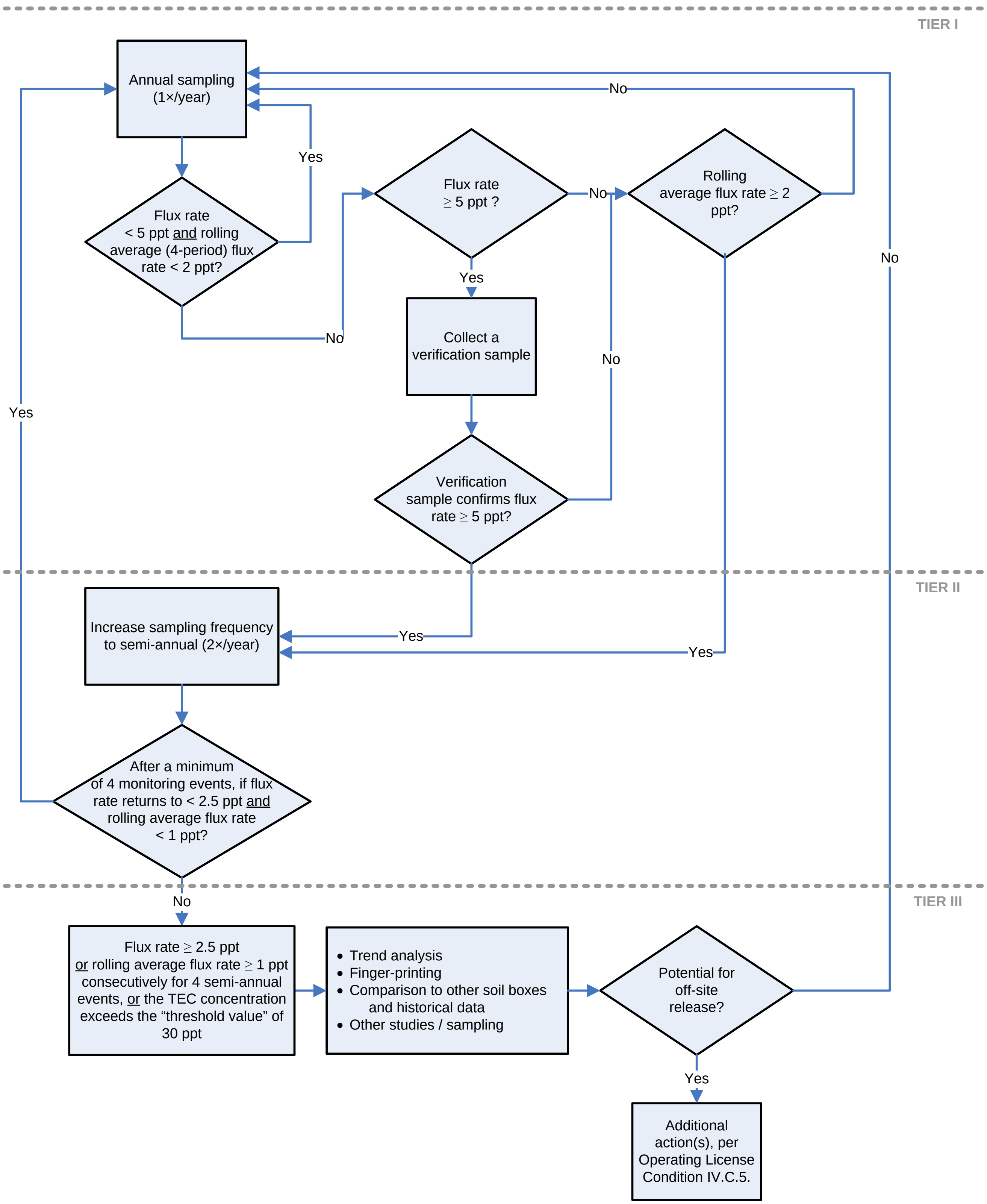


Figure 2
Monitoring Data Evaluation Flowchart

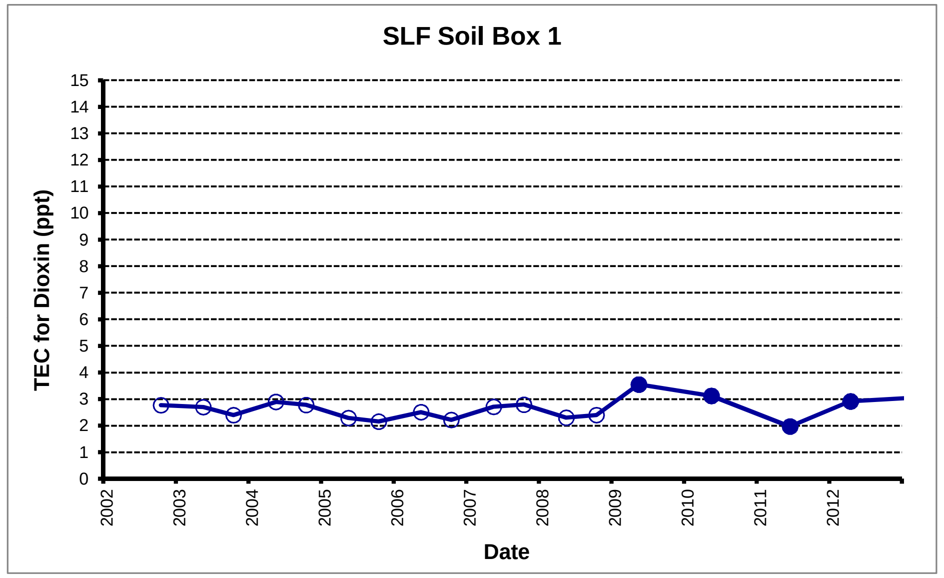
APPENDIX A

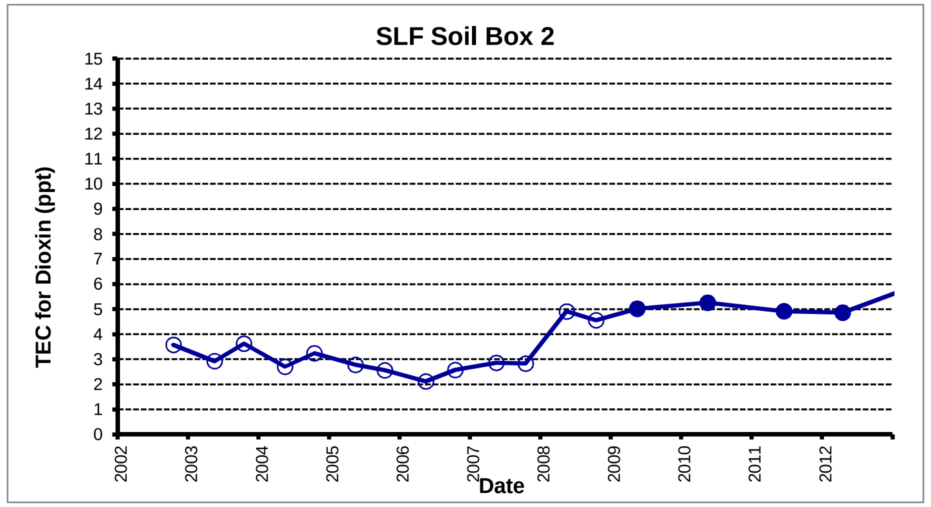
Summary of Soil Box Data Time Plots

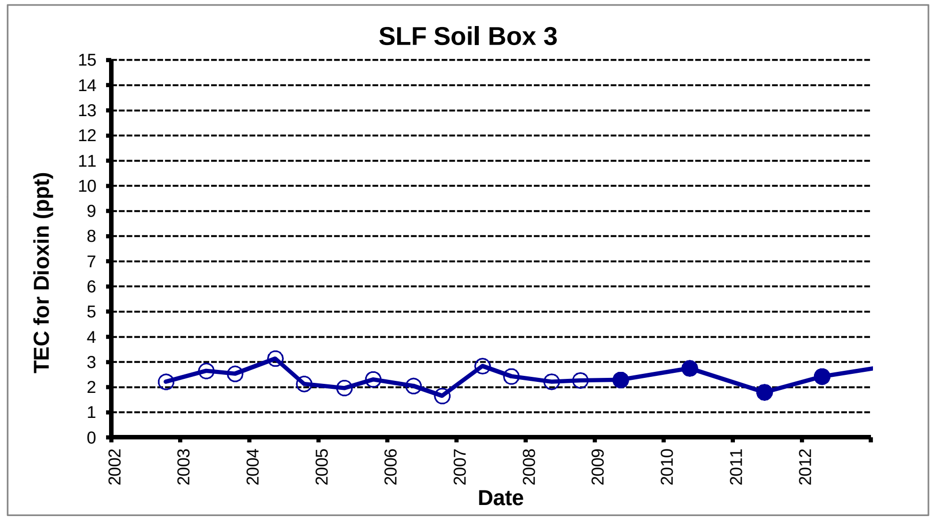
Salzburg Landfill Summary of Soil Box Data Time Plots
The Dow Chemical Company, Michigan Operations, Midland, Michigan
(Revised: 11/21/2011)

Time-Series Plots

○ Baseline Data
● Monitoring Data

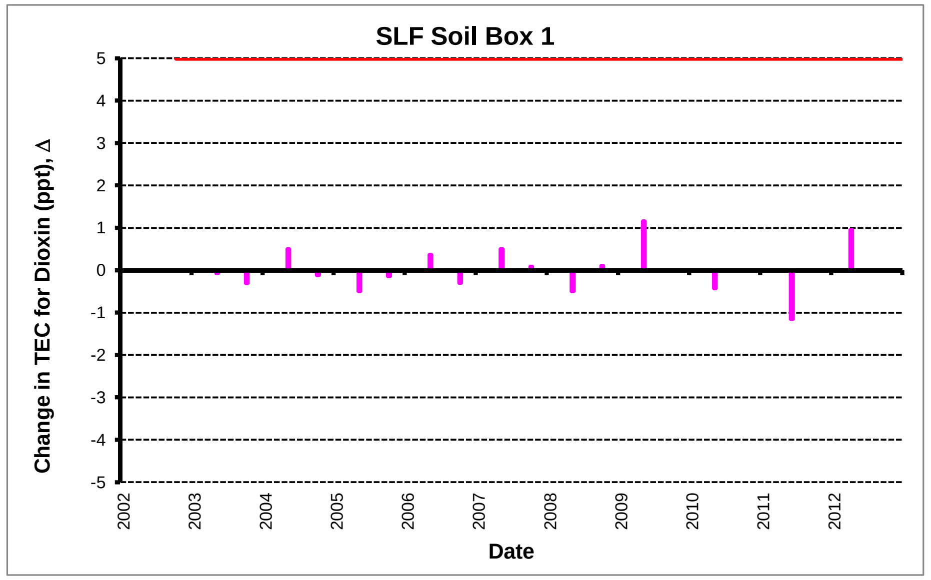

SLF Soil Box 1

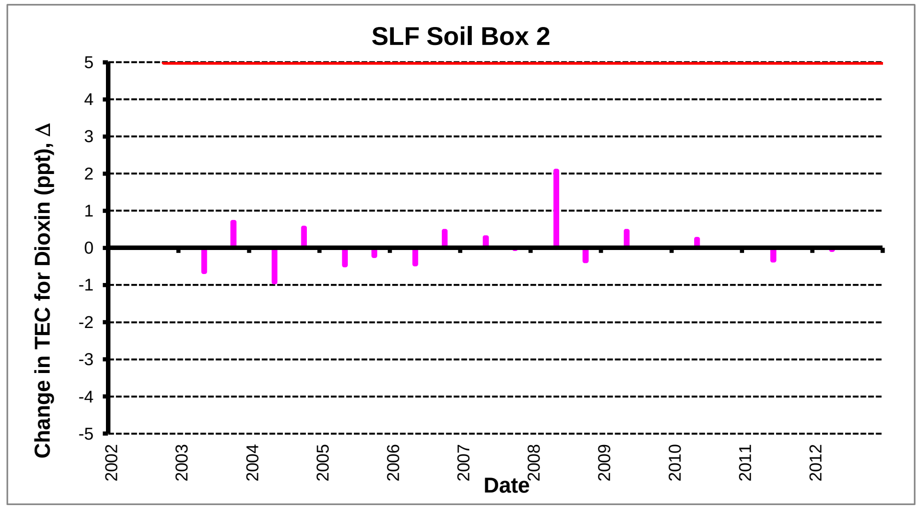

SLF Soil Box 2

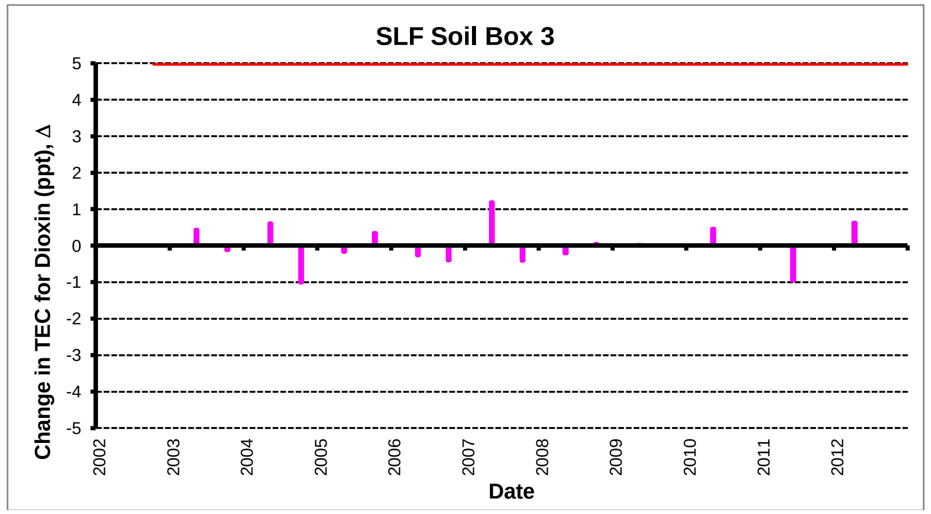

SLF Soil Box 3

Flux Rate Plots

▮ Change in TEC for Dioxin (ppt), Δ
= TEC at Current Period - TEC at Last Period
— Flux Rate Screening Level

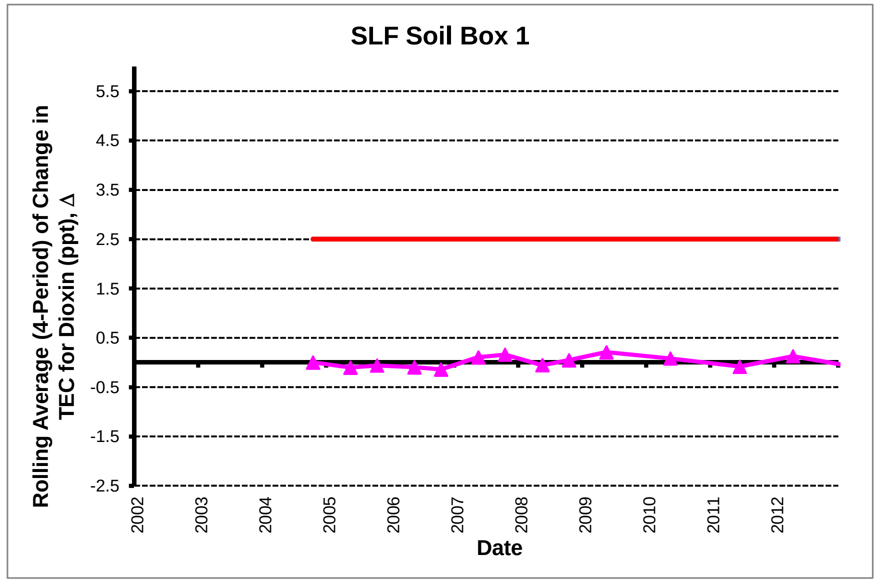

SLF Soil Box 1

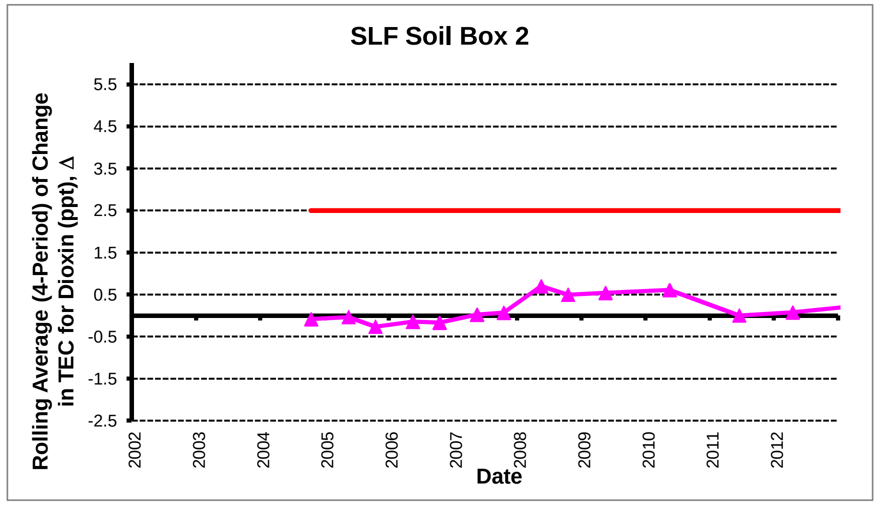

SLF Soil Box 2

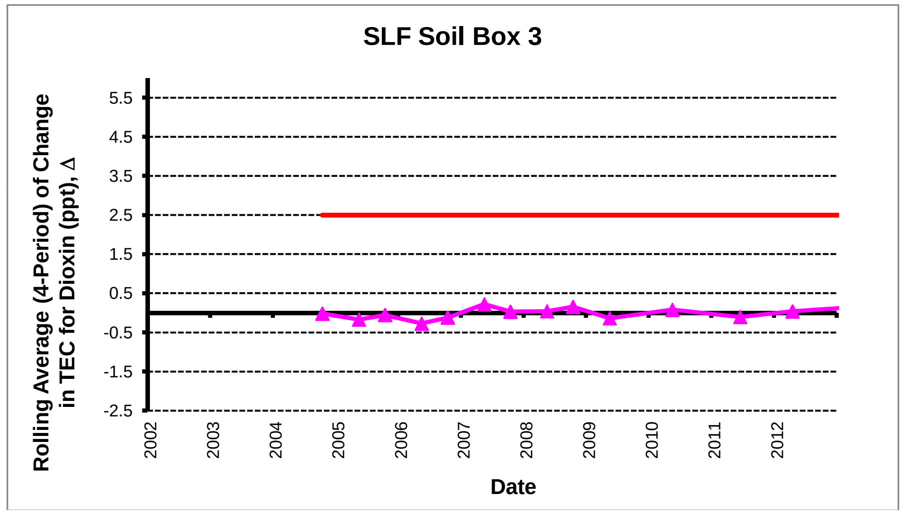

SLF Soil Box 3

Rolling Average (4-Period) Flux Rate Plots

▲ Rolling Average (4-Period) of Change in TEC for Dioxin (ppt), Δ
— Rolling Average Flux Rate Screening Level


SLF Soil Box 1


SLF Soil Box 2


SLF Soil Box 3

Attachment I

Performance Criteria Values

Attachment I - Performance Criteria Values

Program	Well(s)	Analysis/Compound	Performance Criteria Value	Performance Criteria Unit	Type	Background Dataset Submitted
Groundwater Monitoring	4829	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	7	ug/L	UPL	Yes
		Copper	10	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4830	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	12.2	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4831	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper		ug/L		No
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4832	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	13	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4833	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	13.8	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4834	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	10	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4836	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	7.3	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4837	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	9	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4838	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	7	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes

Attachment I - Performance Criteria Values

Program	Well(s)	Analysis/Compound	Performance Criteria Value	Performance Criteria Unit	Type	Background Dataset Submitted
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4839	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	10	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4840	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	10	ug/L	UPL	Yes
		Copper	3	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	5949	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	1.4	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	5780	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	2.6	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4666	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	22	ug/L	UPL	Yes
		Copper	5.6	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	4667	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	4.2	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	—	ug/L		No
		Vanadium	RL	ug/L	Reporting Limit	Yes
	5213	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	14	ug/L	UPL	Yes
		Copper	10	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	3	ug/L	UPL	Yes
	5594	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	14	ug/L	UPL	Yes
		Copper	1.2	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	6	ug/L	UPL	Yes
	3013	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	3.9	ug/L	UPL	Yes

Attachment I - Performance Criteria Values

Program	Well(s)	Analysis/Compound	Performance Criteria Value	Performance Criteria Unit	Type	Background Dataset Submitted
	3013	Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	2708	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	Rl	ug/L	Reporting Limit	Yes
		Copper	6	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	3011	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	RL	ug/L	Reporting Limit	Yes
		Copper	4	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes

Attachment I - Performance Criteria Values

Program	Well(s)	Analysis/Compound	Performance Criteria Value	Performance Criteria Unit	Type	Background Dataset Submitted

Program	Well(s)	Analysis/Compound	Performance Criteria Value	Performance Criteria Unit	Type	Background Dataset Submitted
Leak Detection System	Cells 3-5 LS 3A	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	10.5	ug/L	UPL	Yes
		Copper	6.9	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	Cells 6-8 LS 6	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	9	ug/L	UPL	Yes
		Copper	2.1	ug/L	UPL	Yes
		Cyanide	6.3	ug/L	UPL	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	Cells 9-10 LS 8	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	9	ug/L	UPL	Yes
		Copper	1.9	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	Cells 11-12 LS 11	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	9.12	ug/L	UPL	Yes
		Copper	2.14	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	Cells 13-14 LS 12	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	8.97	ug/L	UPL	Yes
		Copper	2.71	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	Cells 15-16 LS 20	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	9.85	ug/L	UPL	Yes
		Copper	9.1	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	Cells 17-19 LS 21	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	8.5	ug/L	UPL	Yes
		Copper	3.5	ug/L	UPL	Yes
		Cyanide	RL	ug/L	Reporting Limit	Yes
		Selenium	RL	ug/L	Reporting Limit	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes
	Cells 20-22 Cleanout	VOA and EOA	RL	ug/L	Reporting Limit	Yes
		Cobalt	5.8	ug/L	UPL	Yes
		Copper	6.6	ug/L	UPL	Yes
		Cyanide	Rl	ug/L	Reporting Limit	Yes
		Selenium	10	ug/L	UPL	Yes
		Vanadium	RL	ug/L	Reporting Limit	Yes

Attachment I - Performance Criteria Values

Program	Well(s)	Analysis/Compound	Performance Criteria Value	Performance Criteria Unit	Type	Background Dataset Submitted

Program	Well(s)	Analysis/Compound	Performance Criteria Value	Performance Criteria Unit	Type	Background Dataset Submitted
Surface Water Monitoring	001-B	Cobalt	100		Rule 57 Criterion	Yes
		Copper	17		Rule 57 Criterion	
		Cyanide	5.2		Rule 57 Criterion	
		Selenium	5		Rule 57 Criterion	
		TOC	18300		UPL	
		Vanadium	27		Rule 57 Criterion	
	001-D	Cobalt	100		Rule 57 Criterion	
		Copper	17		Rule 57 Criterion	
		Cyanide	5.2		Rule 57 Criterion	
		Selenium	5		Rule 57 Criterion	
		TOC	15900		UPL	
		Vanadium	27		Rule 57 Criterion	
	001-E	Cobalt	100		Rule 57 Criterion	
		Copper	17		Rule 57 Criterion	
		Cyanide	5.2		Rule 57 Criterion	
		Selenium	5		Rule 57 Criterion	
		TOC	15800		UPL	
		Vanadium	27		Rule 57 Criterion	

Program	Well(s)	Analysis/Compound	Performance Criteria Value	Performance Criteria Unit	Type	Background Dataset Submitted
Leachate Monitoring	Cells 1-5 LS 2A	All compounds	None	NA	No performance criteria, however results will be evaluated annually to determine if new constituents need to be added to the primary constituents list. See Table 2-A of the SAP for more information	NA
	Cells 6-8 LS 5	All compounds	None	NA		
	Cells 9-10 LS 7	All compounds	None	NA		
	Cells 11-12 LS 9	All compounds	None	NA		
	Cells 13-14 LS 13	All compounds	None	NA		
	Cells 15-16 LS 19	All compounds	None	NA		
	Cells 17-19 LS 23	All compounds	None	NA		
	Cells 20-22 LS 25	All compounds	None	NA		
	Cells 38-39 LS 38	All compounds	None	NA		
	Cells 40-43 LS 22	All compounds	None	NA		

Attachment I - Performance Criteria Values

Program	Well(s)	Analysis/Compound	Performance Criteria Value	Performance Criteria Unit	Type	Background Dataset Submitted

Program	Well(s)	Analysis/Compound	Performance Criteria Value	Performance Criteria Unit	Type	Background Dataset Submitted
Soil Box Monitoring	SB-01	Dioxins and Furans	5.0/2.0	ppt	Flux rate screening criteria and flux rate rolling average	Yes. See the Soil Box Data Evaluation Plan
	SB-02	Dioxins and Furans	5.0/2.0	ppt		
	SB-03	Dioxins and Furans	5.0/2.0	ppt		