ATTACHMENT XIV.B2

APPENDIX A

Work Plan
for
Groundwater Collection Tile Upgrade Projects

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Introduction

The Revetment Groundwater Interception System (RGIS) was originally installed between 1980 and 1992 along the banks of the Tittabawassee River (River) and around the Tertiary Pond in Michigan Operations (Plant). The 6 Pond Collection Tile (originally referred to as the 'Riverbank Restoration System') was installed in the late 1970's. The South Saginaw Road Tile was installed in 2002 along the Eastern perimeter of the Facility. Each system is a French drain tile collection and pumping system designed and built to ensure untreated groundwater does not enter the Tittabawassee River and Bullock Creek. Starting in 1994, sections of RGIS were upgraded to enhance performance and extend their operational life. Upgrades to the 6 Pond Collection Tile began in 1989, where the section draining to LS-14 was replaced. Additional upgrades were begun in 2005, with the upgrade of LS-11.

This Work Plan describes the protocols used to perform upgrades of the East and West Side RGIS, South Saginaw Road Tile, and the 6 Pond Collection Tile and provides a general description of the various investigations, design and construction tasks that will be performed in order to complete work. This Work Plan will be used as the guideline for completing upgrades to existing groundwater collection systems that use technology and construction techniques that are consistent with previous projects without the need for submitting individual work plans for each segment. This Work Plan is organized into two main sections. The first portion summarizes the details for conducting a soils investigation (including chemical testing for waste characterization) and development of the design for the upgrade. The second portion of the Work Plan summarizes the practices, materials and standards used during the construction of each upgraded system.

For each upgrade project, the technical basis for the designs and relevant environmental data will be provided to MDEQ and an opportunity provided to review and comment provided prior to construction. Design information required to complete the upgrade work will be shown on the construction drawings for each project. In general, all work will be performed in accordance with the detailed specifications that have been used, and approved by the MDEQ on past RGIS upgrade projects.

Scope of Work

Upgrades to existing groundwater collection tile systems are comprehensive projects that are undertaken to provide all of the relevant information necessary for design of the upgrade as well as complete the construction. The major scope items proposed for this project include:

- Soils Investigation
- Permits and Approvals
- Worker Protection
- Waste Management Plan
- Detailed Design
- Construction Plans
- Monitoring Plans
- Schedule

Deliverables that will be provided to MDEQ prior to construction include the following:

- Hydrogeologic Summary Report, including the basis for the suitability of the upgrade project design;
- Project-specific waste management plan, including handling procedures for excess soils including staging or treatment areas as well as environmental data used to demonstrate compliance with Land Disposal Restrictions (or those identified approved Site-Specific Treatability Variance, where applicable);
- Material specifications for new or alternate materials;
- A project-specific construction plan identifying the project schedule and any changes from the elements provided in this Work Plan; and
- For projects where generated excess soils will not meet the requirements of the Site Specific Land Disposal Restriction Treatability Variance and will require additional treatment (e.g. incineration) prior to land disposal which will necessitate the use of a project-specific corrective action management unit (CAMU); detailed plans and a request for minor license modification will be

submitted to include specific license conditions applicable to the design, construction, operation and closure of each project-specific CAMU.

Deliverables that will be provided to MDEQ after completion of construction include the following:

- As-built drawings;
- Relevant changes to the Michigan Operations Midland Plant inspection schedule and Sampling and Analysis Plan; and
- For projects where soils did not meet the requirements of the Site Specific Land Disposal Restriction Treatability Variance and required additional treatment (e.g. incineration) prior to land disposal; a Notice of Completion of Closure for either a single staging pile or a CAMU will be provided as necessary.

Soils Investigation

Soils to be removed during construction typically include some natural soils and fill soils associated with installation of a replacement groundwater collection tile and a highly permeable cutoff-wall (filter stone). Previous work and past experience on the tile systems installed at the Facility suggest soils encountered in existing trench excavations are manmade (placed by filling) and heterogeneous in nature. Soils encountered outside of areas where existing trenches were installed are typically either sands and floodplain deposits or random fill. Additionally, fills may not be stratified in a predictable manner. During construction, soils are typically removed in minimum cuts of 36” to target depth, and proceed laterally.

Soils are investigated for three primary purposes: (1) preparation of a waste management plan; (2) evaluation of short and long term slope stability; and (3) to complete a detailed design of the drainage features associated with the project, being the drainage media gradation, pipe perforation design, tile sizing, and sloping. Where groundwater elevation data are not available, piezometers may be installed and monitored as well to provide data used during estimation of groundwater inflow.

Soil samples will be obtained from each area for chemical characterization and development of the waste management plan, as described below. In addition to chemical testing, soil samples are also obtained from collection tile upgrade areas and tested for index physical properties, such as soil classification, grain size distribution and hydraulic conductivity. These parameters are used during detailed design. Environmental analytical data will be provided to MDEQ prior to construction. At a minimum, any additional environmental monitoring (including analytical data from characterization soil borings) will be submitted to MDEQ within 60 days of the end of the quarter in which the samples were analyzed, or upon completion of data validation.

Permits and Approvals

Certain sections of the groundwater collection tiles may require additional permitting and/or approvals to complete the work. Based on past experience the following permits may be required:

- Some work within floodplains may require a USACE/MDEQ Joint Permit, depending on the scope of activities;
- A Midland County Part 91, Soil Erosion and Sedimentation Control Permit is likely to be required for most groundwater collection tile upgrades; and/or
- Additional permits as required.

The time required for obtaining these permits will be accounted for in the project schedule. All of the required permits or approvals will be obtained prior to starting construction on the project. To facilitate anticipated work in the floodplain, an application for a USACE/MDEQ Joint Permit was submitted to MDEQ on April 16, 2014 which would be in effect for certain upgrade projects to the RGIS through 2020.

Worker and Public Protection

All work will be planned and performed in a manner that protects human health and the environment. The Team will comply with all applicable MIOSHA HAZWOPER, RCRA and Michigan Part 111 rules and regulations along with the applicable Dow Standards. Chemicals of concern will be identified for each project based on associated RGIS lift station water analytical data, soil characterization data in the area or other relevant sources of environmental information. The personal protective equipment and decontamination requirements (PPE Plan) specified each project will be similar to those utilized, and approved by the MDEQ, on past groundwater collection tile upgrade projects. The PPE Plan will be updated with the list of chemicals of concern for each area, along with the applicable exposure limits and associated action criteria.

Dust management and trackout control measures will be performed for the duration of the project on all areas affected by the work. Generation of visible dust will be prevented with water and/or dust palliatives. Trackout will be managed by removing all visible soil from vehicles and equipment prior to exiting the work site. Soil removal will be performed with brooms, brushes, shovels, etc. All soil removed during this process will be placed in trucks and properly disposed of. In the floodplain, clean sacrificial clay cover soil will be applied to prevent inundation and/or erosion of contaminated soils during high water events.

Site Control

Access to the construction site will be limited from the plant site by the existing gates in the fence. A temporary construction barricade (orange safety fencing) will be placed around the excavation during off-hours to prevent inadvertent entry by the public. Signs will be posted at the boundary of the work area indicating access is restricted and PPE is required prior to entry. Dow security personnel routinely patrol the area and many areas are also under camera surveillance.

Waste Management Plan

Previous work and past experience on the tile systems installed at the Facility suggest soils encountered along the east side of the Tittabawassee River are impacted to a greater extent than those encountered at either the South Saginaw Road Tile or the 6 Pond Collection Tile. As described in Attachments 1 and 2, soils that have contacted East Side RGIS leachate or seepage from the Tertiary Pond Surface Impoundment along the West Side, are classified as hazardous waste and carry the F039 waste code by application of R 299.9203(1)(c). As such, soil chemistry data are necessary to determine whether or not treatment is required prior to land disposal of excess soils. Generated hazardous waste that meets land disposal restrictions or complies with the site-specific treatability variance will be disposed of in Salzburg Landfill.

The primary objective of soil chemistry sampling for the South Saginaw Road Tile or 6 Pond Collection Tile systems is to determine if excavated soils may be re-used or excess soils may be relocated to upland areas within the Facility, subject to site excavation protocols and Part 201 of P.A. 451, as amended; or disposed of in Salzburg Landfill. Environmental analytical data will be provided to MDEQ prior to construction. At a minimum, any additional environmental monitoring (including analytical data from characterization soil borings) will be submitted to MDEQ within 60 days of the end of the quarter in which the samples were analyzed, or upon completion of data validation.

Depending on the results of chemical characterization, the Waste Management Plan will specify any handling procedures for excess soils including staging or treatment areas. For short term handling of soils prior to loading and trucking for disposal, staged soils will be managed and maintained to prevent runoff to surface water and generation of visible dust. For longer term soil storage, if the use of a Soil Staging Pile (currently authorized for a single use) or Corrective Action Management Unit will be utilized during the upgrade project, a work plan for the project must include detailed designs for the preparation of a Corrective Action Management Unit, within the portion of the facility authorized by the MDEQ for such use.

If suitable excavated soil will be salvaged and reused as backfill, the locations for doing so will be shown on the relevant construction drawings. All excess excavated soil that will be relocated will be hauled to a relocation site as soon as practical. The relocated soil will be covered with 6 inches of new topsoil and seeded.

Dust management and trackout control measures will be performed for the duration of the project on all areas affected by the work so that no visible dust is generated. Dust will be managed with water and/or dust palliatives. Trackout will be managed by removing all visible soil from vehicles and equipment prior to exiting the work site. Soil removal will be performed with brooms, brushes, shovels, etc. If water is used for equipment decontamination at the construction site, the equipment decontamination area will be designed to manage rinseate. All soil removed during this process will be placed in trucks and properly disposed of. All waste hauled over public roadways will use appropriately licensed waste haulers and dump trucks with sealed tailgates.

Detailed Design

Detailed design reports and drawings will be prepared for each upgrade section. The detailed design will describe the basis for design as well as specify the materials of construction. Changes to this baseline design will be approved prior to implementation.

The new pipe will be perforated HDPE pipe similar to that used on past RGIS upgrades. The pipe, perforations and filter stone backfill will all be designed to accommodate the surrounding soils plus the anticipated groundwater and river infiltration flow rates.

Perforated Pipe

Pipe size and perforation will be specifically designed for each section. Unless otherwise specified, drain pipe will be 8” SDR 21 HDPE with 4 – 1/4 inch diameter perforations located 90 degrees from each other at 3 inch centers for the full length of the pipe as shown on the construction drawings. Sloping of the pipe will also be specified on the detailed design drawings.

Filter Stone

The backfill for the new pipe will be low carbonate filter stone meeting the gradation requirements determined for the project. Unless otherwise specified, the filter stone will meet the following criteria:

- Permeability – minimum of 1 x 10^{-2} cm/sec as determined by ASTM D 2434
- Carbonate content – maximum of 5% by weight as determined by ASTM D 3042

Manholes

Manholes (MH) will typically be 48 inch diameter and meet ASTM specifications. The cover and coating requirements for the bottom section of each MH are detailed on the construction drawing.

Piezometer

Pipe materials and fitting for the new piezometers (piezos) will generally be 2 inch threaded schedule 40 PVC. The piezo screen will be 3 foot long 2 inch diameter, 10 slot, stainless steel wire-wrapped Johnson screen or an approved equal. Primary piezos will be installed in the pipe trench and surrounded with filter stone as shown on the drawings. Details for the protection of piezometers will be provided on the drawings (e.g., poured concrete vault or salvaged steel canisters). Piezometers will be located along the tile at the maximum tile invert elevations for each reach, which are generally spaced between 300 to 600 feet apart. The locations of the proposed piezometers will be shown on the design drawings and provided to MDEQ prior to construction.

Upon completion, new piezometer well specifications, monitoring and inspection requirements will be provided in an update to the Midland Plant Facility SAP and inspection schedule.

Geotextiles

Where utilized, the geotextile (GTX) separator brand and type will be specified on the design drawings, including necessary installation details.

Cap Materials

Where utilized, a geosynthetic clay liner brand and type will be a specified on the design drawings, including necessary installation details. Where compacted clay is used, the soil classification and compaction requirements will be specified on the design drawings.

Topsoil, Seed, Fertilizer & Mulch

Topsoil will be clean and consist of loamy type and from a source approved by Dow. All foreign material and rocks 2 inches in diameter or larger shall be removed from the topsoil.

Unless otherwise specified, seed will be applied at 350 pounds per acre in the following mixture, or an approved equal:

- 33% Creeping Red Fescue
- 33% Kentucky Bluegrass
- 33% Perennial Ryegrass

Fertilizer will be 12-12-12 and applied at 500 pounds per acre, or an approved equal.

Mulch blanket will be North American Green S75®, or an equivalent approved by Dow. The mulch blankets will be anchored with wood or metal stakes in accordance with the manufacturer's recommendations.

Construction Plans

The sequence, schedule and details of construction for the upgrades will generally be in accordance with the following section. Special additional construction techniques may be necessary depending on utilities, surrounding area or other conditions at the time of

construction. The successful operation of the groundwater collection system will not be interrupted during construction. Groundwater pumping will continue throughout construction and successful reversal of the natural gradient will be maintained.

Mobilization and Site Preparation

Prior to the start of pipe installation, the site and associated facilities will be prepared and/or upgraded to ensure a safe, clean working area for personnel and equipment.

Haul Roads & Ramps

Existing access roads and ramps that will be used to access the construction site will be graded and resurfaced with new crushed stone, as needed. The ramps and roads will be inspected for spillage of excavated material throughout the construction process. Any material that is found will be scraped-up (along with 2 to 4 inches of the existing gravel), placed in trucks or packs and properly disposed of.

Silt Fence

A silt fence or other required erosion control measures will be installed at work site in accordance with the relevant Soil Erosion and Sedimentation Control Permit (or equivalent). The erosion control measures will be inspected daily maintained for the duration of the project.

Personnel Decontamination Facilities

Personnel decontamination facilities (decon station) will be constructed immediately adjacent to the work site. The decon station will include a small shed for storage of personal protective equipment (PPE), benches for personnel to use while donning and doffing PPE, small tubes of water with brushes for washing and rinsing boots, portable hand-wash stations and a portable toilet. The decon facilities will be maintained for the duration of the project. Boot wash and rinse water will be changed and properly disposed of as often as needed to provide adequate cleaning. The decon station may be moved from time to time to different locations along the project to facilitate the location of work for that day.

Pipe Installation and Restoration Work

A properly sloped trench will be to provide safe entry for the workers installing the new pipe and also to allow the trench box to be set. If ground conditions are found to be too unstable for an open-cut trench, two rows of temporary sheet piling will be installed to facilitate this work. The new pipe will typically be installed in an upstream direction using the same trench box technology that has been successfully used on past groundwater collection tile upgrade projects.

Dow will continuously monitor the weather and river for the duration of the project. This will include contacting Sanford Dam to discuss the upstream river conditions and their anticipated operational flow parameters for upcoming day(s). Open excavations within the floodplain will be completely backfilled and all stockpiled excavated soil will be moved off of the river bank if a flood event is imminent.

Groundwater encountered during construction will be managed via the existing collection tiles or on-site sewers (new and existing) and with pumps. All pumped groundwater will be discharged to an existing lift station, manholes or cleanout and/or a Facility sewer that drains to the Dow's Wastewater treatment plant. Precipitation or surface water that falls or flows onto an open excavation within the project site will be handled in the same manner as groundwater. All groundwater and surface water managed on this project will be sent to the WWTP.

The HDPE pipe sections will be bonded into continuous length by the butt fusion method in accordance with manufacturer's recommended welding procedure. All pipe welds will be properly inspected and documented. The new pipe will be installed to the horizontal and vertical alignment shown on the construction drawings. It will have a continuous filter stone envelop placed below, around and above the pipe with no voids. The installed horizontal location and elevation of the new pipe will be continuously documented to generate as-built drawings when the work is completed.

The new pipe will be cleaned and tested. Cleaning will consist of running a water jet through the new pipe to remove all soil and debris which may have entered during construction. Testing consists of manually pulling a mandrel (pig) through the new pipe. The acceptance criterion for pulling the pig through the new pipe is "no resistance". Any new pipe found to be defective will be repaired, replaced or adjusted to grade. When repairs have been made, the new pipe will be re-cleaned and re-tested.

The new manholes, piezometer and geotextile separator will all be installed as detailed on the construction drawings after the pipe work is completed. Upon completion of the installation work all disturbed areas, including where excavated was stockpiled along the Plant side of the trench, will be restored by placing a new 6 inch layer of topsoil then seeding, fertilizing and covering with a mulch blanket. The original grade for each area will be maintained after restoration, except as explicitly allowed by the USACE/MDEQ Joint Permit.

Site Cleanup and Demobilization

Upon completion of the pipe installation and restoration work, the site and associated marshalling facilities will be thoroughly cleaned and all equipment demobilized. This work involves, but is not limited to the following tasks.

Decon Stations

The decon station shed and benches will be cleaned and salvaged for reuse on future projects. The portable hand-wash stations and toilet will be deconned, as necessary, returned to the vendors. All other decon station materials will be properly disposed of.

Construction Equipment & Hand Tool Decon

Construction equipment and hand tools will receive final decontaminated at the 1304 Building (truck wash) located near the WWTP. Tracked equipment will be hauled by low-boy to the truck wash. Rubber tired vehicles will be driven to the truck wash. All equipment, including the low-boys used to haul equipment, will be washed visibly

clean of all soil. All cleaned equipment and hand tools will be inspected and approved by Dow prior to leaving the Plant.

Erosion Control Measures

The erosion control measures will be left inplace and maintained until and adequate vegetative growth is achieved then it shall be removed and disposed of.

Schedule

The anticipated schedule for the completion of each upgrade project and submittal of deliverables will be specified in the project-specific construction plan. The dates shown will be estimates and subject to change based on issuance of the necessary permits and approvals plus river and weather conditions.

Attachments

Attachment 1

RGIS UPGRADE PROJECTS
SOIL CHEMICAL CHARACTERIZATION PROTOCOL

RGIS UPGRADE PROJECTS
SOIL CHEMICAL CHARACTERIZATION PROTOCOL

1.0 Project Description

Dow's Michigan Operations Midland Plant is located in Midland, Michigan, as shown in Figure 1. Several miles of groundwater collection trench and tiling are utilized for groundwater containment at Dow's Michigan Operations Midland Plant. Periodic upgrades or replacements of portions of this system are done as needed to insure long-term performance of the system is maintained. Upgrades to the RGIS typically include removal of existing soils and groundwater collection tiles from target areas defined by the project. New groundwater collection tile and permeable cutoff media will be installed within the excavated trench. The soil sampling protocol defines how to obtain and test samples to evaluate their re-use as fill, disposal, or treatment prior to disposal. Samples are obtained prior to construction for planning disposal purposes.

2.0 Description of Soils to be Excavated

Soils to be removed include some natural soils and fill soils associated with installation of existing groundwater collection tiles and permeable cutoff media. Previous work and past experience suggest soils encountered in the trench excavations are manmade (placed by filling) and heterogeneous in nature. Additionally, fills may not be stratified in a predictable manner. During construction, soils will be removed in minimum cuts of 36" to target depth, and proceed laterally. Excess soils that have contacted East Side RGIS Leachate or seepage from the Tertiary Pond Surface Impoundment may not be relocated, are classified as hazardous waste and carry the F039 waste code by application of R 299.9203(1)(c).

3.0 Primary Objective

The primary objective of this sampling protocol is to determine if excavated soils will be:

1. Re-used or relocated on site as fill and covered with new topsoil;
2. Disposed of in Salzburg Landfill; or
3. Stockpiled and treated (via incineration) prior to disposal in Salzburg Landfill.

4.0 Specific Sampling Objectives

This sampling plan is designed to complete the primary objective in a safe, efficient and scientifically reliable manner. The soil sampling strategy is to obtain sufficient samples that are both representative of soils, and representative of the overall excavation project.

5.0 Sampling Strategy

Sample locations are selected using an authoritative sampling method (SW-846, Ch 9). During construction, excavation will proceed with minimum 36" cuts, as described above. Samples are therefore collected on 36" vertical intervals to be representative of soils to be removed. The number of samples is identified within each project area based on calculations typically done for random sample selection (MDEQ, 2002). The samples are obtained from direct push, split spoon, or sonic drilling methods dependent on project requirements. Sampling will proceed to a depth equal to or just below existing tile elevations.

Figure 2 presents a schematic diagram of what could be referred to as soil management units. Each unit will be centered on the representative sample, and will extend ½ of the horizontal distance between adjacent samples. Disposition of individual units will be determined by results of chemical testing on the respective sample. Sub-sampling may be performed within an individual soil management unit, if desired, dependent on results of initial testing.

6.0 Laboratory Testing Protocol

Many RGIS lift stations have been chemically monitored on an annual basis for a number of years. This is completed as described in the Michigan Operations Midland Plant Sampling and Analysis Plan (SAP).

Results of historic annual leachate sampling and analysis from RGIS lift stations are the basis for the target list determination. Target analytes are selected from the list of detected constituents in the historic annual leachate sampling events. Target analytes are selected to evaluate industrial hygiene controls for construction, the potential for the soils to exhibit toxicity characteristic and, if so, to compare against universal treatment standards. To appropriately evaluate non-detect results, reporting limits will be adequate for comparison to relevant standards.

7.0 Field Sampling Methods

Field sampling methods will be consistent with Soil Monitoring Field Procedures identified in the SAP. Volatile organic compound samples (VOC) will be obtained from various locations throughout the sample interval. Semi-volatile organic compounds (SVOC), metals, inorganic, and trace analysis samples will be composited in a disposable aluminum pan prior to placement in sample jars. The following sampling procedure is anticipated:

- VOC samples obtained first;
- Remaining soils composited and homogenized in pan;
- Jars for SVOC testing will be filled;

- Jars for trace analyses will be filled; and
- Jars for metals and inorganic analyses will be filled.

Disposable plastic tools or re-useable metal or Teflon© coated tools should be used to collect samples. Decontamination of re-useable hand tools will include washing in water and Alconox© detergent (or equivalent) and rinsing with contaminant free water and then air dried.

8.0 Sample Preservation

VOC samples will be preserved in the field with methanol. All samples will be placed on ice in a cooler after collection. Overnight storage of samples will be done using a sample refrigerator designated for sample storage only.

9.0 Sample Labeling

Sample jars and vials will be clearly labeled with the following information:

- Unique sample identification;
- Sampler name or initials;
- Date sample collected;
- Time sample collected; and
- Analysis to be performed (VOC, SVOC, TRACE, or Metals).

10.0 Chain of Custody Procedures

All samples will be logged on a chain-of-custody record form. Transfer or shipment must include the chain-of-custody record form. A release and/or receipt signature is required for a change in custody of samples. The last person to sign the form retains responsibility for the samples.

11.0 Quality Assurance/Quality Control

Accuracy and precision of results will be evaluated by the use of duplicate sample analyses and field blank analyses. Duplicate samples will be collected and analyzed to verify that data are repeatable, or precise. Duplicate results that indicate less difference between analyses than between the maximum concentration and the regulatory threshold are acceptable. One duplicate sample will be collected for each ten (10) samples collected. Surrogate recoveries during analyses will be used to evaluate the accuracy of results. Recoveries within established ranges specified within the specific laboratory test methods are acceptable. Testing of field blank samples will be done to evaluate samples

for contamination from field activities. One field blank will be collected for each day of fieldwork.

12.0 Specific Project Details

It must be recognized that each area of upgrade will contain some degree of uniqueness. This section contains specific details or provides further insight on individual projects that are not discussed above.

12.1 Project Location

The RGIS soil sampling project will cover areas planned for excavation during the next construction season.

12.2 Target List

Annual sampling and analyses from East Side RGIS lift stations has been completed since 2003. Sampling events from 2000 through 2002 were for 40 CFR 264 Appendix IX constituents are also available for review to determine the target analyte list for this work, as described in Section 6.0. The Operating License requires West Side RGIS Lift Stations 9, 10, and 20 to be analyzed for 40 CFR 264 Appendix IX annually for four consecutive years, starting in 2003. Remaining West Side Lift Stations were sampled four times during 2006 for the Remediation MACT target list. After reviewing the pertinent data, target analytes are selected from those compounds previously identified above the detection limit in reviewed datasets.

12.3 Sample Number Determination

Calculations to estimate the appropriate minimum number of samples are based on simple grid interval spacing calculations recommended by MDEQ for statistical sampling grids (MDEQ, 2002). Since excavations proceed in a linear fashion, the total depth and length of the excavation are used to estimate the "area" of the excavation. Based on this area, the project site must be classified as "small", "medium", or "large", using the following MDEQ criterion:

- Small = up to 10,890 ft^2
- Medium = 10,890 ft^2 to 130,680 ft^2
- Large = over 130,680 ft^2

Grid intervals can be computed as described below. Grid intervals for "small", "medium", and "large" sites are computed using formulas (1), (2), and (3), respectively (taken from MDEQ Guidance).

$$\text{Grid Interval (GI)} = [(\text{Area} \times \pi^{-1})^{0.5}] \times 2^{-1} \quad (1)$$

$$\text{Grid Interval (GI)} = [(\text{Area} \times \pi^{-1})^{0.5}] \times 4^{-1} \quad (2)$$

$$\text{Grid Interval (GI)} = [(\text{Area} \times \pi^{-1})^{0.5}] \times SF^{-1}\text{, where} \quad (3)$$

SF = Site Factor, which can be substituted by the length of the gridded area.

The minimum number of nodes needed to cover a sample area can be approximated by dividing the total project area by the area of each interval note (GI^2). This can be taken as the total minimum number of samples to be used for a project of similar area. Actual number of samples typically is more than the computed minimum.

12.4 Schedule

A sampling schedule will be developed and should allow for nearly three months for processing of data.

12.5 Soil Boring Limitations

Areas which have limited access will have to be dealt with on a case-by-case basis. In some instances, obtaining samples "near" the excavation which will conservatively approximate the chemical composition of the soils should be sufficient.

13.0 Reporting

Environmental analytical data will be provided to MDEQ prior to construction. At a minimum, any additional environmental monitoring (including analytical data from characterization soil borings) will be submitted to MDEQ within 60 days of the end of the quarter in which the samples were analyzed, or upon completion of data validation.

14.0 References

14.1 SW-846, Chapter 9 Sampling Plan.

14.2 Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria (2002).

14.3 Guidance for Data Quality Assessment, Practical Methods for Data Analysis EPA QA/G-9 (July 2000).

Attachment 2

SOUTH SAGINAW ROAD
AND
6 POND COLLECTION TILE UPGRADE PROJECTS
SOIL CHEMICAL CHARACTERIZATION PROTOCOL

SOUTH SAGINAW ROAD AND 6 POND COLLECTION TILE UPGRADE PROJECTS SOIL CHEMICAL CHARACTERIZATION PROTOCOL

1.0 Project Description

Several miles of groundwater collection trench and tiling are utilized for groundwater containment at Dow's Michigan Operations Midland Plant. Periodic upgrades or replacements of portions of this system are done as needed to insure long-term performance of the system is maintained. Upgrades to the South Saginaw Road Tile or 6 Pond Collection Tile will include removal of existing soils and groundwater collection tiles from target areas defined by the project. New groundwater collection tile and permeable cutoff media will be installed within the excavated trench. The soil sampling protocol applies to specific areas along South Saginaw Road and on the west side of the Tittabawassee River and defines how to obtain and test samples in those areas to evaluate their re-use as fill, disposal, or treatment prior to disposal. Samples are obtained prior to construction for planning disposal purposes.

2.0 Description of Soils to be Excavated

Soils to be removed include some natural soils and fill soils associated with installation of existing groundwater collection tiles and permeable cutoff media. Previous work and past experience on the tile systems installed on the west side of the Tittabawassee River suggest soils encountered in existing trench excavations are manmade (placed by filling) and heterogeneous in nature. Soils encountered outside of areas where existing trenches were installed are typically sands and floodplain deposits. Additionally, fills may not be stratified in a predictable manner. During construction, soils will be removed in minimum cuts of 36" to target depth, and proceed laterally.

3.0 Primary Objective

The primary objective of this sampling protocol is to determine if excavated soils will be re-used or relocated on site as fill and covered with new topsoil; or disposed of in Salzburg Landfill.

4.0 Specific Sampling Objectives

This sampling plan is designed to complete the primary objective in a safe, efficient and scientifically reliable manner. The soil sampling strategy is to obtain sufficient samples that are both representative of soils, and representative of the overall excavation project.

5.0 Sampling Strategy

Soils on the west side of the Tittabawassee River typically consist of a shallow fine sandy deposit over lakebed clay soils or clay till. While some fills are present, much of the soil is naturally deposited. An authoritative sampling strategy is used, biased to soils that exhibit evidence of contamination. Roughly half of the samples will be taken from the top of the existing water table, and half will be obtained from the base of the shallow saturated zone (or directly above the lower bounding clay unit). Sub-sampling may be performed, dependent on results of initial testing.

6.0 Laboratory Testing Protocol

Many RGIS lift stations have been chemically monitored on an annual basis for a number of years. This is completed as described in the Michigan Operations Midland Plant SAP.

Soils to be excavated from projects on the west side of the Tittabawassee River will be sampled as described above and subjected to the totals analysis for a targeted list of analytes as well as Toxicity Characteristic Leaching Procedure (TCLP) by EPA Method 1311. The leachate will be tested for compounds listed in Table 201a (R 299.9217) to determine if soils exhibit the toxicity characteristic {R 299.9212 (4)}. Results are compared to the threshold values provided in Table 201a (R 299.9217). If no results are present above the threshold level, soils may be relocated within the Facility, subject to the site excavation protocols. Results that exceed the threshold values must be evaluated individually. To appropriately evaluate non-detect results, reporting limits will be adequate for comparison to relevant standards listed above. Results of laboratory testing may also be used to evaluate industrial hygiene controls for construction.

7.0 Field Sampling Methods

Field sampling methods will be consistent with Soil Monitoring Field Procedures identified in the SAP. Soil samples will be obtained from various locations throughout the sample interval. Disposable plastic tools or re-useable metal or Teflon© coated tools should be used to collect samples. Decontamination of reusable hand tools will include washing in water and Alconox© detergent (or equivalent) and rinsing with contaminant free water and then air dried.

8.0 Sample Preservation

All samples will be placed on ice in a cooler after collection. Overnight storage of samples will be done using a sample refrigerator designated for sample storage only. Samples subjected to TCLP must be received by the laboratory and undergo extraction within a maximum of 14 days after collection.

9.0 Sample Labeling

Sample jars and vials will be clearly labeled with the following information:

- Unique sample identification;
- Sampler name or initials;
- Date sample collected;
- Time sample collected; and
- Analysis to be performed (TCLP).

10.0 Chain of Custody Procedures

All samples will be logged on a chain-of-custody record form. Transfer or shipment must include the chain-of-custody record form. A release and/or receipt signature is required for a change in custody of samples. The last person to sign the form retains responsibility for the samples.

11.0 Specific Project Details

It must be recognized that each area of upgrade will contain some degree of uniqueness. This section contains specific details or provides further insight on individual projects that are not discussed above.

11.1 Project Location

The RGIS soil sampling project will cover areas planned for excavation during the next construction season.

11.2 Target List

Annual sampling and analyses from West Side RGIS lift stations has been completed since 2007. The Operating License required West Side RGIS Lift Stations 9, 10, and 20 to be analyzed for 40 CFR 264 Appendix IX annually for four consecutive years, starting in 2003. Remaining West Side Lift Stations were sampled four times during 2006 for the Remediation MACT target list. After reviewing the pertinent data, target analytes for totals analysis are selected from those compounds previously identified above the detection limit in reviewed datasets. TCLP analysis will be made for the constituents listed in Table 201a (R 299.9217).

11.3 Sample Number Determination

Four soil borings were made in each area, evenly spaced along the projects. Soil borings are advanced with an auger rig, using hollow-stem drilling technique. Soils are logged by continuous split spoon sampling and inspected in the field by an experienced geologist. Soils are also inspected for evidence of staining, odors, or volatile emissions detectable by a photoionization detector (PID). Soils with evidence of contamination are sampled and subjected to testing described in Section 6.0. If no evidence of contamination is present, soils from the top of the water table and the base of the shallow saturated zone

will be obtained and subjected to testing described in Section 6.0. A minimum of one sample per soil boring will be obtained.

11.4 Schedule

A sampling schedule will be developed and should allow for nearly three months for processing of data.

11.5 Soil Boring Limitations

Areas which have limited access will have to be dealt with on a case-by-case basis. In some instances, obtaining samples "near" the excavation which will conservatively approximate the chemical composition of the soils should be sufficient.

12.0 Reporting

Environmental analytical data will be provided to MDEQ prior to construction. At a minimum, any additional environmental monitoring (including analytical data from characterization borings) will be submitted to MDEQ within 60 days of the end of the quarter in which the samples were analyzed, or upon completion of data validation.

13.0 References

13.1 SW-846, Chapter 9 Sampling Plan.

13.2 Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria (2002).

13.3 Guidance for Data Quality Assessment, Practical Methods for Data Analysis EPA QA/G-9 (July 2000).

City of Midland

Dow Chemical
Michigan Operations

10

20

20

10

47

Midland County

Bay County

N

W

E

S

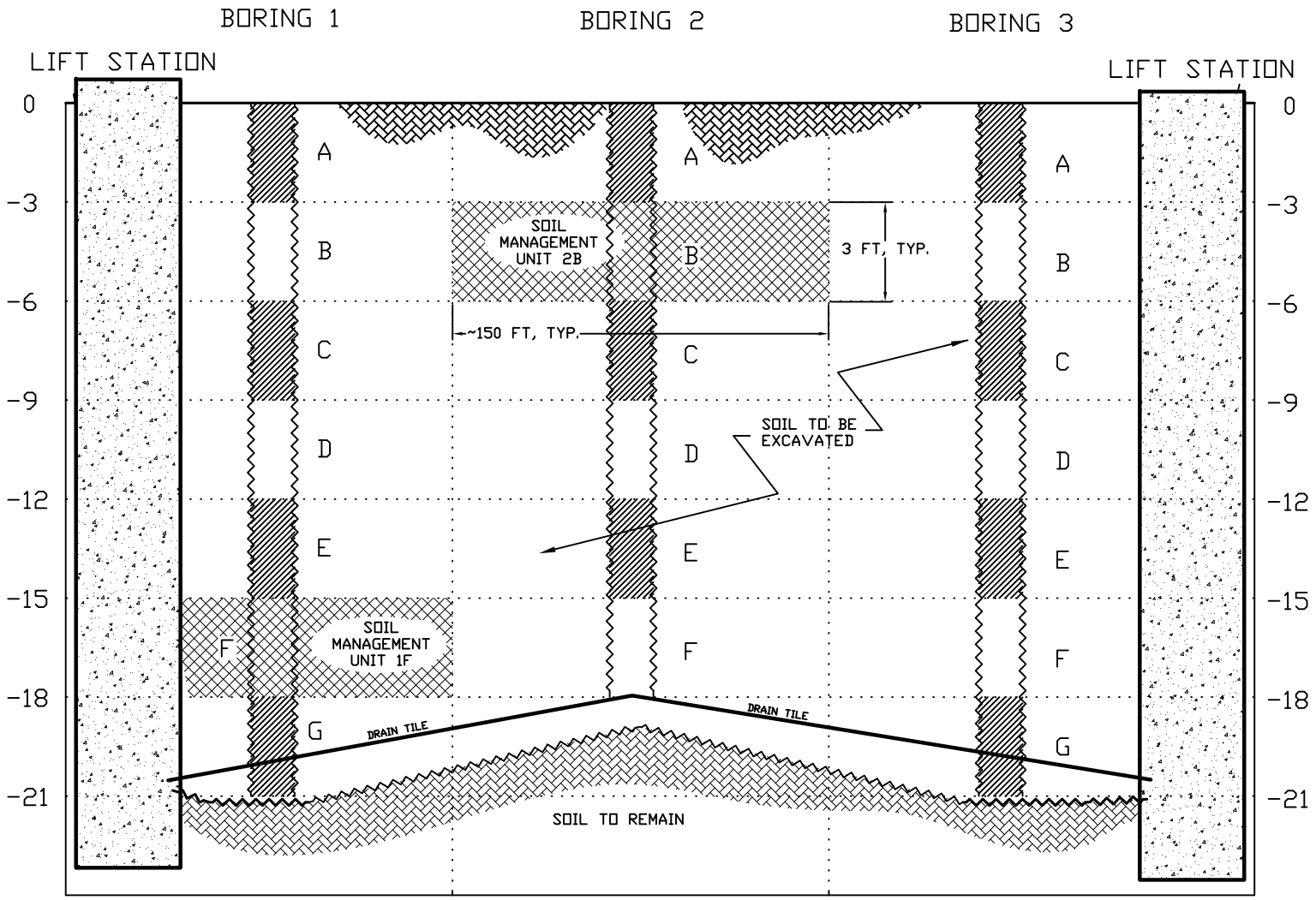
Legend

- Dow Facility Boundary
- City of Midland

URS
Dow Business Unit

FIGURE 1
Site Location Plan
The Dow Chemical Company
Michigan Operations

Drawn:	Checked:	Approximate Scale:
MDC	MS	1" = 2400'
Date:	Drawing File:	
10/03/06	Figure 1A.mxd	



TITLE

FIGURE 2

GENERALIZED SOIL CHARACTERIZATION AND MANAGEMENT SCHEMATIC

URS CORPORATION – DOW BUSINESS UNIT – MIDLAND, MI

DATE	JOB NO.
09/29/06	41567461
DR. MDC	SKETCH NO.
CK. MS	RGIS_SCEMATIC.DWG

Attachment XIV.B2 Appendix B

Staging Pile and Corrective Action Management Unit

Designation with Design

The Dow Chemical Company

Michigan Operations, Midland Plant

STAGING PILE DESIGNATION with DESIGN

SUMMARY

In accordance with R 299.9519(6) of the administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of NREPA, 1994 PA 451, as amended, The Dow Chemical Company (Dow) requested approval to designate a staging pile as provided for under R299.9638 (Part 111 Rule 638). Designation of a staging pile to replace the facility currently used to stage waste remediation soils requiring incineration (Waste Storage Area IIA, closed in 2009) was previously discussed between Dow and the Michigan Department of Environmental Quality's (MDEQ) Waste and Hazardous Materials and Air Quality Divisions, as well as the MDEQ's Water Bureau. The staging pile was designated by MDEQ in 2009 for one-time use, as described below.

The material expected to be generated onsite for temporary management in the staging pile is consistent with the above definition as well as the definition of "remediation waste" contained in 40 C.F.R. 260.10.

Information Required for Staging Pile Designation

The information required for submittal in seeking a staging pile designation is contained in 264.554 (c) (1) through (3), and states that the information:

- Must be sufficient for the Director to impose standards and design criteria; and
- Must be certified by an independent engineer unless determined by Director that certification is not necessary to ensure staging pile is protective of human health and environment.

Performance Criteria

The performance criteria for staging piles are contained in 40 C.F.R. 264.554 (d) and require that a staging pile:

(1)(i): *"must facilitate a reliable, effective and protective remedy"*

The use of the staging pile will facilitate the continued maintenance and operation of the Revetment Groundwater Interception System (RGIS) as well as other onsite corrective actions;

(1)(ii): *"designed to prevent or minimize releases of hazardous waste and constituents into the environment; minimize or adequately control cross-media transfer (through the use of liners, covers, run-off/run-on controls, as appropriate)*"

The design of the staging pile as discussed below will minimize releases of any hazardous waste or constituents to any environmental media.

(1)(iii): *"must not operate for more than two years"*

The two-year limit starts on the first day remediation waste is placed into the staging pile; should the necessity of the staging pile extend beyond the initial two-year limit, Dow will formally request the single 180-day extension provided for in the rule.

Considerations by Director

Considerations by the Director in setting standards and design criteria are contained in 264.554(d)(2) and include:

(2)(i): *Length of time pile will be in operation*

The length of time the pile will be operated is stipulated by statute and will be complied with as stated above.

(2)(ii): *Volumes of wastes intended for storage in the pile*

The staging pile as designed will have a maximum capacity of 6,000 cubic yards of material.

(2)(iii): *Physical and chemical characteristics of wastes to be stored*

The waste to be stored in the pile will consist of contaminated soils that are classified as hazardous waste generated as a result of RGIS upgrade or maintenance activities or other potential corrective actions conducted at the Michigan Operations, Midland Plant site. The soils will not meet the requirements of the Site Specific Land Disposal Restriction Treatability Variance issued July 3, 2008 and will require additional treatment (e.g. incineration) prior to land disposal.

(2)(iv): *Hydrogeological/other information that may influence migration of potential releases from the unit.*

The construction of the existing Containment Facility for the staging pile includes an asphalt surface underlain by an 80 mil HDPE liner, under which is a 3-foot thick clay layer (see below for more detailed construction details). The potential for migration of any potential releases is virtually nonexistent.

Additionally, any ignitable/reactive waste placed in the staging pile (if present and not de-characterized) will be managed consistent with 40 C.F.R. 264.17(b) as required by statute.

DESIGN FOR STAGING PILE

Dow will designate a Staging Pile (SP) in accordance with the appropriate and relevant regulations identified above. The SP is intended to be a temporary storage facility for hazardous remediation wastes (soils) that cannot be landfilled directly and require treatment prior to landfilling (e.g., through incineration or other means).

Dow will locate the SP within the existing Reach D Project Containment Facility that was engineered and constructed over the top of the closed Diversion Basin. An overall Diversion Basin-Containment Units Plan View is depicted on drawing B2-906-994072.

The location and construction of the Containment Facility provide an ideal site for the SP. Two liners currently exist underneath the SP, including an 80 mil HDPE geomembrane (GMB) under the topmost asphalt surface of the Containment Facility and a 3-foot thick compacted clay liner which acts as the cap of the Diversion Basin. The liner for the SP will make it a triple-lined facility, not including the surficial asphalt layer. Because of the conservative design and location of the SP, Dow believes that the independent, registered professional engineering certification referenced in 40 C.F.R. 264.554 is not necessary to ensure that the SP is protective of human health and environment and can be waived by the Director as allowed in the Rule.

The SP will be located in either Containment Unit #1 or Containment Unit #2 Area of the Containment Facility, depending on the size of the remediation projects being planned (see attached drawings). For smaller projects where less than 3,000 cubic yards of waste soil is anticipated to be generated, the SP will be located in the Containment Unit #2 Area. For larger projects generating from 3,000 to 6,000 cubic yards of soil, the SP will be located in the Containment Unit #1. Accordingly, the dimensions and capacity of the SP will vary depending upon the volume of waste soils that require temporary storage. The facility depicted in attached drawings B2-903-994072 and B2-904-994072 represents the SP designed for the Containment Unit #1 Area and drawing B2-905-994072 depicts the smaller facility designed for the Containment Unit #2 Area. Only one SP will be operated at any given time.

Both of the scenarios outlined above still provide for the installation of several geotubes in the Containment Facility, if needed to accommodate other corrective action projects.

DESIGN DETAILS

The SP will be located immediately on top of the existing asphalt surface of the Containment Facility. The SP liner system is currently envisioned to include the following elements:

Floor cross section for Containment Unit #1 and Containment Unit #2 Areas – starting at the existing asphalt and moving upwards:

- A 80 mil HDPE GMB;
- A 6 oz/yd^2 geotextile (GTX);
- A 12-inch thick layer of sand; and
- Waste soils will be placed on top of the sand layer.

Dike cross section for Containment Unit #1 (only) – starting at the existing asphalt and moving upwards:

- A 80 mil HDPE GMB;
- A 6 oz/yd^2 GTX ;
- Fill material to construct the earthen dikes (sand, silt, clay and/or stone); and
- A 60 mil HDPE GMB will cover the dikes and be welded to the floor 80 mil HDPE.

STORM WATER/RUNOFF/LEACHATE CONTROL

The dikes will have an elevation that will enable the SP to contain the runoff from a 100-year/24-hour storm event of approximately 5 inches of rain when completely full of soil.

A new or existing sump for leachate collection will be at the low end of the SP. Leachate from the waste soil will flow through the sand layer on the floor and then through a 6A natural stone filter berm and finally into the sump. The sand layer and 6A stone berm will serve as a dual filtration system to provide any necessary pretreatment of the leachate prior to discharge. Pump(s) and an HDPE force main will be installed to transfer all leachate to the Plant sewers for treatment in the on-site waste water treatment plant.

Consistent with licensed tank and container dike discharges to Dow's onsite WWTP, leachate will be sampled and analyzed for TOC prior to discharge to the WWTP. Leachate having concentrations of TOC less than 650 mg/L will be directly discharged to the WWTP. Should the 650 mg/L threshold be exceeded, the liquids will be incinerated.

Rainwater or snow falling on top of the tarp and not contacting the staged soil will be considered clean and will be pumped off of the tarp and directly to the Plant sewers. No TOC analysis will be conducted on water deemed "clean". Storm water will not be allowed to accumulate for more than 96 hours before pumping to the sewer system.

TRUCK ACCESS/TRACKOUT CONTROL

Truck and heavy equipment access to the SP will be provided by a ramp at the high end of the facility. Trucks hauling waste soils will be tarped and have sealed tailgates. The trucks will enter the SP, deposit their load and then be decontaminated with brooms and shovels prior to exiting the facility.

The soils will be stockpiled with low ground pressure bulldozers and/or hydraulic excavators and maintained as follows:

- Soil will placed on 1 vertical to 2 horizontal slopes or flatter if needed for stability;
- The SP will be tarped at all times (except when adding or removing inventory) with TX1200 or a similar plastic liner material; the tarp will be anchored with sand bags, tires and/or windrows of gravel.

FUGITIVE DUST EMISSIONS

To address the potential for particulate emissions, Dow will implement and follow the provisions of its approved Fugitive Dust Control Program (contained in Attachment XIV.B2, Appendix B of this operating license reapplication) to minimize any fugitive dust emissions from the SP area. Dust control will primarily be minimized by the continuous use of a tarp over the SP. Additional dust control measures will be utilized if necessary to mitigate fugitive emissions during active

operations that either add or remove soil from the SP.

AMBIENT AIR MONITORING

Because levels of volatile organic compounds (VOCs) are expected to be low for the vast majority of soils designated for the SP, ambient air monitoring is not proposed as a routine operating practice. However, should a corrective action or other maintenance project generate soils with elevated levels of VOCs, ambient air monitoring will be addressed in a site- or project-specific work plan. It is expected that ambient air monitoring will be primarily directed at the immediate activities generating the soil. Additional ambient air monitoring around the SP will be evaluated on a case-by-case basis in consultation with MDEQ-AQD Lansing and Bay City District staff.

INSPECTION SCHEDULE

Dow commits to the following inspection schedule for the SP, as included in Attachment XIV.A5 of this operating license reapplication:

1. The SP and its components will be inspected at the end of the day on any day when an operation causes soil to be either placed in or removed from the SP.
2. The SP and its components will be inspected once per calendar month in the absence of any operation that causes soil to be either placed in or removed from the SP.

CLOSURE

At the conclusion of the approved time limit for the SP (two years or two years plus 180 days should an extension be requested and approved) closure of the SP will begin. Closure will begin with removal and disposal of any remaining soils within the SP. Next, the tarp and anchoring materials, sand fill, GTX and HDPE GMD will be properly characterized and disposed.

If necessary, the asphalt floor of the Containment Facility under which the SP was located will be decontaminated with a water wash following removal and disposal of all SP elements; however, the triple-lining of the SP suggests that this may not be necessary. Decontamination water, if generated, will be sent to the plant sewer for treatment in the on-site WWTP.

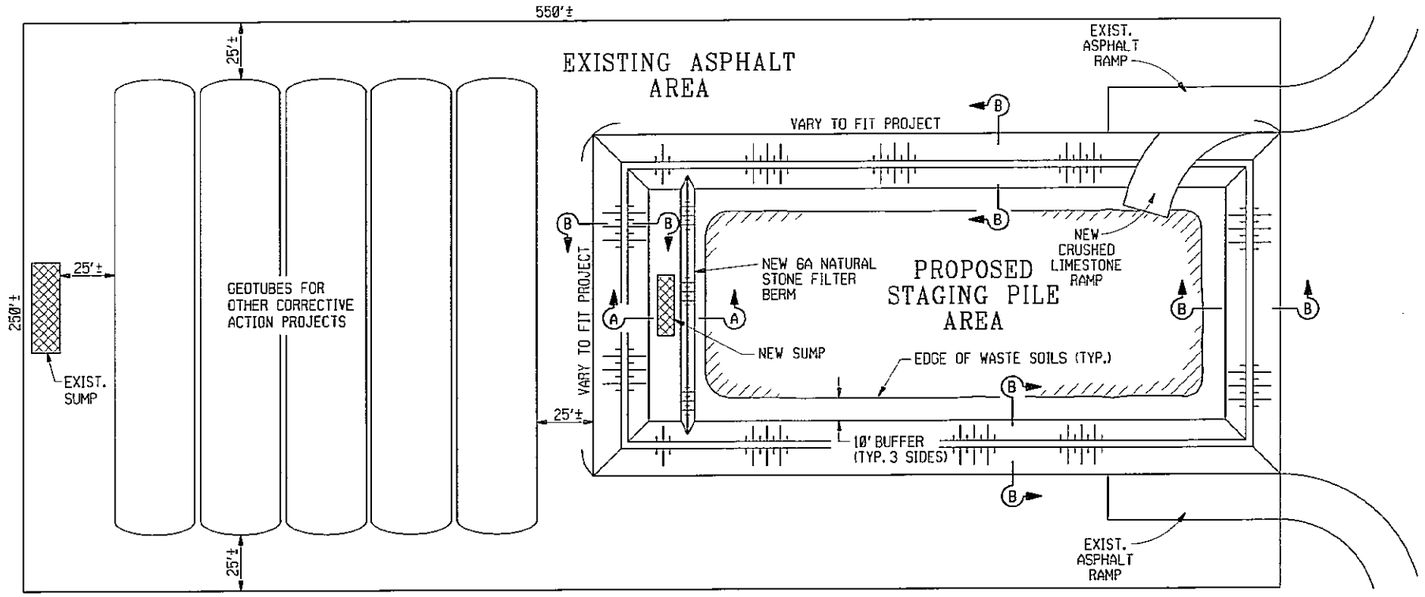
Closure of the SP will be completed within 180 days of the initiation of closure activities (see tabulated depiction of the closure schedule below). Dow will provide MDEQ with a “Notice of Completion of Closure” and a brief closure report documenting final disposition of SP materials. Upon completion of closure activities, Dow will provide the MDEQ with a license modification request to either:

1. Designate a new SP within the facility to facilitate a reliable, effective and protective remedy; or
2. Remove the designation for the SP within the facility.

The closure activities outlined above have been designed to satisfy the closure requirements for staging piles located in previously contaminated areas that are contained in 40 C.F.R. 264.554 (j).

Anticipated Closure Schedule for Staging Pile

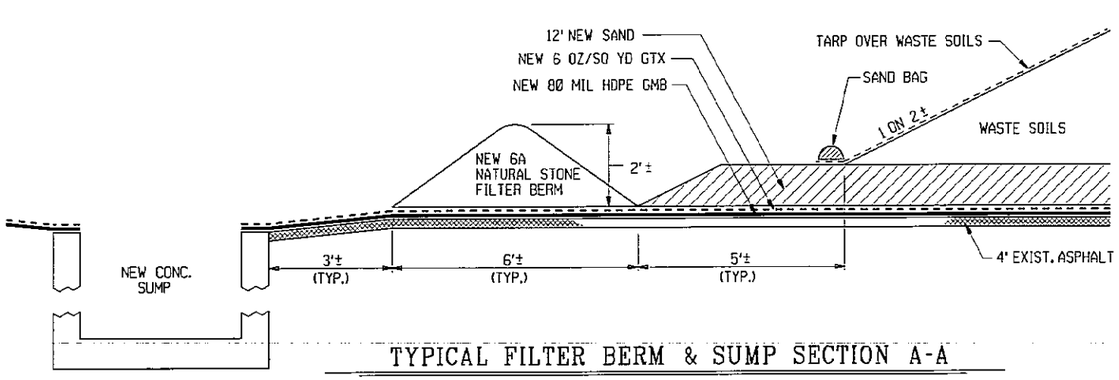
	Days								
Activity	20	40	60	80	100	120	140	160	180
1. Expiration of authorized time limit	^								
1. Removal/disposal of final waste inventory	-------	-------	-------	-------	--^				
3. Removal/disposal of facility components				-------	-------	-------	-------	-------	
4. Cleaning of floor and facility demolition						-------	-------	-------	----
5. Completion of closure and report submittal to the director								-------	------^



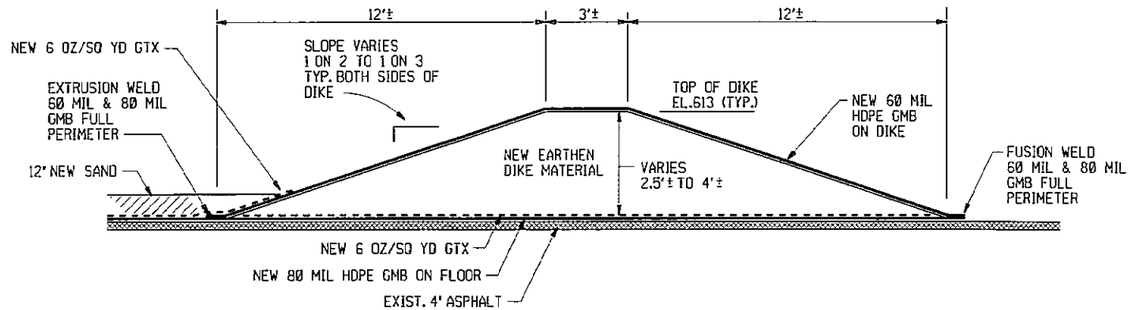
PLAN VIEW

NOTE:

THE WIDTH & LENGTH OF THE STAGING PILE FACILITY WILL VARY TO FIT THE WASTE SOILS STORAGE VOLUME REQUIREMENTS OF THE PROJECT. STAGNG PILE SHOWN TO LEFT IS APPROXIMATELY 150' x 300'. THE ESTIMATED MAXIMUM STORAGE VOLUME OF THE STAGING PILE IN THE CONTAINMENT UNIT #1 AREA IS APPROXIMATELY 6,000 CUIC YARDS.



TYPICAL FILTER BERM & SUMP SECTION A-A



TYPICAL DIKE SECTION B-B

REV. MARK	REVISION	BY	CHK	APP	DATE

REV. MARK	REVISION	BY	CHK	APP	DATE

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF

DATE ISSUED FOR

DESIGNED	L.E.G.	6/89
DRAWN	L.E. GIRARDIN	6/89
CHECKED	J.J.A.	6/89
APPROVED	J.J.A.	6/89
PROJ. ENGR.	J.J. ALLEN	6/89
MFG. REP.	STEVE LUCAS	6/89

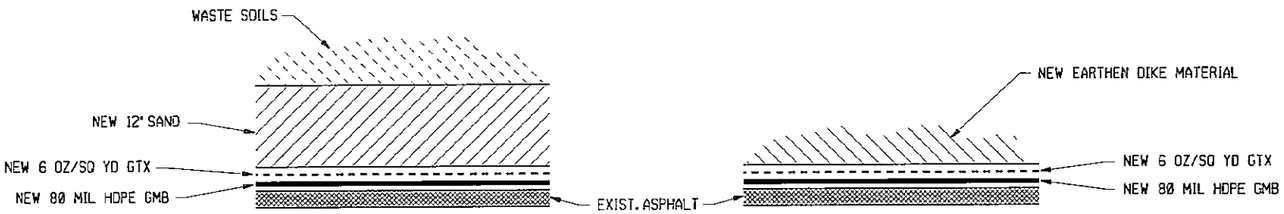
STATUS: P.E. SEAL — PLANT NO.

THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN
EVO — RGIS

CONTAINMENT UNIT #1 -STAGING PILE DESIGN

D/W NUMBER	SCALE		REV.	VER.
120881	NONE	B2-903-994072	0	2 PLN

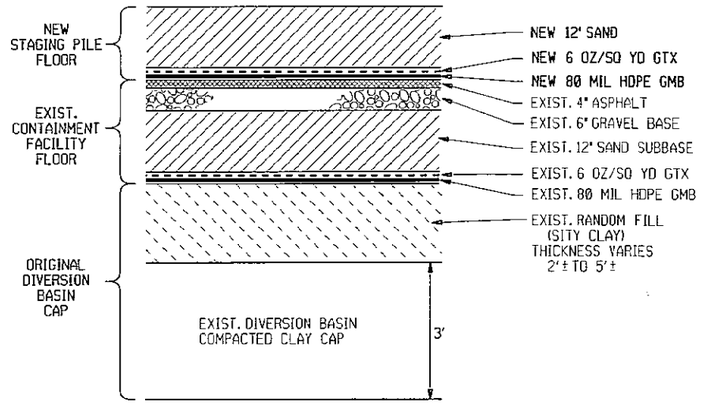
PRINTED



UNDER WASTE SOILS

UNDER DIKE

TYPICAL FLOOR SECTIONS



TYPICAL SECTION
THRU DIVERSION BASIN CAP

REV. MARK	REVISION	BY	CHK	APP	DATE

REV. MARK	REVISION	BY	CHK	APP	DATE

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	DATE ISSUED FOR: BID	FAB	CONST	REF

DESIGNED	L.E.G.	6/89
DRAWN	L.E. GIRARDIN	6/89
CHECKED	J.J.A.	6/89
APPROVED	J.J.A.	6/89
PROJ. ENGR.	J.J. ALLEN	6/89
MFG. REP.	STEVE LUCAS	6/89

STATUS | PLANT NO.
SPEC. SERIAL

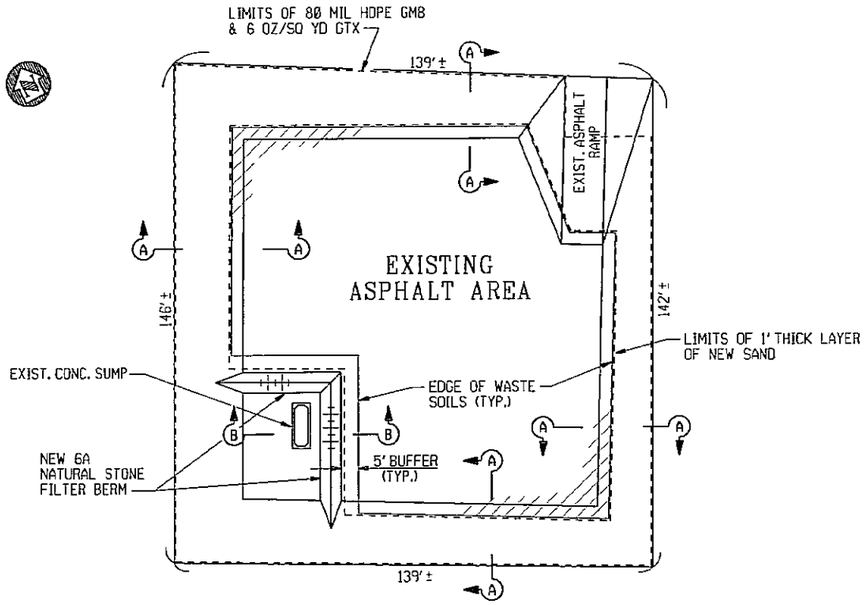
THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN
EVO — RGIS

CONTAINMENT UNIT #1 -STAGING PILE DESIGN

JOB NUMBER	SCALE		REV.
120881	NONE	B2-904-994072	0

2 PLN

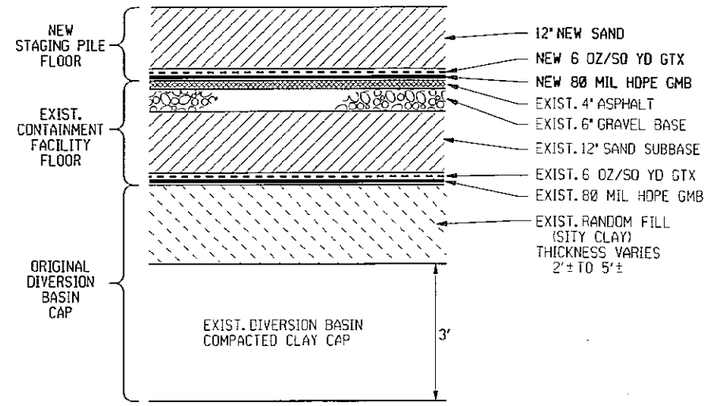
PRINTED | VER.



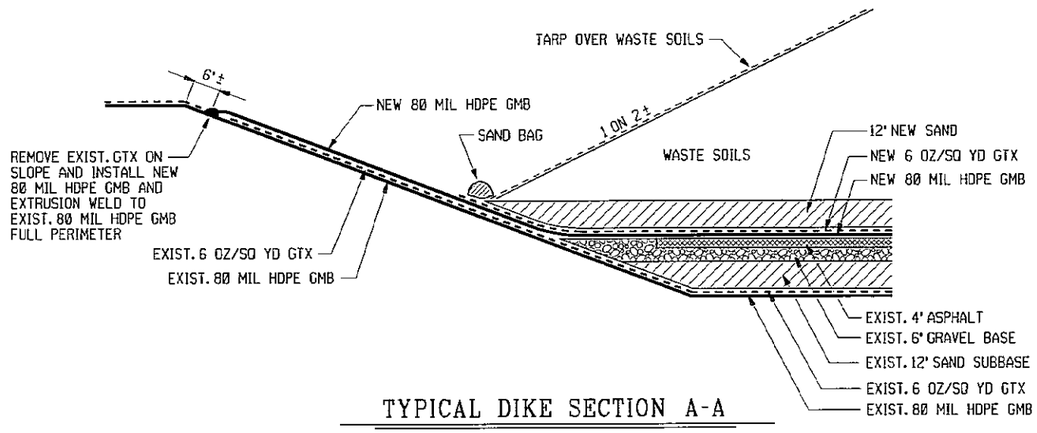
PLAN VIEW

NOTE:

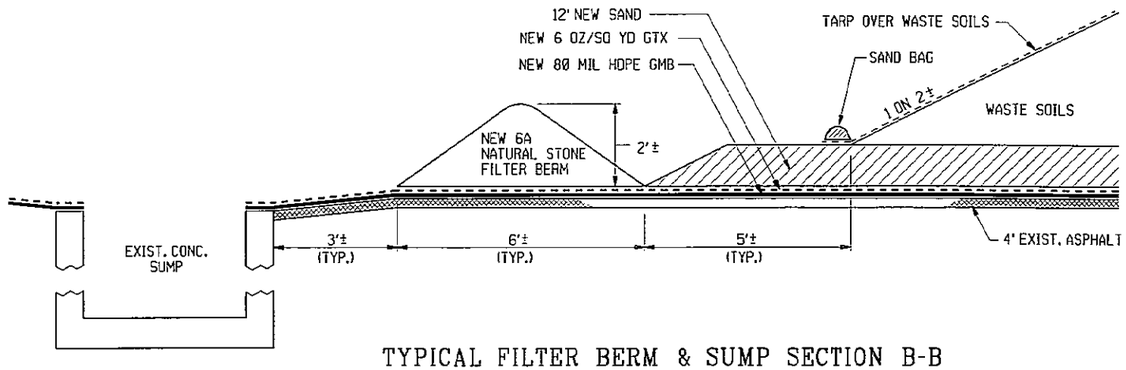
THE ESTIMATED MAXIMUM STORAGE VOLUME OF THE STAGING PILE IN THE CONTAINMENT UNIT #2 AREA IS APPROXIMATELY 2,500 CUIC YARDS.



TYPICAL FLOOR SECTION
THRU DIVERSION BASIN CAP



TYPICAL DIKE SECTION A-A



TYPICAL FILTER BERM & SUMP SECTION B-B

REV. MARK	REVISION	BY	CHK	APP	DATE

DRAWING ISSUE RECORD						
ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
			DATE ISSUED FOR			

DESIGNED	L.E.G.	6/89
DRAWN	L.E. GIRARDIN	6/89
CHECKED	J.J.A.	6/89
APPROVED	J.J.A.	6/89
PROJ. ENGR.	J.J. ALLEN	6/89
MFG. REP.	STEVE LUCAS	6/89

STATUS | PLANT NO.
P.E. SEAL

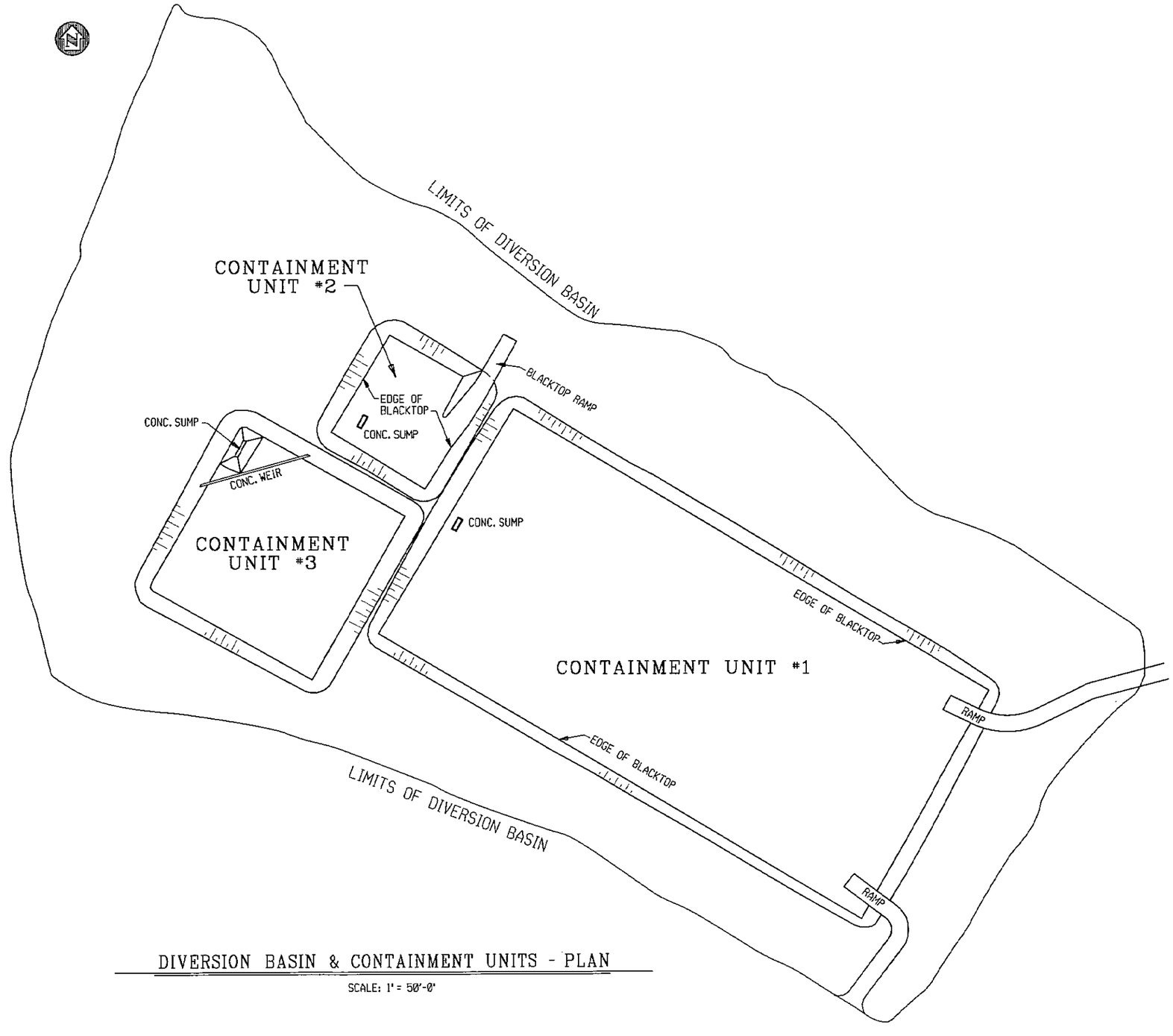
THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN
EVO — RGIS

CONTAINMENT UNIT #2 -STAGING PILE DESIGN
SAND FLOOR OPTION

EJN NUMBER	SCALE		REV.
128881	NONE	B2-905-994072	0

PRINTED | VER.

2 PLN



DIVERSION BASIN & CONTAINMENT UNITS - PLAN

SCALE: 1" = 50'-0"

REV. MARK	REVISION	BY	CHK	APP	DATE

REV. MARK	REVISION	BY	CHK	APP	DATE

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF

DATE ISSUED FOR

DESIGNED	J.J. ALLEN	6/09
DRAWN	L.E. GIRARDIN	6/09
CHECKED	J.J.A.	6/09
APPROVED	J.J.A.	6/09
PROJ. ENGR.	J.J. ALLEN	6/09
MFG. ENGR.	STEVE LUCAS	6/09

STATUS: P.E. SEAL — PLANT NO.

THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN
EVO — RIVER

DIVERSION BASIN - CONTAINMENT UNITS
PLAN VIEW

E.W. NUMBER	SCALE	PRINTED	REV.
117874	1" = 50'-0"	B2-906-994072	2

VER. PLN

INSTRUCTIONS: 1 PERSON 2 DATE 3 TIME 4 FILENAME

CORRECTIVE ACTION MANAGEMENT UNIT DESIGNATION with DESIGN

SUMMARY

In accordance with R 299.9635, The Dow Chemical Company (Dow) requested approval to operate project-specific storage and treatment CAMUs, upon submittal of detailed plans to the MDEQ for review and approval. MDEQ authorized the request in 2013 for CAMUs located in the area that was previously approved (but not implemented) as a one-time use staging pile.

The CAMU will be operated in the area that was previously designated for the approved staging pile. The CAMU will consist of all three constructed containment areas within the Diversion Basin footprint. Dow proposes to manage these as one unit, with one capacity limit and set of performance standards, as described below.

The material expected to be generated onsite for temporary management in the CAMU is consistent with the applicable definitions in R299.9102[1] ("corrective action management unit-eligible waste") and 40 CFR 260.10[2] (“remediation waste”).

The following provides a discussion of the applicable regulations and how Dow’s Michigan Operations CAMU will meet those requirements.

The Michigan regulations at R299.9635(11) set out the information needs regarding wastes to be managed in the CAMU:

(a) The origin of the waste and how it was subsequently managed, including a description of the timing and circumstances surrounding the disposal or release.

The waste to be stored in the CAMU will consist of contaminated media that may be classified as either characteristically hazardous waste or listed hazardous waste.

CAMU-eligible, listed hazardous waste would likely be classified through the “contained-in” policy and generated as a result of Revetment Groundwater Interception System (RGIS) upgrade or other maintenance activities or other potential corrective actions conducted at the Michigan Operations site.

---

[1] **R 299.9102 Definitions** (u) "Corrective action management unit-eligible waste" or "CAMU-eligible waste" means all wastes and hazardous wastes and all media, including groundwater, surface water, soils, sediments, and debris, that are managed for implementing cleanup. As-generated wastes from ongoing industrial operations at a site are not CAMU-eligible.

Notwithstanding this subrule and where appropriate, as-generated non-hazardous waste may be placed in a corrective action management unit if the waste is being used to facilitate treatment or the performance of the corrective action management unit. Wastes that would otherwise meet the definition of a CAMU-eligible waste are not CAMU-eligible wastes if either of the following apply:

(i) If the wastes are hazardous wastes found during a cleanup in intact or substantially intact containers, tanks, or other non-land-based units found above ground, unless the wastes are first placed in the tanks, containers or non-land-based units as part of the cleanup, or the containers or tanks are excavated during the course of the cleanup.

(ii) If the director, or the director's designee, uses the authority in R 299.9635 to prohibit the wastes from management in a corrective action management unit.

[2] **40 CFR 260.10** *Remediation waste* means all solid and hazardous wastes, and all media (including ground water, surface water, soils, and sediments) and debris, that are managed for implementing cleanup.

(b) Whether the waste was listed or identified as hazardous at the time of disposal or release.

Groundwater that is recovered from the RGIS is generally classified as a listed waste, carrying EPA code F039 for multisource leachate (liquids that have percolated through land disposed wastes)[3]. However, environmental media (soil, sediment etc.) generated as a result of RGIS upgrade or maintenance activities or other corrective actions may also be considered F039 via the "contained-in" policy[4] depending on the concentrations of constituents of concern. Contaminated media from other corrective actions at Michigan Operations may also be placed in the CAMU, and will be characterized appropriately. These media may carry other EPA codes in addition to or in place of the F039 designation. In addition, rainfall onto any CAMU eligible waste in the CAMU is also considered environmental media and will be evaluated under the "contained-in" policy prior to management and final disposition.

(c) Whether the disposal or release of the waste occurred before or after the land disposal requirements of 40 C.F.R. part 268 were in effect for the waste listing or characteristic.

The Dow Michigan Operations facility has been in operation for over 100 years and activities at the facility pre-date most RCRA regulations, including the LDRs.

CAMU DESIGN AND OPERATION

The Michigan regulations at R299.9635(12)(a) and (b) are applicable and require that the ***areal configuration and applicable design, operation, treatment, and closure requirements*** be included in the license and application.

Dow will locate the CAMU within the current Staging Pile area (former Geotube Containment Facility) that was engineered and constructed over the top of the closed Diversion Basin. An overall plan view of the various CAMU areas is depicted on Drawings B2-903A-994072 – Overall CAMU Plan View. Use of this closed and capped hazardous waste management area provides Dow with a sustainable alternative to developing another area of the plant.

As was determined at the time of the Staging Pile approval, the location and construction of the Geotube Containment Facility provides an ideal site for the CAMU. Two liners currently exist underneath the site, including an 80 mil HDPE geomembrane (GMB) under the topmost asphalt surface in Containment Unit #1 and Containment Unit #2, or exposed Containment Unit #3 of the Geotube Containment Facility, and a 3-foot thick compacted clay liner which acts as the cap of the Diversion Basin as shown on drawing B2-903A-994072. The new 80 mil HDPE GMB liner for the CAMU will make it a triple-lined facility, not including the surficial asphalt layer.

[3] F039 Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other Hazardous Wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028.).

[4] The contained-in policy was first articulated in a November 13, 1986 EPA memorandum, "RCRA Regulatory Status of Contaminated Groundwater." It has been updated many times in Federal Register preambles, EPA memos and correspondence, see, e.g., 53 FR 31138, 31142, 31148 (Aug. 17, 1988), 57 FR 21450, 21453 (May 20, 1992), and detailed discussion in HWIR-Media proposal preamble, 61 FR 18795 (April 29, 1996).

The proposed CAMU liner system is currently envisioned to include the following elements:

Typical Cross Section Under CAMU Eligible Waste for Containment Unit #1 and Containment Unit #2 Areas – starting at the existing asphalt and moving upwards (shown in drawings B2-904A-994072 and B2-905A-994072):

- A 80 mil HDPE GMB;
- A 6 oz/yd^2 geotextile (GTX);
- A 12-inch thick layer of sand; and
- CAMU eligible waste will be placed on top of the sand layer.

Typical Cross Section Under Earthen Dike for Containment Unit #1– starting at the existing asphalt and moving upwards (shown in drawing B2-904A-994072):

- A 80 mil HDPE GMB;
- A 6 oz/yd^2 GTX ;
- Earthen Fill material to construct the earthen dikes (sand, silt, clay and/or stone); and
- A 60 mil HDPE GMB will cover the dikes and be welded to the floor 80 mil HDPE.

A new or existing concrete sump is shown at the low end of the CAMU as needed for leachate collection. Leachate from the CAMU eligible waste materials will flow through the sand layer on the floor and then through a 6A natural stone filter berm and finally into the sump. Pump(s) and an HDPE force main can be installed to transfer all leachate to the Plant sewers for treatment in the on-site waste water treatment plant (WWTP).

Consistent with licensed tank and container dike discharges to Dow's onsite WWTP, leachate will be sampled and analyzed for TOC prior to discharge to the WWTP. Leachate having concentrations of TOC less than 650 mg/L will be directly discharged to the WWTP. Should the 650 mg/L threshold be exceeded, the liquids will be appropriately treated prior to discharge to the WWTP or incinerated.

The CAMU will be operated such that no releases occur from the unit, either through run-off/run-on or air dispersion of particulates. For example, waste constituents cannot leach out of the soil into the subsurface due to the presence of the engineered cap/liners of the existing containment facility. Run-off/run-on will be prevented by the earthen dikes and other storm water management practices that are routine at the facility. Air dispersion via particulates will be prevented by a variety of methods, depending on the quantity of CAMU-eligible waste materials present in the unit, including, but not limited to, surface tarps or other geomembrane-type temporary covers, daily cover, wetting or other appropriate methods.

Because levels of volatile organic compounds (VOCs) are expected to be low for the vast majority of soils or sediment-like material designated for potential management in the CAMU, ambient air monitoring is not proposed as a routine operating practice. However, should a corrective action or other maintenance project generate soils with elevated levels of VOCs, ambient air monitoring will be addressed in a site- or project-specific work plan submitted to the MDEQ in advance of project implementation. It is expected that ambient air monitoring will be primarily directed at the immediate activities generating the soil. Additional ambient air monitoring around the CAMU will be evaluated on a case-by-case basis in consultation with MDEQ.

Truck and heavy equipment access to the CAMU will be provided by ramps at the high end of the

facility. Trucks hauling waste soils will be tarped and have sealed tailgates. The trucks will enter the CAMU, deposit their load and then be decontaminated with brooms and shovels prior to exiting the facility.

The soils will be stockpiled with low ground pressure bulldozers and/or hydraulic excavators and will be placed on 1 vertical to 2 horizontal slopes or flatter if needed for stability.

Other technologies may be used as the preferred dewatering method for a particular project; sediment-like or slurried material will be pumped into material handling equipment (Geotubes or other) and the liquid fraction from the dewatering operation will be collected, characterized and disposed through the WWTP as proposed. Contaminated water may also be pretreated within the CAMU Containment Units prior to discharge to the WWTP.

The CAMU will operate under EPA process codes S99 ("Other Storage") and T04 ("Other Treatment") as reflected in the Part A application. Typical capactities for remediation projects using these codes are as follows:

- **S99**: for CUs #1/#2 – 26,500 cubic yard storage capacity and for CU #3 – 1,000,000 gallons
- **T04**: treatment capacity of 2,000,000 gallons/day for dewatering/treatment and 6,500 cubic yards/day for stabilization/solidification/debris.

Examples of treatment that may be conducted in the CAMU include dewatering, addition of appropriate absorbents, stabilization, solidification or treatment of hazardous debris using one or more treatment technologies specified in Table 1 of R268.45. Final treatment for the CAMU-eligible waste can include incineration, or as appropriate, disposal on- or off-site in an authorized facility. Specific treatment options will be defined in a site- or project-specific work plan submitted to MDEQ in advance of project implementation. In addition, the work plan preparation will include a step to evaluate the applicability of any other environmental permits and ensure these are in place and/or to provide appropriate notifications for discharges or other similar items.

CAMU CLOSURE PLAN

At the conclusion of the CAMU authorization or a decision to permanently cease CAMU use, closure of the CAMU will begin. Closure will begin with removal and disposal of any remaining waste within the CAMU. Next, any additional operational materials will be properly characterized and disposed.

The asphalt or HDPE liner floor of the Containment Facility area(s) on which the CAMU material as located will be decontaminated with a water wash following removal and disposal of all CAMU elements. Decontamination water, if generated, will be properly characterized through TOC analysis and directed to the plant sewer for treatment in the on-site WWTP.

Closure of the CAMU will be completed within 180 days of the initiation of closure activities (see tabulated depiction of the closure schedule below), unless Dow submits an extension request to MDEQ. Dow will provide MDEQ with a "Notice of Completion of Closure" and a brief closure report documenting final disposition of CAMU materials. Upon completion of closure activities, Dow will provide the MDEQ with a license modification request to either:

1. Designate a new CAMU within the facility to facilitate a reliable, effective and protective remedy; or
2. Remove the designation for the CAMU within the facility.

The closure activities outlined above have been designed to satisfy the closure requirements for CAMU located in previously contaminated areas that are contained in 40 CFR 264.554(j).

Anticipated Closure Schedule for CAMU

Activity	Days
Cease CAMU use	0
Removal/disposal of final waste inventory	30
Removal/disposal of facility components	60
Cleaning of floor and facility demolition	90
Completion of closure and report submittal to the director	180

FEDERAL REGULATORY DISCUSSION

The Michigan regulations at R299.9635(15) discuss specific time limits and performance criteria that must be met for CAMUs which are used for storage or treatment only, in which waste will not remain after closure. These units must operate for a time limit established by the director, that is no longer than necessary to achieve a timely remedy selected for the waste and are subject to the federal requirements for staging piles in 40 CFR §§264.554(d)(1)(i) and (ii), (d)(2), (e), (f), (j), and (k) instead of specific Michigan regulations in R299.9635(10) and (12) (d) – (f). A discussion of those federal regulations and how Dow is complying with them follows. For purposes of this discussion, citations below replace the words "staging pile" with "CAMU".

264.554(d) Performance criteria:
(1)(i) The CAMU must facilitate a reliable, effective and protective remedy;

The nature of the Dow Michigan Operations corrective action program is such that it is a long term, multi-site project with the potential for a large quantity of remediation waste to be generated. The most protective and cost effective way for Dow to manage that waste is to incinerate the material on-site. The nature of the contaminants is such that they are amenable to incineration and the incinerator is managed in such a way (permit-required operating parameters and controls) as to be a reliable and protective treatment technology. However, the through-put of the incinerator and the possible quantities of remediation waste to be generated require that Dow have a designated accumulation area for these materials that is licensed and managed in accordance with the pertinent regulations. The CAMU would satisfy this need and will allow multiple corrective action projects to be conducted simultaneously, thus expediting the corrective action process for the facility as a whole.

(ii) The CAMU must be designed so as to prevent or minimize releases of hazardous wastes and hazardous constituents into the environment, and minimize or adequately control cross-media transfer, as necessary to protect human health and the environment (for example, through the use of liners, covers, run-off/run-on controls, as appropriate); and

The CAMU will be located within the Dow facility, and Dow's 24-hr site security force will control access. The plant is surrounded by an access-prevention fence and natural barriers, and points of entry are guarded to prevent unauthorized access. Routine security patrols of the complex are also conducted. On-site management will reduce risk associated with off-site transport. Additionally, the CAMU's protective, engineered liner will ensure that material is managed in a manner that is protective of human health and the environment.

The design of the unit, as discussed above, will prevent releases to the subsurface and includes the two liners currently existing underneath the site, and an 80 mil HDPE geomembrane (GMB) under the topmost asphalt surface of the Containment Facility and a 3-foot thick compacted clay liner which acts as the cap of the Diversion Basin (drawings B2-903A-994072, B2-904A-994072 and B2-905A-994072).

Because of the conservative design and location of the CAMU, Dow believes that the independent, registered professional engineering certification referenced in 40 CFR 264.554 is not necessary to ensure that the CAMU is protective of human health and environment and can be waived by the Director as allowed in the Rule.

(2) In setting the standards and design criteria, the Director must consider the following factors:
(i) Length of time the CAMU will be in operation;

The length of time the CAMU will be operated will be ultimately be determined by the schedule of corrective actions at the facility. However, the need for the CAMU will be evaluated at each license renewal period (approximately every 10 years) and the license renewal applications will reflect the request to reauthorize the CAMU as necessary.

(ii) Volumes of wastes you intend to store in the CAMU;

The CAMU as designed will have a maximum capacity of ~ 26,500 cubic yards (CY) of CAMU-eligible waste material (based on the design capacity of the area). CAMU Containment Unit #1 can hold 24,000 CY and CAMU Containment Unit #2 can hold 2,500 CY. The projected total capacity is the maximum that the unit can actually accommodate, not the expected volumes that will be stored at any one time.

CAMU Containment Unit #3 is reserved for CAMU-eligible waste liquids or other contaminated run-off/run-on with a storage volume of 1 million gallons. A cross-section of CAMU Containment Unit #3 is shown on drawing B2-903A-994072.

(iii) Physical and chemical characteristics of the wastes to be stored in the unit;

The CAMU-eligible waste to be stored in the unit will consist of contaminated media and other materials that meet the definition that may be classified as hazardous waste (F039) through the "contained-in" policy as described above if generated from RGIS upgrade or maintenance activities. Contaminated media from other corrective actions at Michigan Operations may also be placed in the CAMU, and will be characterized appropriately prior to final disposition. These media may carry other EPA codes in addition to or in place of the F039 designation.

(iv) Potential for releases from the unit;

As previously discussed the CAMU will be designed and managed to prevent the potential for any releases from the unit.

(v) Hydrogeological and other relevant environmental conditions at the facility that may influence the migration of any potential releases; and

The design for the existing Staging Pile Area (the former Geotube Containment Facility) which will also serves as the CAMU includes an asphalt surface underlain by an 80 mil HDPE liner, under which is a 3-foot thick clay layer (see above for more detailed construction details). The potential for migration of any potential releases is virtually nonexistent.

Additionally, any ignitable/reactive waste placed in the CAMU (if present and not de-characterized) will be managed consistent with 40 CFR 264.17(b) and Preventative Procedures, Attachment XIV.A6 of this operating license reapplication as required by statute.

Contact storm water will be characterized appropriately based on the environmental media it has come in contact with (for example F039 media from RGIS activities), and through application of the "contained-in" policy will be managed accordingly.

(vi) Potential for human and environmental exposure to potential releases from the unit;

The CAMU will be located within the Dow facility, and Dow's 24-hr site security force will control access. The plant is surrounded by an access-prevention fence and natural barriers, and points of entry are guarded to prevent unauthorized access. Routine security patrols of the complex are also conducted. On-site management will reduce risk associated with off-site transport. Additionally, the CAMU's protective, engineered liner will ensure that material is managed in a manner that is protective of human health and the environment.

(e) May a CAMU receive ignitable or reactive remediation waste? You must not place ignitable or reactive remediation waste in a CAMU unless:
(1) You have treated, rendered or mixed the remediation waste before you placed it in the staging pile so that:
(i) The remediation waste no longer meets the definition of ignitable or reactive under § 261.21 or § 261.23 of this chapter; and
(ii) You have complied with § 264.17(b); or
(2) You manage the remediation waste to protect it from exposure to any material or condition that may cause it to ignite or react.

It is unlikely, based on the historical waste management practices and known characteristics of potential remediation waste sources at the facility, that any CAMU-eligible waste will be ignitable or reactive. However if this does occur, any ignitable/reactive waste placed in the CAMU (if present and not de-characterized) will be managed consistent with 40 CFR. 264.17(b) and Attachment XIV.A6 of this operating license reapplication as required by statute.

(f) How do I handle incompatible remediation wastes in a CAMU? The term ''incompatible waste'' is defined in § 260.10 of this chapter. You must comply with the following requirements for incompatible wastes in CAMUs:
(1) You must not place incompatible remediation wastes in the same CAMU unless you have complied with § 264.17(b);
(2) If remediation waste in a CAMU is incompatible with any waste or material stored nearby in containers, other CAMUs, open tanks or land disposal units (for example, surface impoundments), you must separate the incompatible materials, or protect them from one another by using a dike, berm, wall or other device; and
(3) You must not pile remediation waste on the same base where incompatible wastes or materials were previously piled, unless the base has been decontaminated sufficiently to comply with § 264.17(b).

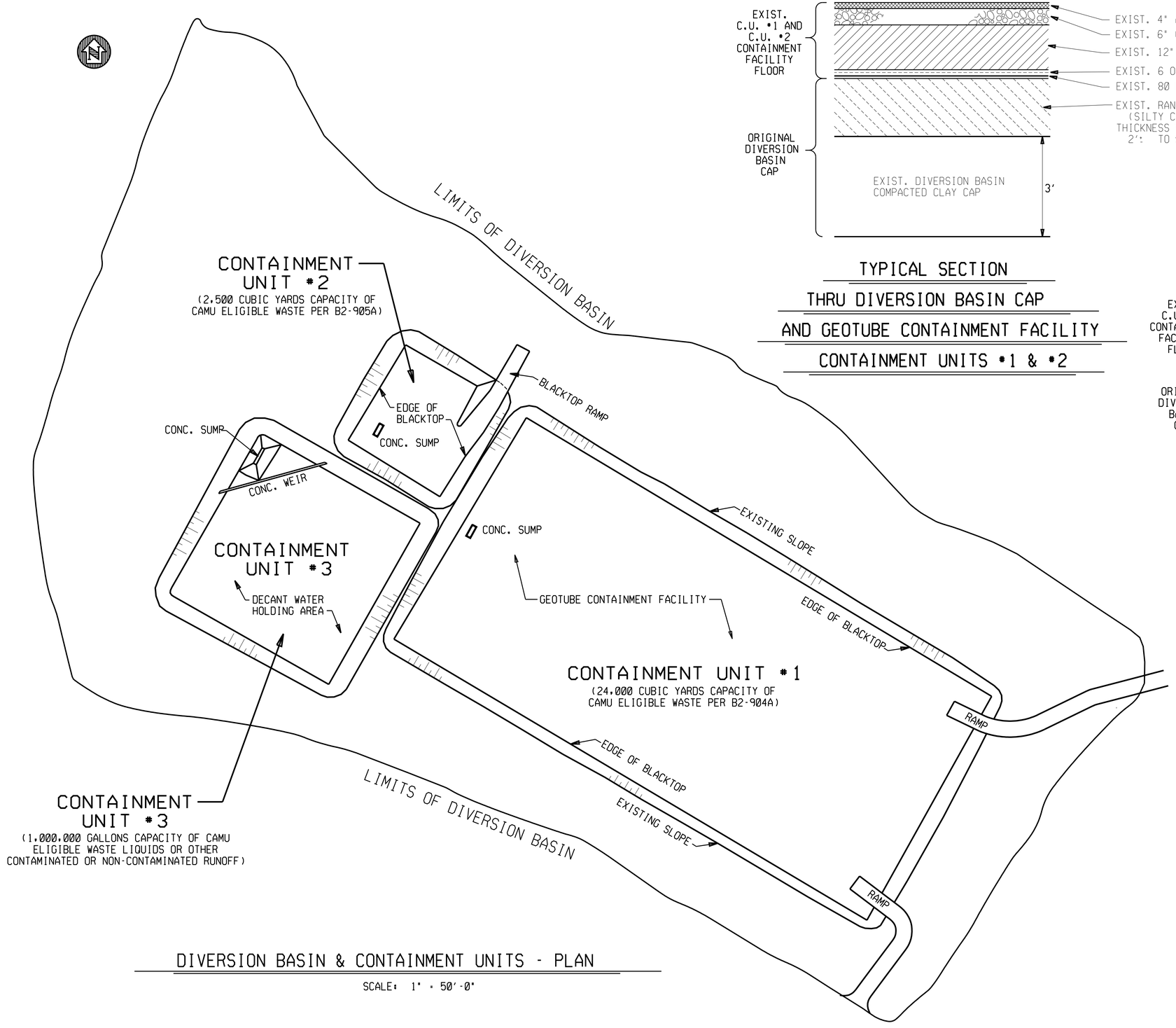
It is unlikely, based on the historical waste management practices and known characteristics of potential remediation waste sources at the facility, that incompatible wastes will be generated and thus issues of storage will not occur. However if this does occur, incompatible wastes will be managed using segregation practices.

(j) What is the closure requirement for a CAMU located in a previously contaminated area?
(1) Within 180 days after the operating term of the CAMU expires, you must close a CAMU located in a previously contaminated area of the site by removing or decontaminating all:
(i) Remediation waste;
(ii) Contaminated containment system components; and
(iii) Structures and equipment contaminated with waste and leachate.
(2) You must also decontaminate contaminated subsoils in a manner and according to a schedule that the Director determines will protect human health and the environment.
(3) The Director must include the above requirements in the permit, closure plan, or order in which the CAMU is designated.

Waste will not be left in-place at final closure, therefore the closure activities will be limited to cleaning/decontaminating the asphalt surface of the containment basins and verifying that cleaning/decontaminating process though sampling of rinsate water.

(k) What is the closure requirement for a CAMU located in an uncontaminated area?
(1) Within 180 days after the operating term of the CAMU expires, you must close a CAMU located in an uncontaminated area of the site according to §§ 264.258(a) and 264.111; or according to §§ 265.258(a) and 265.111 of this chapter.
(2) The Director must include the above requirement in the permit, closure plan, or order in which the CAMU is designated.

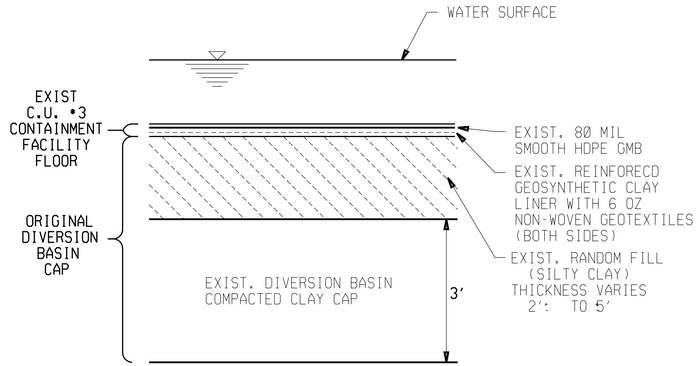
Not applicable to the Dow Michigan Operation CAMU.



DIVERSION BASIN & CONTAINMENT UNITS - PLAN

SCALE: 1" = 50'-0"

TYPICAL SECTION THRU DIVERSION BASIN CAP AND GEOTUBE CONTAINMENT FACILITY CONTAINMENT UNITS #1 & #2



TYPICAL SECTION CONTAINMENT UNIT #3

REFER TO THE DOW CHEMICAL COMPANY OPERATING LICENSE, ATTACHMENT 30 CORRECTIVE ACTION MANAGEMENT FOR ADDITIONAL INFORMATION.

CAMU - CORRECTIVE ACTION MANAGEMENT UNIT

REV. MARK	REVISION	BY	CHK	APP	DATE

CONSULTANT

URS

URS CORPORATION
GRAND RAPIDS, MI..
3950 SPARKS DR. S.E.

URS CORPORATION
MIDLAND, MI..
1078 BUILDING, DOOR 1

URS PROJECT NUMBER: 41569229

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
2		ATTACH 30 - REV				01-30-13
1		ATTACH 30				12-03-12

DATE ISSUED FOR

DESIGNED	URS CORPORATION	8/2012
DRAWN	URS CORPORATION	8/2012
CHECKED	URS CORPORATION	8/2012
APPROVED	S. LUCAS	8/2012
PROJ. ENGR.		8/2012
MFG. REP.	S. LUCAS	8/2012

STATUS | PLANT NO.

P.E. SEAL

THE DOW CHEMICAL COMPANY

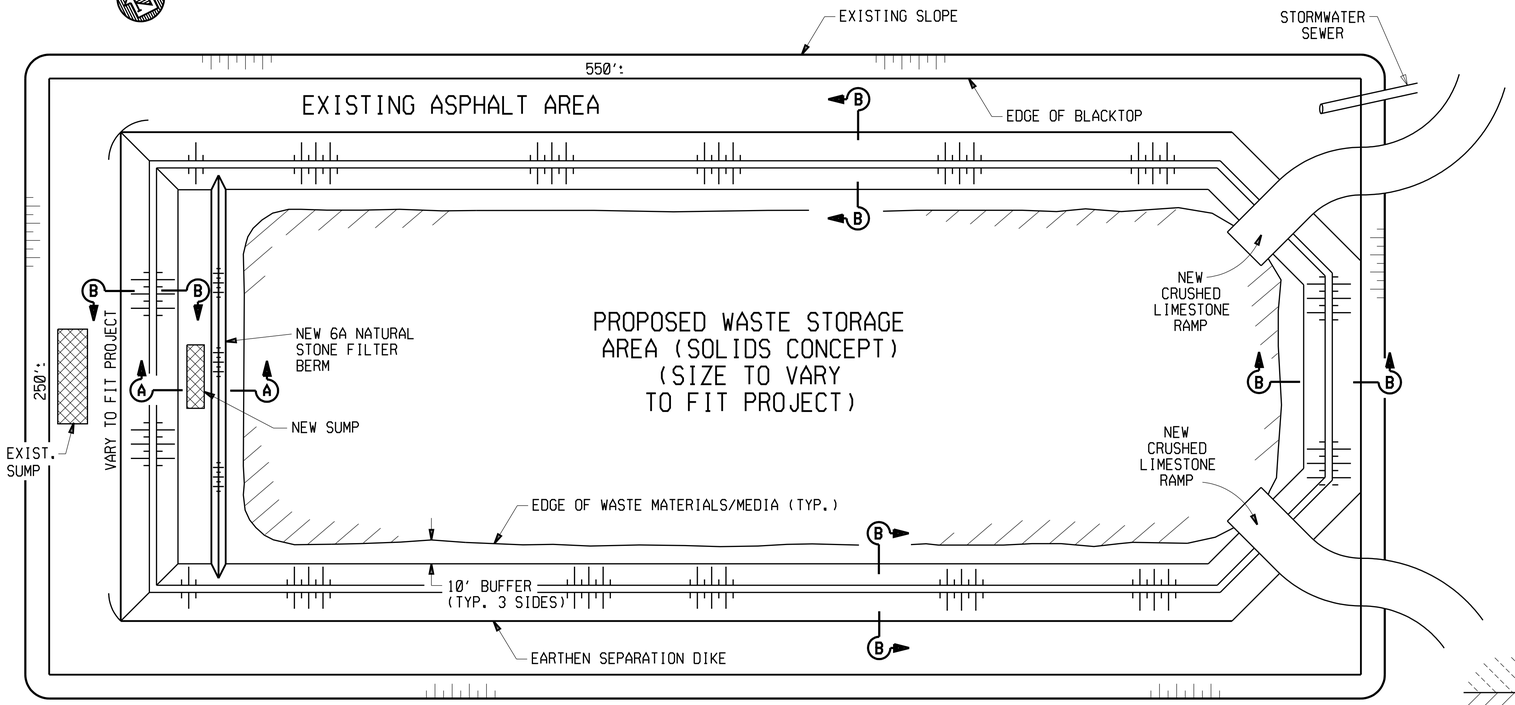
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN

EVO — RGIS

CONTAINMENT UNIT
OVERALL CAMU - PLAN VIEW

PROJECT NUMBER	SCALE	REV.
XXXXXX	NONE	B2-903A-994072

PRINTED | VER.

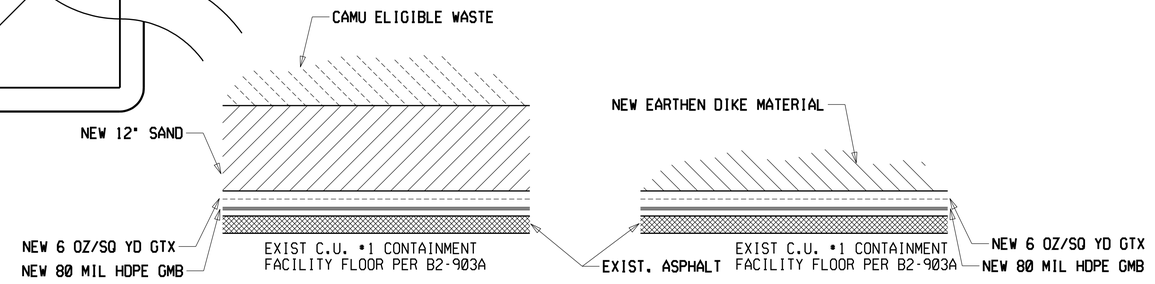


CONTAINMENT UNIT *1

PLAN VIEW - SOLIDS CONCEPT

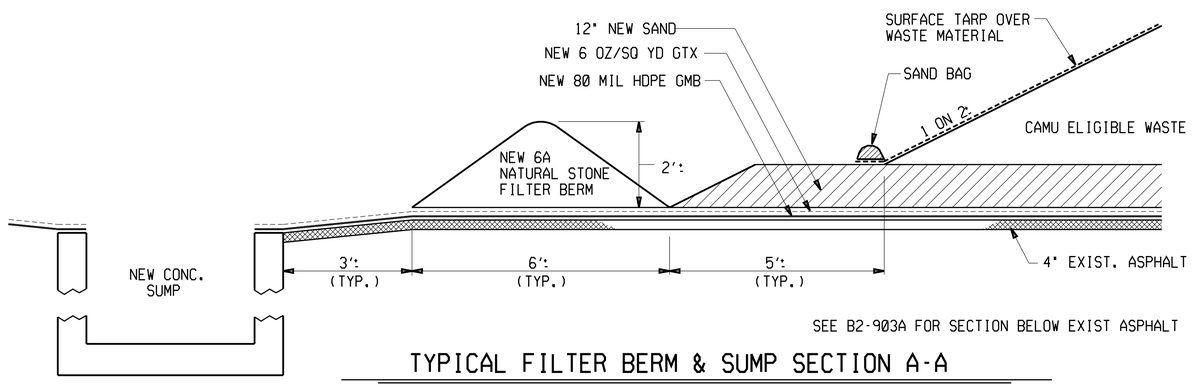
NOTES:

1. THE WIDTH & LENGTH OF THE WASTE STORAGE AREA FACILITY WILL VARY TO FIT THE WASTE STORAGE VOLUME REQUIREMENTS OF THE PROJECT.
2. IN CONTAINMENT UNIT *1 (SOLIDS CONCEPT) STORMWATER RUN-ON IS EXPECTED TO BE NON-CONTACT-STORMWATER, SEPERATED FROM WASTE BY EARTHEN SEPERATION DIKES, AND MANAGED AS NON-CONTAMINATED RUN-OFF.
3. WASTE STORAGE AREA (SOLIDS CONCEPT) SHOWN TO LEFT IS APPROXIMATELY 190' X 475'. THE ESTIMATED MAXIMUM STORAGE VOLUME OF THE WASTE STORAGE AREA IN CONTAINMENT UNIT *1 IS APPROXIMATELY 24,000 CUBIC YARDS.

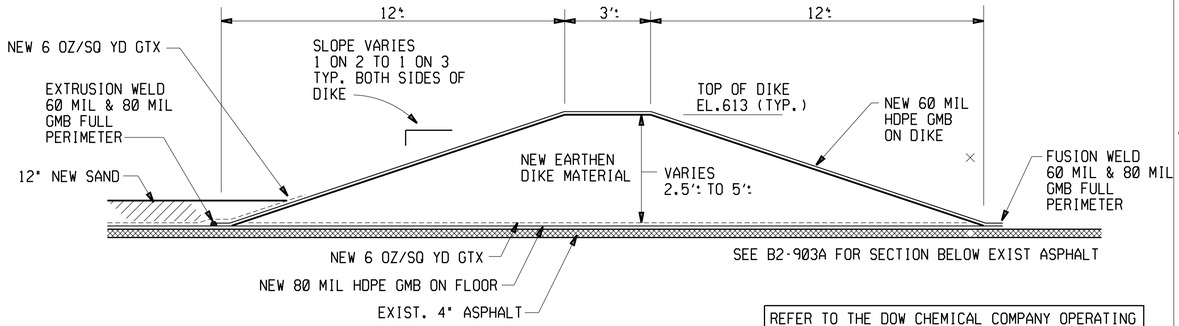


UNDER CAMU ELIGIBLE WASTE — UNDER EARTHEN DIKE

TYPICAL FLOOR SECTIONS



TYPICAL FILTER BERM & SUMP SECTION A-A



TYPICAL EARTHEN DIKE SECTION B-B

REFER TO THE DOW CHEMICAL COMPANY OPERATING LICENSE, ATTACHMENT 30 CORRECTIVE ACTION MANAGEMENT FOR ADDITIONAL INFORMATION.

CAMU = CORRECTIVE ACTION MANAGEMENT UNIT

REV. MARK	REVISION	BY	CHK	APP	DATE

CONSULTANT: URS

URS CORPORATION, GRAND RAPIDS, MI., 3950 SPARKS DR. S.E.
URS CORPORATION, MIDLAND, MI., 1078 BUILDING, DOOR 1

URS PROJECT NUMBER: 41569229

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
			DATE ISSUED FOR			
2		ATTACH 30 - REV				01-30-13
1		ATTACH 30				12-03-12

DESIGNED	URS CORPORATION	8/2012
DRAWN	URS CORPORATION	8/2012
CHECKED	URS CORPORATION	8/2012
APPROVED	S. LUCAS	8/2012
PROJ. ENGR.		8/2012
MFG. REP.	S. LUCAS	8/2012

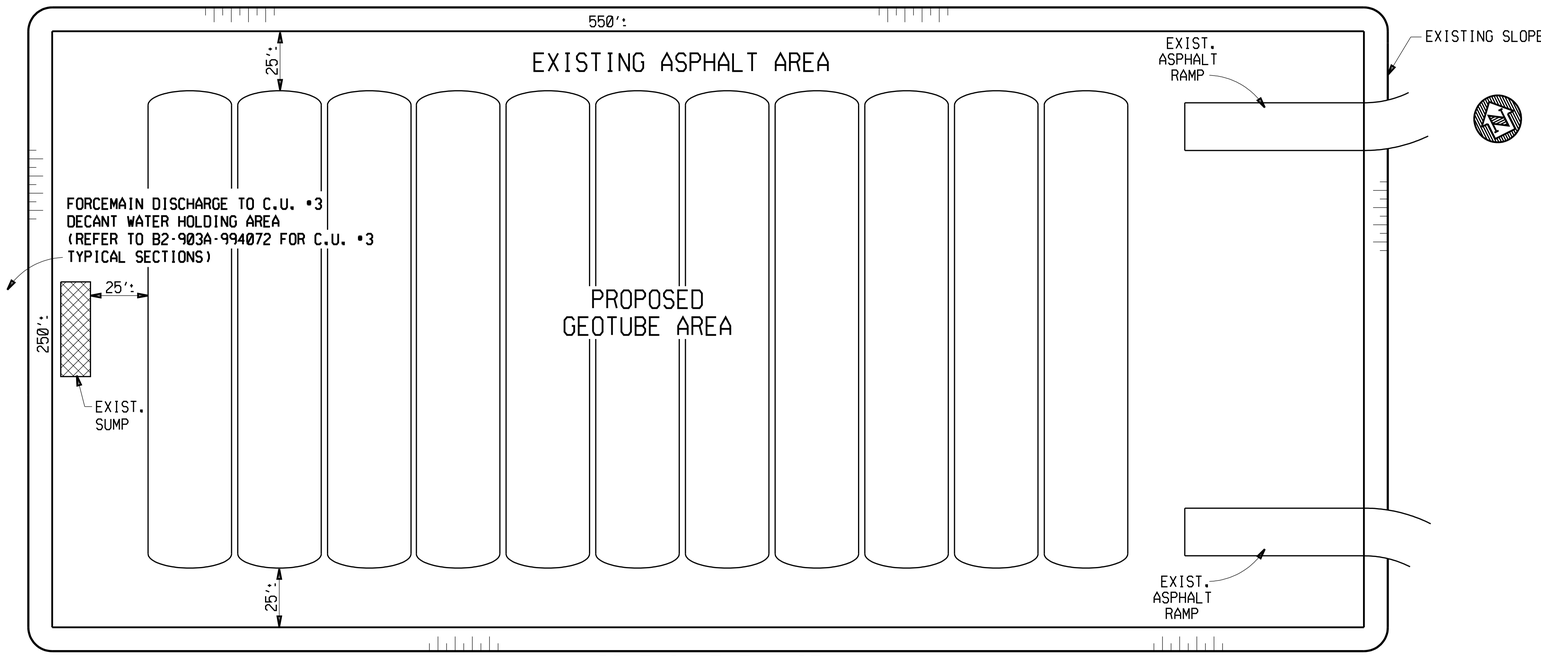
STATUS | PLANT NO. | P.E. SEAL

THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN
EVO — RGIS

CONTAINMENT UNIT
C.U. *1 - WASTE STORAGE AREA
(SOLIDS CONCEPT)

PROJECT NUMBER	SCALE	REV.
XXXXXX	NONE	B2-904A-994072

PRINTED | VER.

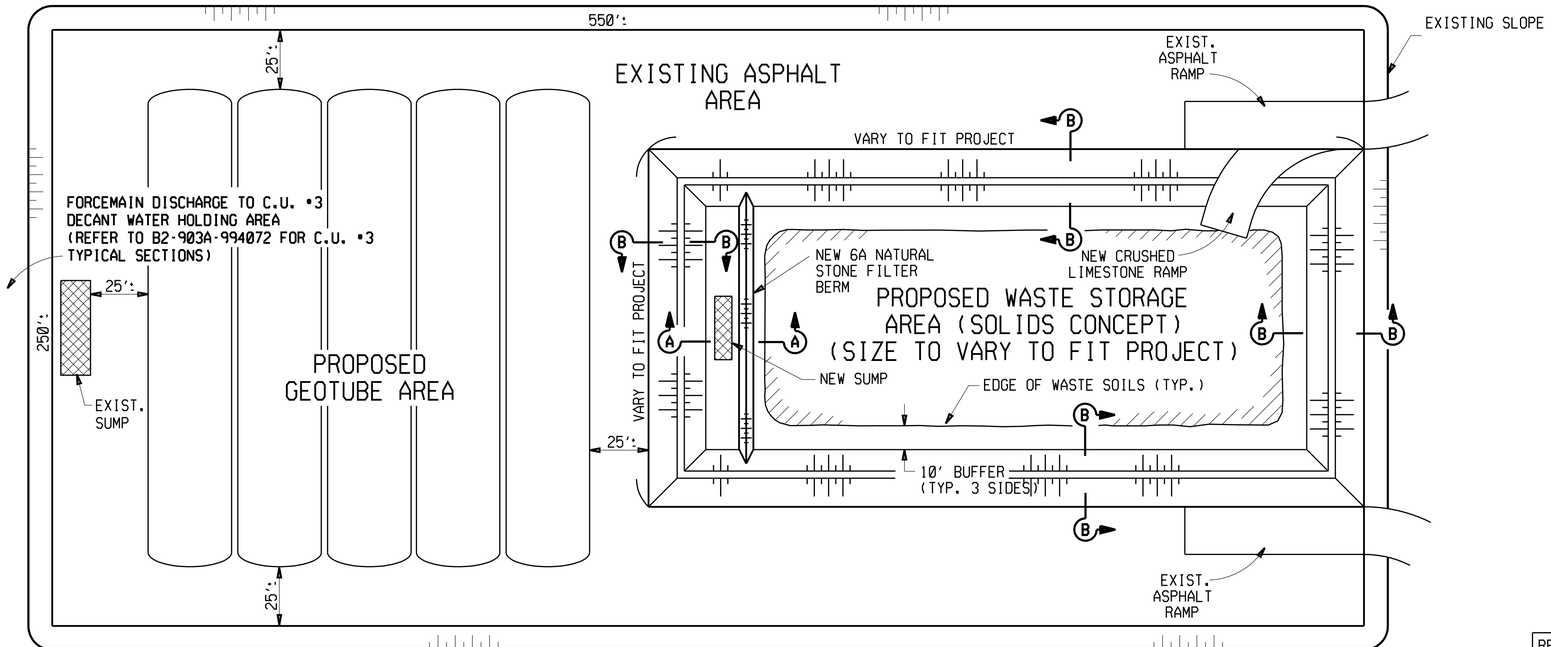


CONTAINMENT UNIT #1

PLAN VIEW - GEOTUBE ONLY CONCEPT

NOTES:

1. THE WIDTH & LENGTH OF THE WASTE STORAGE AREA FACILITY WILL VARY TO FIT THE WASTE STORAGE VOLUME REQUIREMENTS OF THE PROJECT.
2. IN CONTAINMENT UNIT #1 GEOTUBE CONCEPT SHOWN ON THIS PAGE, STORMWATER RUN-ON WILL BE MANAGED THE SAME AS GEOTUBE DEWATERING WATER.
3. WASTE STORAGE AREA (SOLIDS CONCEPT) SHOWN TO LEFT IS APPROXIMATELY 150' X 300'. THE ESTIMATED STORAGE VOLUME OF THE WASTE STORAGE AREA IN CONTAINMENT UNIT #1, FOR THE SCENARIO SHOWN, IS APPROXIMATELY 6,000 CUBIC YARDS.
4. REFER TO B2-904A-994072 FOR SECTIONS A-A AND B-B, AND FOR TYPICAL FLOOR SECTIONS.



CONTAINMENT UNIT #1

PLAN VIEW - COMBINATION GEOTUBE AND SOLIDS CONCEPT

REFER TO THE DOW CHEMICAL COMPANY OPERATING LICENSE, ATTACHMENT 30 CORRECTIVE ACTION MANAGEMENT FOR ADDITIONAL INFORMATION.

CAMU - CORRECTIVE ACTION MANAGEMENT UNIT

REV. MARK	REVISION	BY	CHK	APP	DATE

CONSULTANT

URS

URS CORPORATION
GRAND RAPIDS, MI.,
3950 SPARKS DR. S.E.

URS CORPORATION
MIDLAND, MI.,
1078 BUILDING, DOOR 1

URS PROJECT NUMBER: 41569229

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF	DATE ISSUED FOR
2		ATTACH 30 - REV					01-30-13
1		ATTACH 30					12-03-12

DESIGNED	URS CORPORATION	8/2012
DRAWN	URS CORPORATION	8/2012
CHECKED	URS CORPORATION	8/2012
APPROVED	S. LUCAS	8/2012
PROJ. ENGR.		8/2012
MFG. REP.	S. LUCAS	8/2012

STATUS | PLANT NO.

P.E. SEAL

THE DOW CHEMICAL COMPANY

MICHIGAN OPERATIONS — MIDLAND, MICHIGAN

EVO — RGIS

CONTAINMENT UNIT

C.U. #1 - WASTE STORAGE AREA (GEOTUBE CONCEPT)

PROJECT NUMBER	SCALE	REV.
XXXXXX	NONE	B2-904B-994072

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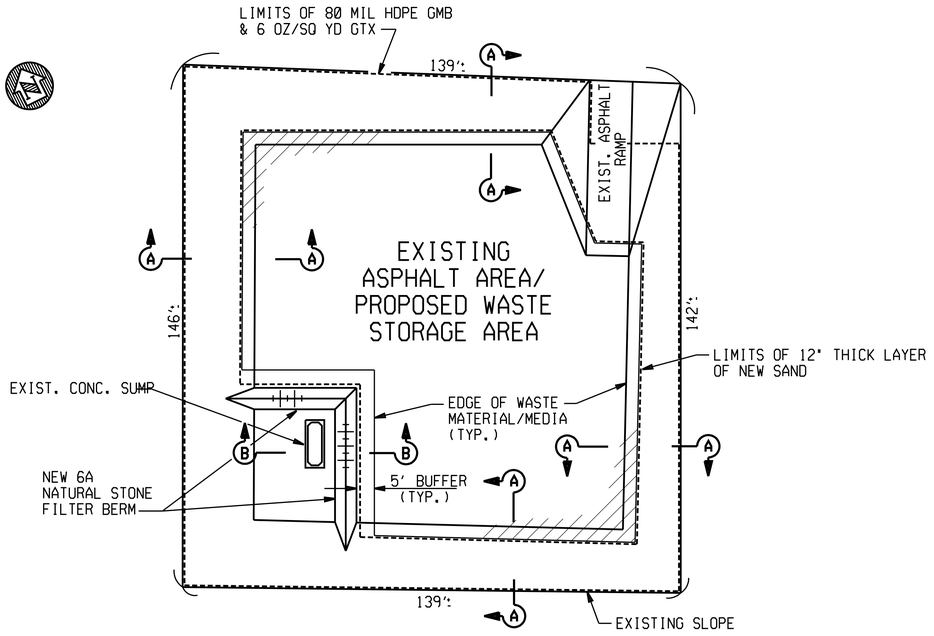
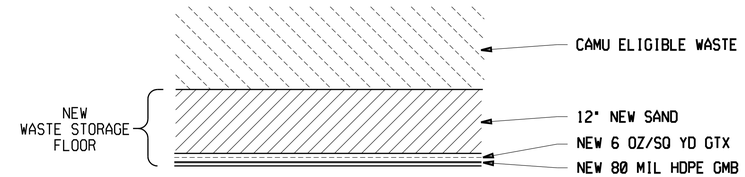


CONTAINMENT UNIT #2

PLAN VIEW

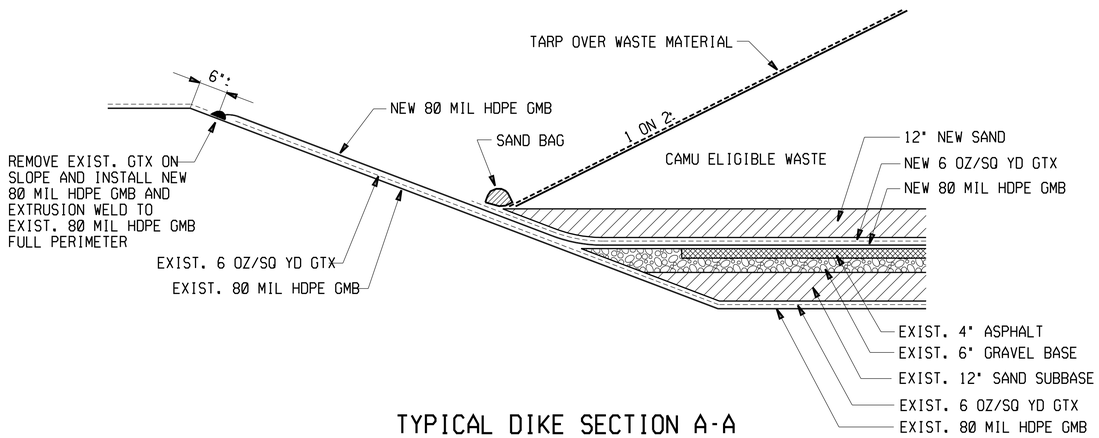
NOTES:

1. THE ESTIMATED MAXIMUM STORAGE VOLUME OF THE WASTE STORAGE AREA IN THE CONTAINMENT UNIT #2 IS APPROXIMATELY 2,500 CUIC YARDS.
2. IN CONTAINMENT UNIT #2, ALL STORMWATER RUN-ON IS EXPECTED TO BE CONTACT-STORMWATER, AND WILL BE MANAGED AS CONTAMINATED RUN-OFF.

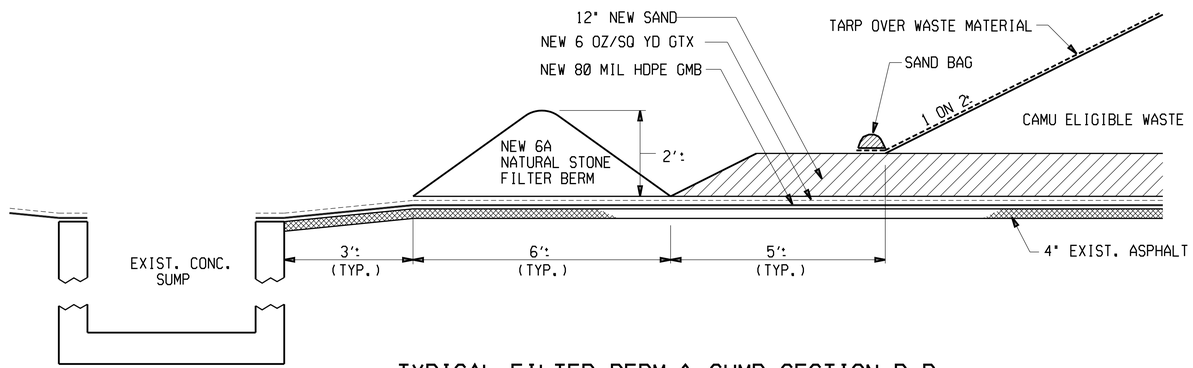


EXIST C.U. #2 CONTAINMENT FACILITY FLOOR PER B2-903A

TYPICAL FLOOR SECTION UNDER CAMU ELIGIBLE WASTE



TYPICAL DIKE SECTION A-A



TYPICAL FILTER BERM & SUMP SECTION B-B

REFER TO THE DOW CHEMICAL COMPANY OPERATING LICENSE, ATTACHMENT 30 CORRECTIVE ACTION MANAGEMENT FOR ADDITIONAL INFORMATION.

CAMU = CORRECTIVE ACTION MANAGEMENT UNIT

REV. MARK	REVISION	BY	CHK	APP	DATE

CONSULTANT

URS

URS CORPORATION GRAND RAPIDS, MI.. 3950 SPARKS DR. S.E.

URS CORPORATION MIDLAND, MI.. 1078 BUILDING, DOOR 1

URS PROJECT NUMBER: 41569229

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
2		ATTACH 30 - REV	DATE ISSUED FOR			01-30-13
1		ATTACH 30				12-03-12

DESIGNED	URS CORPORATION	8/2012
DRAWN	URS CORPORATION	8/2012
CHECKED	URS CORPORATION	8/2012
APPROVED	S. LUCAS	8/2012
PROJ. ENGR.		8/2012
MFG. REP.	S. LUCAS	8/2012

STATUS | PLANT NO.

P.E. SEAL

THE DOW CHEMICAL COMPANY

MICHIGAN OPERATIONS — MIDLAND, MICHIGAN

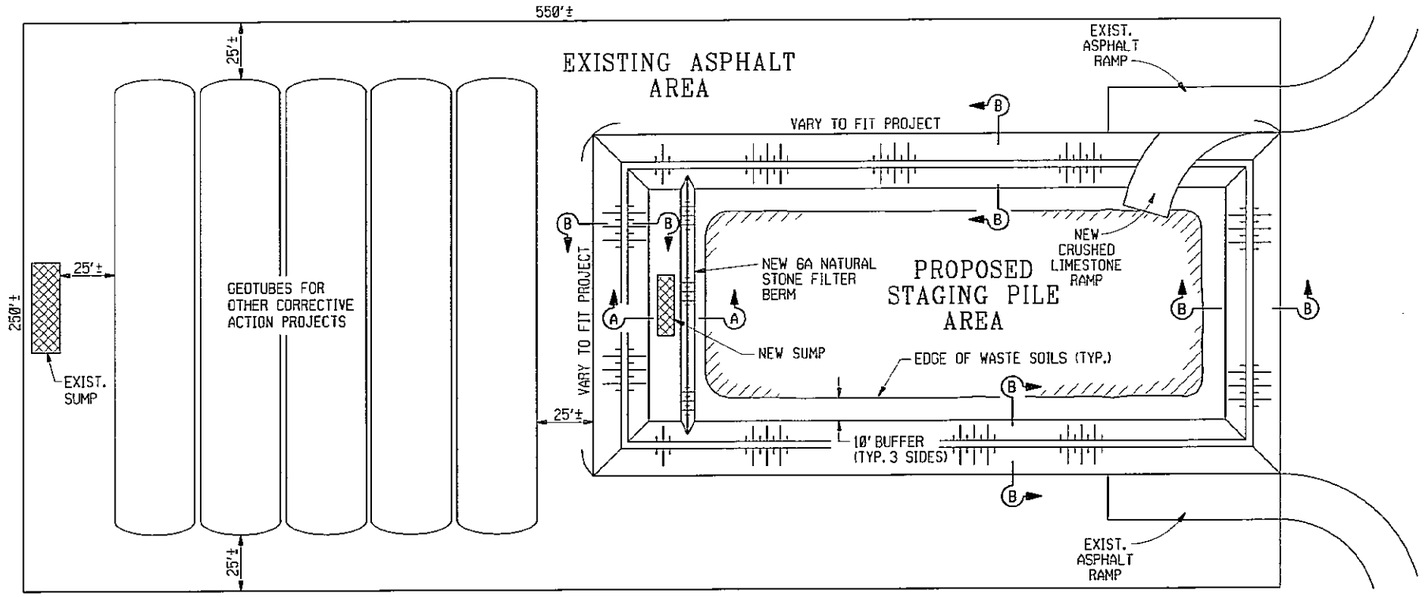
EVO — RGIS

CONTAINMENT UNIT

C.U. #2 - WASTE STORAGE AREA

PROJECT NUMBER	SCALE	REV.
XXXXXX	NONE	B2-905A-994072

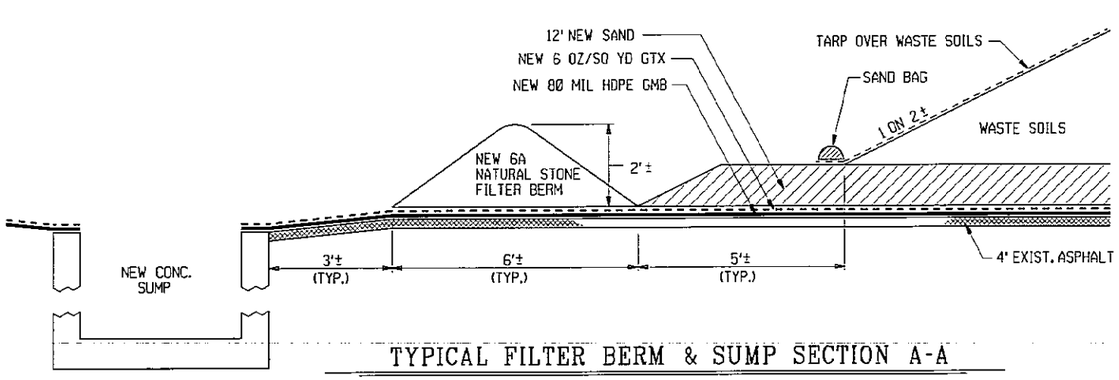
PRINTED | VER.



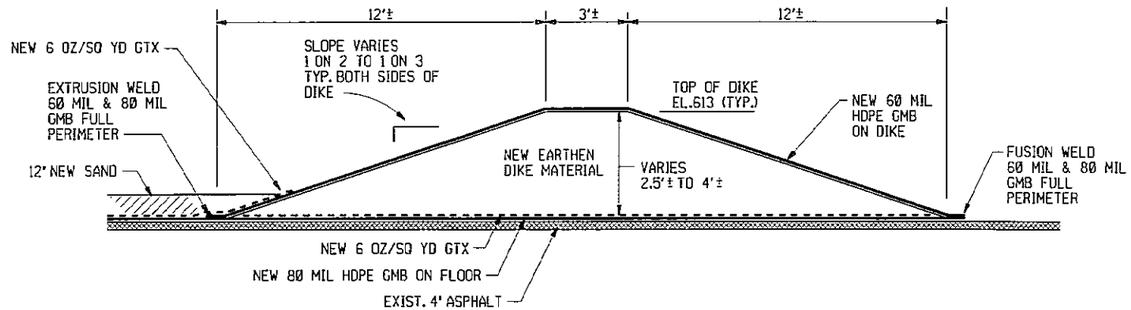
PLAN VIEW

NOTE:

THE WIDTH & LENGTH OF THE STAGING PILE FACILITY WILL VARY TO FIT THE WASTE SOILS STORAGE VOLUME REQUIREMENTS OF THE PROJECT. STAGNG PILE SHOWN TO LEFT IS APPROXIMATELY 150' x 300'. THE ESTIMATED MAXIMUM STORAGE VOLUME OF THE STAGING PILE IN THE CONTAINMENT UNIT #1 AREA IS APPROXIMATELY 6,000 CUIC YARDS.



TYPICAL FILTER BERM & SUMP SECTION A-A



TYPICAL DIKE SECTION B-B

REV. MARK	REVISION	BY	CHK	APP	DATE

REV. MARK	REVISION	BY	CHK	APP	DATE

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF

DATE ISSUED FOR

DESIGNED	L.E.G.	6/89
DRAWN	L.E. GIRARDIN	6/89
CHECKED	J.J.A.	6/89
APPROVED	J.J.A.	6/89
PROJ. ENGR.	J.J. ALLEN	6/89
MFG. REP.	STEVE LUCAS	6/89

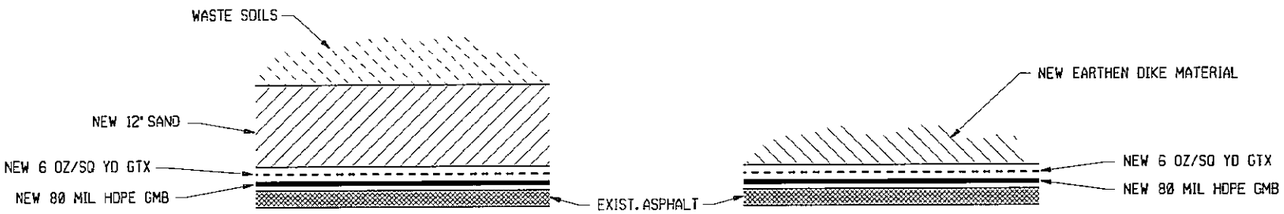
STATUS: P.E. SEAL — PLANT NO.

THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN
EVO — RGIS

CONTAINMENT UNIT #1 -STAGING PILE DESIGN

D/W NUMBER	SCALE		REV.	VER.
120881	NONE	B2-903-994072	0	2 PLN

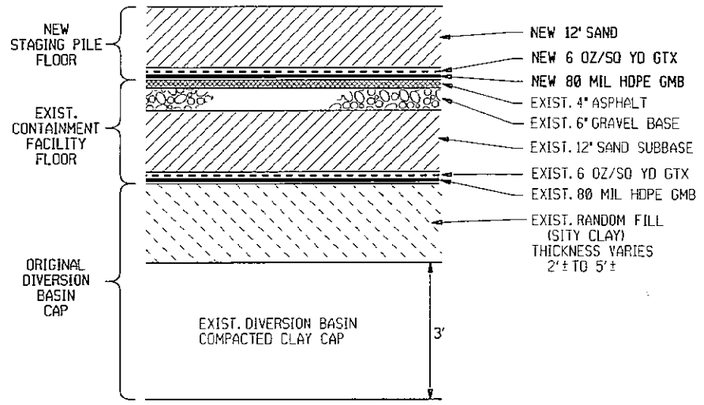
PRINTED



UNDER WASTE SOILS

UNDER DIKE

TYPICAL FLOOR SECTIONS



TYPICAL SECTION
THRU DIVERSION BASIN CAP

REV. MARK	REVISION	BY	CHK	APP	DATE

REV. MARK	REVISION	BY	CHK	APP	DATE

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	DATE ISSUED FOR: BID	FAB	CONST	REF

DESIGNED	L.E.G.	6/89
DRAWN	L.E. GIRARDIN	6/89
CHECKED	J.J.A.	6/89
APPROVED	J.J.A.	6/89
PROJ. ENGR.	J.J. ALLEN	6/89
MFG. REP.	STEVE LUCAS	6/89

STATUS | PLANT NO.
SPEC. SERIAL

THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN
EVO — RGIS

CONTAINMENT UNIT #1 -STAGING PILE DESIGN

JOB NUMBER	SCALE		REV.
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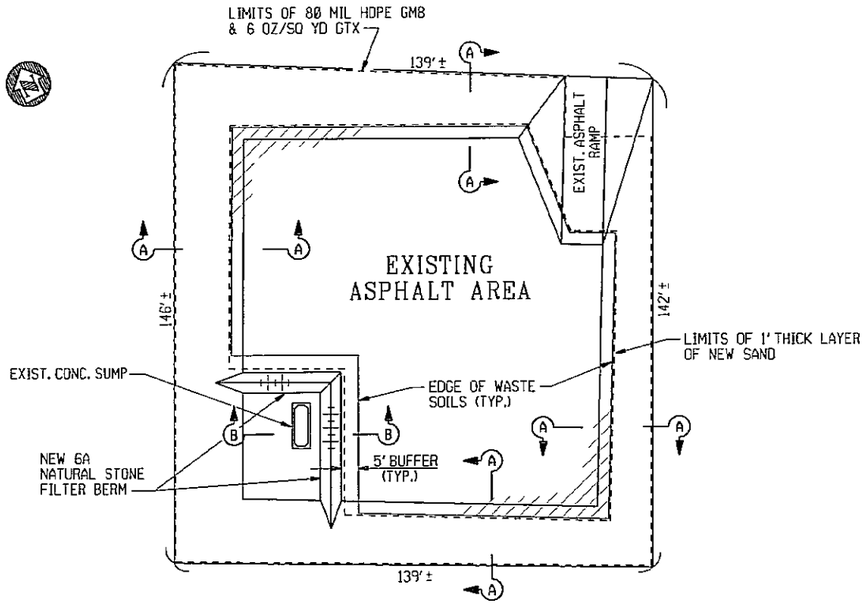
2 PLN

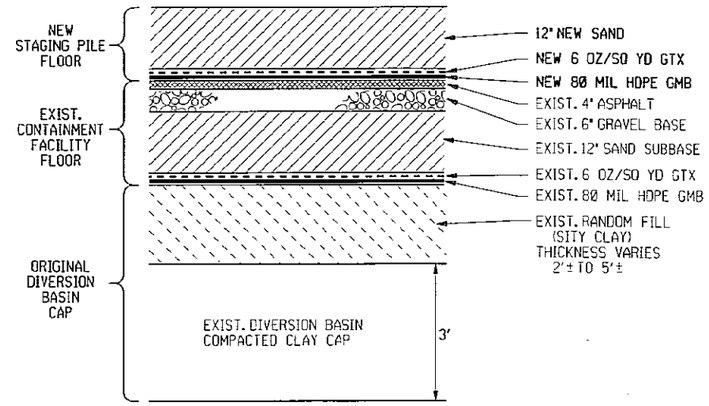
PRINTED | VER.



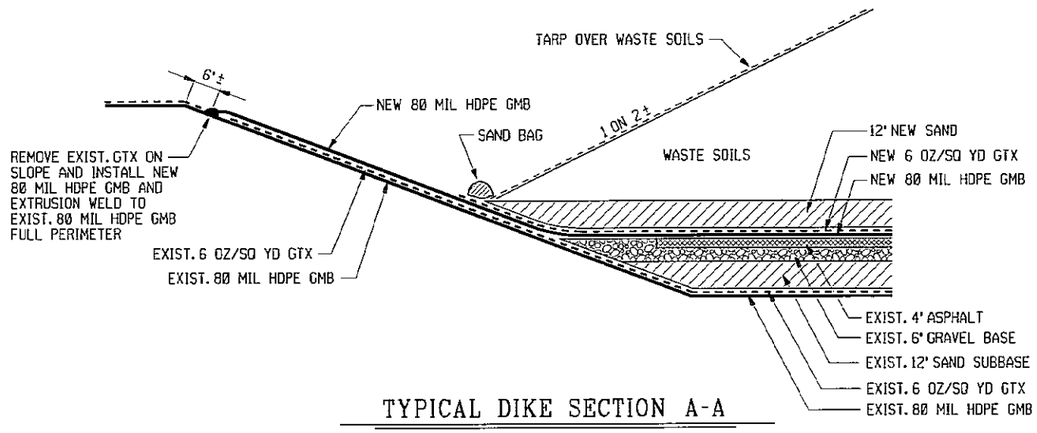
PLAN VIEW

NOTE:

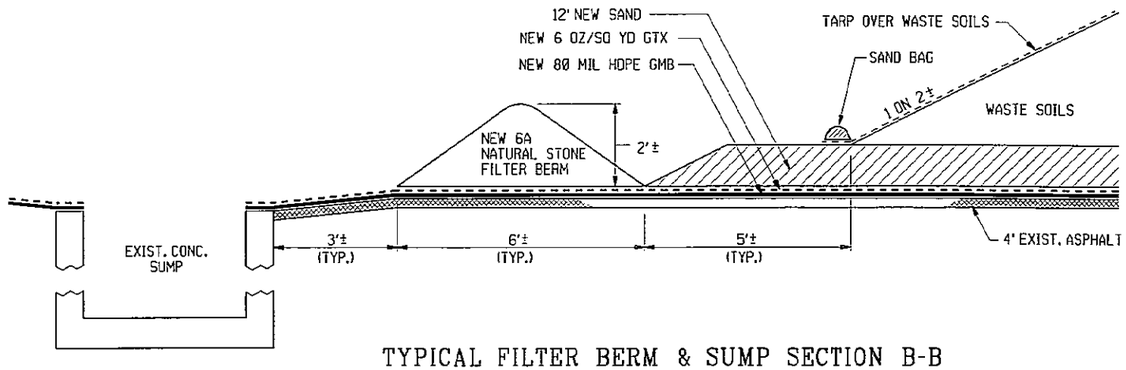
THE ESTIMATED MAXIMUM STORAGE VOLUME OF THE STAGING PILE IN THE CONTAINMENT UNIT #2 AREA IS APPROXIMATELY 2,500 CUIC YARDS.



TYPICAL FLOOR SECTION
THRU DIVERSION BASIN CAP



TYPICAL DIKE SECTION A-A



TYPICAL FILTER BERM & SUMP SECTION B-B

REV. MARK	REVISION	BY	CHK	APP	DATE

DRAWING ISSUE RECORD						
ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
			DATE ISSUED FOR			

DESIGNED	L.E.G.	6/89
DRAWN	L.E. GIRARDIN	6/89
CHECKED	J.J.A.	6/89
APPROVED	J.J.A.	6/89
PROJ. ENGR.	J.J. ALLEN	6/89
MFG. REP.	STEVE LUCAS	6/89

STATUS | PLANT NO.
P.E. SEAL

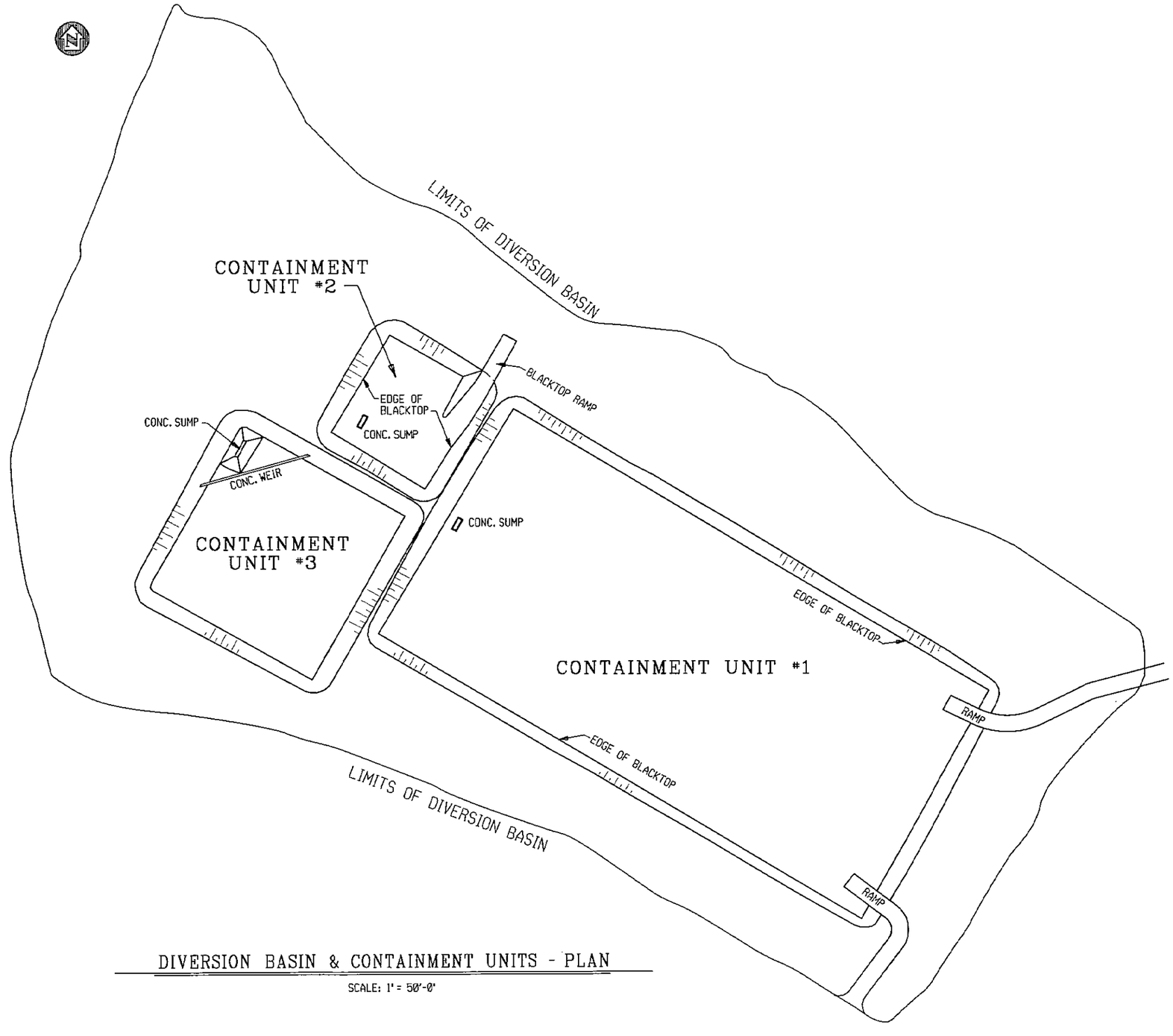
THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN
EVO — RGIS

CONTAINMENT UNIT #2 -STAGING PILE DESIGN
SAND FLOOR OPTION

EJN NUMBER	SCALE		REV.
128881	NONE	B2-905-994072	0

PRINTED | VER.

2 PLN



DIVERSION BASIN & CONTAINMENT UNITS - PLAN

SCALE: 1" = 50'-0"

REV. MARK	REVISION	BY	CHK	APP	DATE

REV. MARK	REVISION	BY	CHK	APP	DATE

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF

DATE ISSUED FOR

DESIGNED	J.J. ALLEN	6/09
DRAWN	L.E. GIRARDIN	6/09
CHECKED	J.J.A.	6/09
APPROVED	J.J.A.	6/09
PROJ. ENGR.	J.J. ALLEN	6/09
MFG. ENGR.	STEVE LUCAS	6/09

STATUS: P.E. SEAL — PLANT NO.

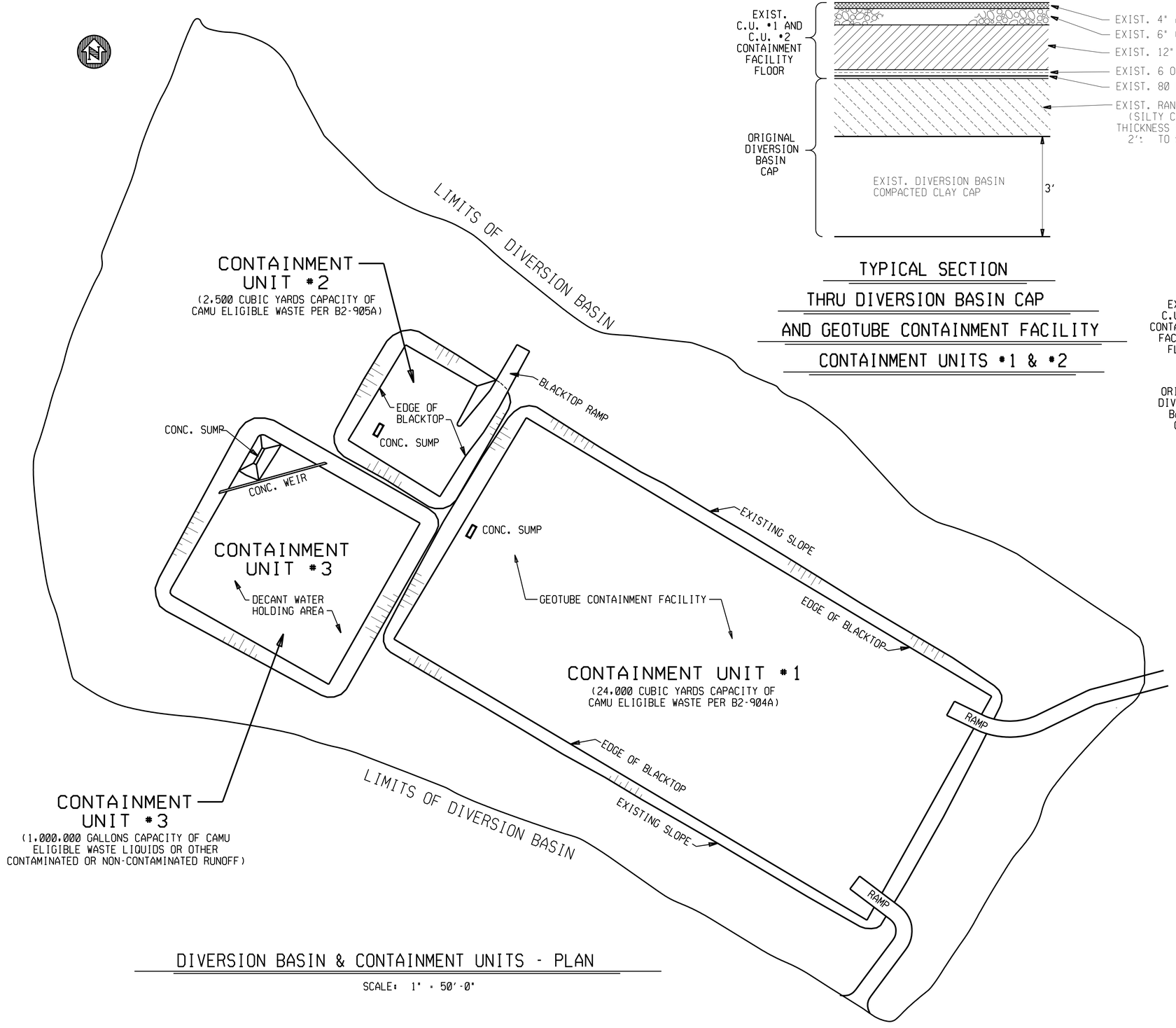
THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN
EVO — RIVER

DIVERSION BASIN - CONTAINMENT UNITS
PLAN VIEW

E.W. NUMBER	SCALE	PRINTED	REV.
117874	1" = 50'-0"	B2-906-994072	2

VER. PLN

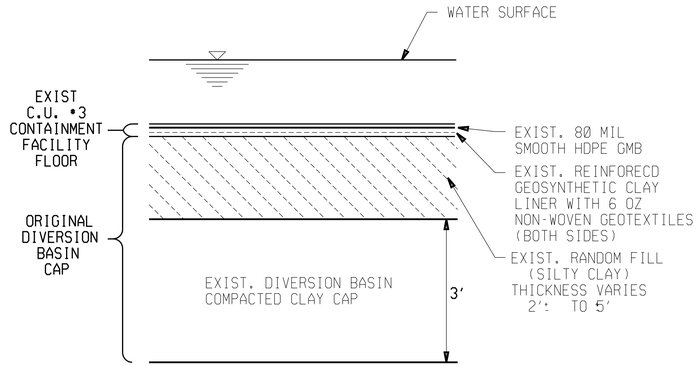
INSTRUCTIONS: 1 PERSON 2 DATE 3 TIME 4 FILENAME



DIVERSION BASIN & CONTAINMENT UNITS - PLAN

SCALE: 1" = 50'-0"

TYPICAL SECTION THRU DIVERSION BASIN CAP AND GEOTUBE CONTAINMENT FACILITY CONTAINMENT UNITS #1 & #2



TYPICAL SECTION CONTAINMENT UNIT #3

REFER TO THE DOW CHEMICAL COMPANY OPERATING LICENSE, ATTACHMENT 30 CORRECTIVE ACTION MANAGEMENT FOR ADDITIONAL INFORMATION.

CAMU - CORRECTIVE ACTION MANAGEMENT UNIT

REV. MARK	REVISION	BY	CHK	APP	DATE

CONSULTANT

URS

URS CORPORATION
GRAND RAPIDS, MI..
3950 SPARKS DR. S.E.

URS CORPORATION
MIDLAND, MI..
1078 BUILDING, DOOR 1

URS PROJECT NUMBER: 41569229

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
2		ATTACH 30 - REV				01-30-13
1		ATTACH 30				12-03-12

DATE ISSUED FOR

DESIGNED	URS CORPORATION	8/2012
DRAWN	URS CORPORATION	8/2012
CHECKED	URS CORPORATION	8/2012
APPROVED	S. LUCAS	8/2012
PROJ. ENGR.		8/2012
MFG. REP.	S. LUCAS	8/2012

STATUS | PLANT NO.

P.E. SEAL

THE DOW CHEMICAL COMPANY

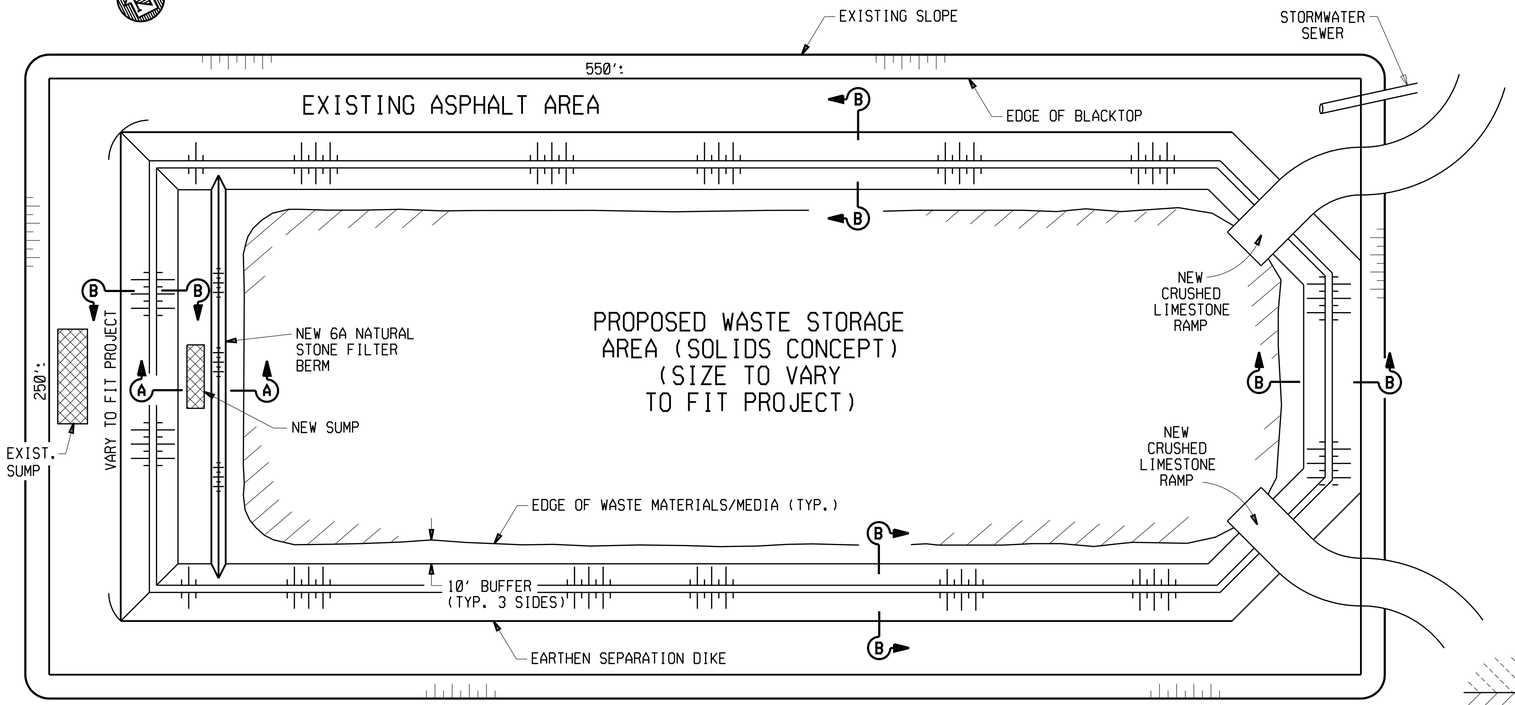
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN

EVO — RGIS

CONTAINMENT UNIT
OVERALL CAMU - PLAN VIEW

PROJECT NUMBER	SCALE	REV.
XXXXXX	NONE	B2-903A-994072

PRINTED | VER.

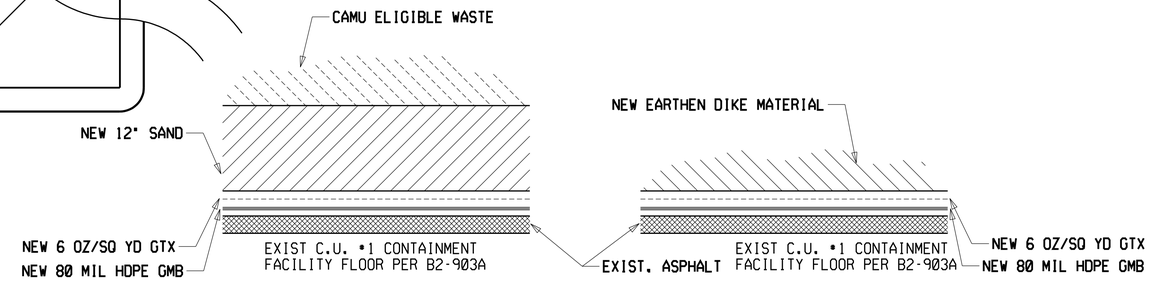


CONTAINMENT UNIT *1

PLAN VIEW - SOLIDS CONCEPT

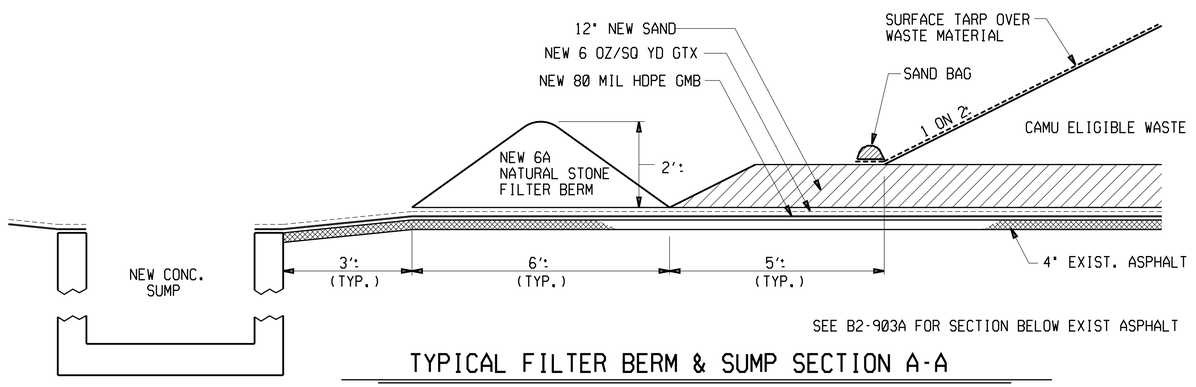
NOTES:

1. THE WIDTH & LENGTH OF THE WASTE STORAGE AREA FACILITY WILL VARY TO FIT THE WASTE STORAGE VOLUME REQUIREMENTS OF THE PROJECT.
2. IN CONTAINMENT UNIT *1 (SOLIDS CONCEPT) STORMWATER RUN-ON IS EXPECTED TO BE NON-CONTACT-STORMWATER, SEPERATED FROM WASTE BY EARTHEN SEPERATION DIKES, AND MANAGED AS NON-CONTAMINATED RUN-OFF.
3. WASTE STORAGE AREA (SOLIDS CONCEPT) SHOWN TO LEFT IS APPROXIMATELY 190' X 475'. THE ESTIMATED MAXIMUM STORAGE VOLUME OF THE WASTE STORAGE AREA IN CONTAINMENT UNIT *1 IS APPROXIMATELY 24,000 CUBIC YARDS.

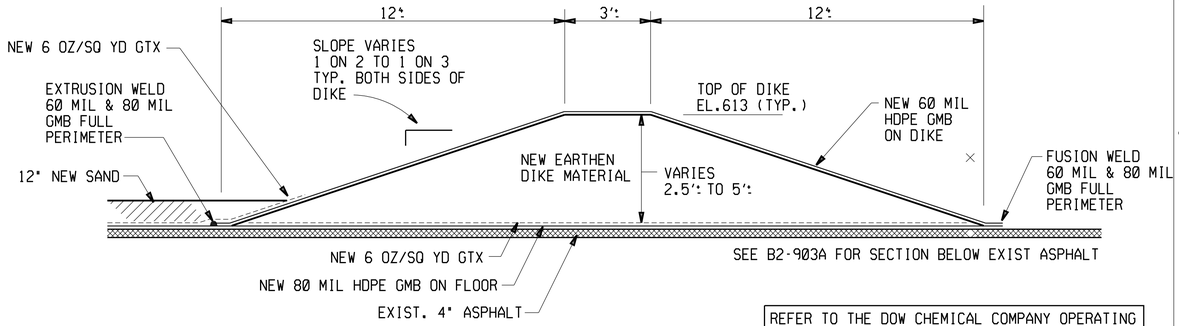


UNDER CAMU ELIGIBLE WASTE — UNDER EARTHEN DIKE

TYPICAL FLOOR SECTIONS



TYPICAL FILTER BERM & SUMP SECTION A-A



TYPICAL EARTHEN DIKE SECTION B-B

REFER TO THE DOW CHEMICAL COMPANY OPERATING LICENSE, ATTACHMENT 30 CORRECTIVE ACTION MANAGEMENT FOR ADDITIONAL INFORMATION.

CAMU = CORRECTIVE ACTION MANAGEMENT UNIT

REV. MARK	REVISION	BY	CHK	APP	DATE

CONSULTANT: URS

URS CORPORATION, GRAND RAPIDS, MI., 3950 SPARKS DR. S.E.
URS CORPORATION, MIDLAND, MI., 1078 BUILDING, DOOR 1

URS PROJECT NUMBER: 41569229

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
			DATE ISSUED FOR			
2		ATTACH 30 - REV				01-30-13
1		ATTACH 30				12-03-12

DESIGNED	URS CORPORATION	8/2012
DRAWN	URS CORPORATION	8/2012
CHECKED	URS CORPORATION	8/2012
APPROVED	S. LUCAS	8/2012
PROJ. ENGR.		8/2012
MFG. REP.	S. LUCAS	8/2012

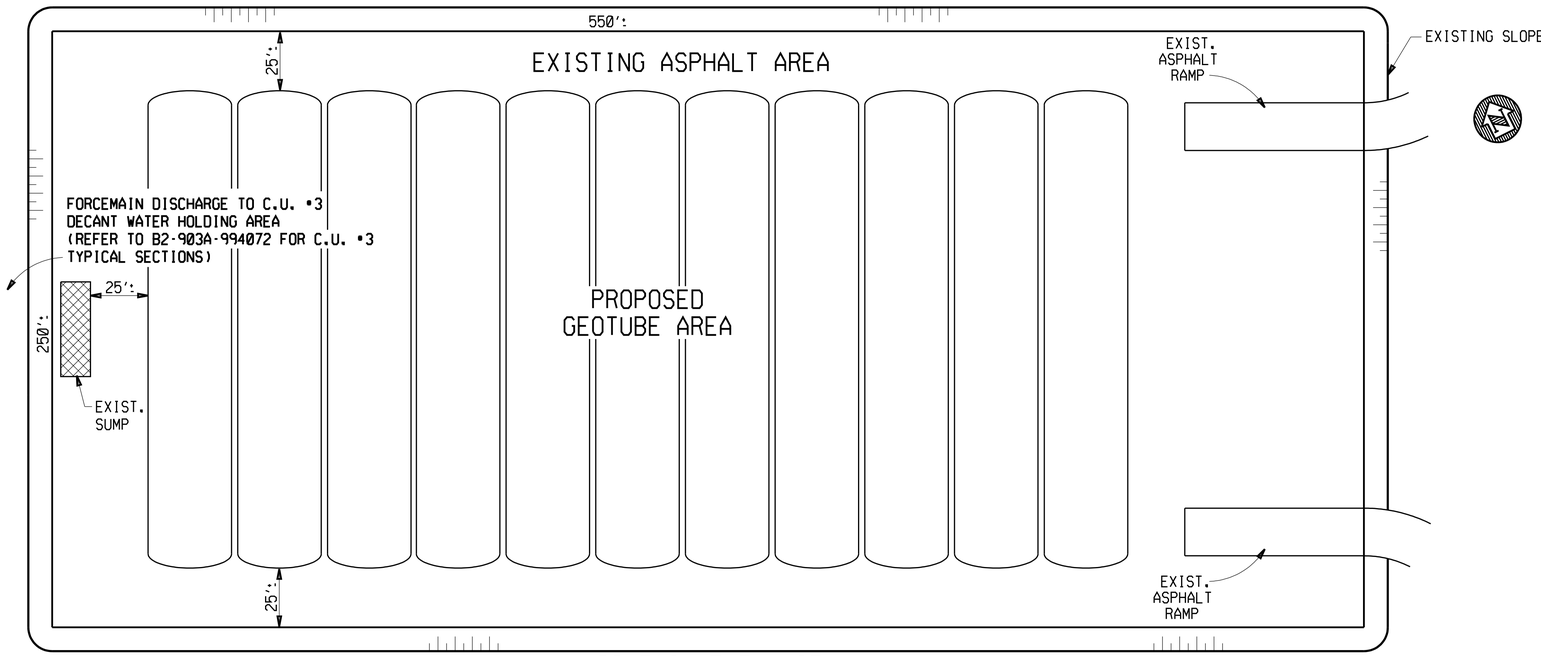
STATUS | PLANT NO. | P.E. SEAL

THE DOW CHEMICAL COMPANY
MICHIGAN OPERATIONS — MIDLAND, MICHIGAN
EVO — RGIS

CONTAINMENT UNIT
C.U. *1 - WASTE STORAGE AREA
(SOLIDS CONCEPT)

PROJECT NUMBER	SCALE	REV.
XXXXXX	NONE	B2-904A-994072

PRINTED | VER.

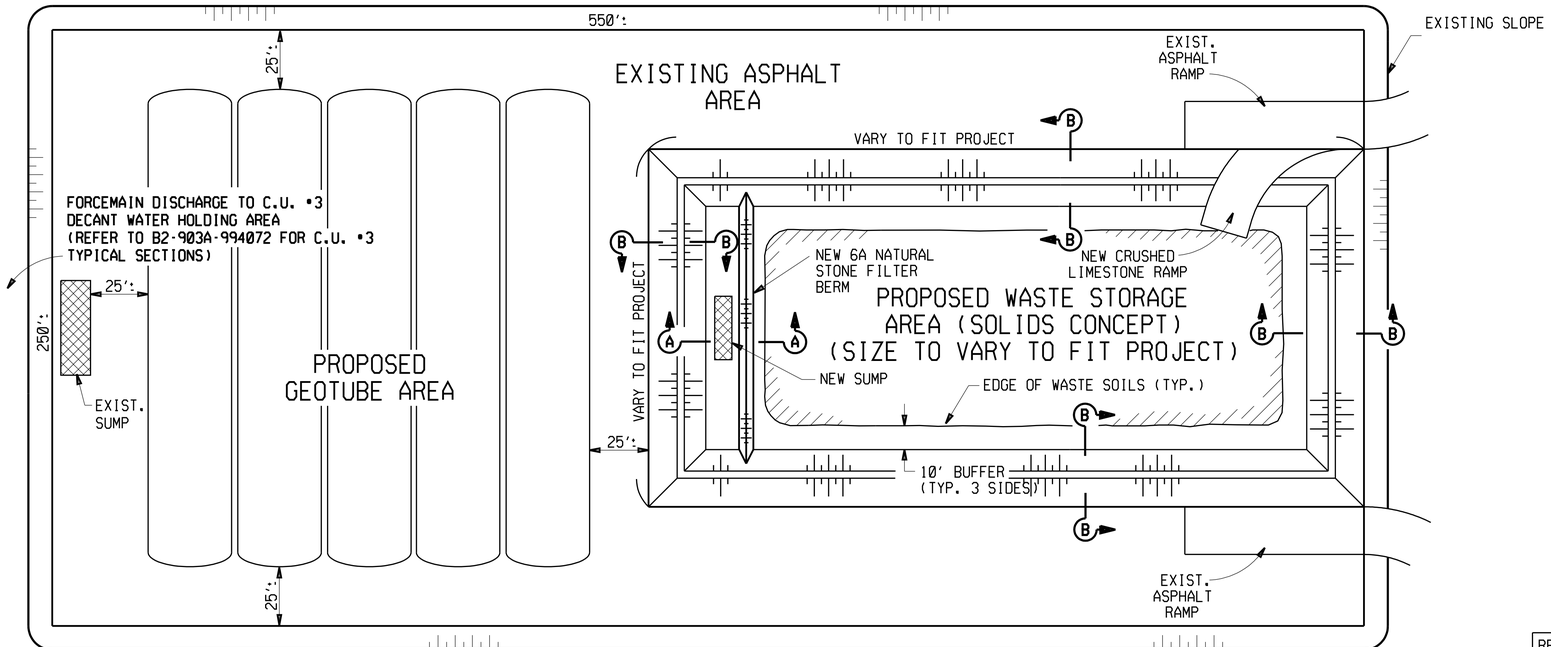


CONTAINMENT UNIT #1

PLAN VIEW - GEOTUBE ONLY CONCEPT

NOTES:

1. THE WIDTH & LENGTH OF THE WASTE STORAGE AREA FACILITY WILL VARY TO FIT THE WASTE STORAGE VOLUME REQUIREMENTS OF THE PROJECT.
2. IN CONTAINMENT UNIT #1 GEOTUBE CONCEPT SHOWN ON THIS PAGE, STORMWATER RUN-ON WILL BE MANAGED THE SAME AS GEOTUBE DEWATERING WATER.
3. WASTE STORAGE AREA (SOLIDS CONCEPT) SHOWN TO LEFT IS APPROXIMATELY 150' X 300'. THE ESTIMATED STORAGE VOLUME OF THE WASTE STORAGE AREA IN CONTAINMENT UNIT #1, FOR THE SCENARIO SHOWN, IS APPROXIMATELY 6,000 CUBIC YARDS.
4. REFER TO B2-904A-994072 FOR SECTIONS A-A AND B-B, AND FOR TYPICAL FLOOR SECTIONS.



CONTAINMENT UNIT #1

PLAN VIEW - COMBINATION GEOTUBE AND SOLIDS CONCEPT

REFER TO THE DOW CHEMICAL COMPANY OPERATING LICENSE, ATTACHMENT 30 CORRECTIVE ACTION MANAGEMENT FOR ADDITIONAL INFORMATION.

CAMU - CORRECTIVE ACTION MANAGEMENT UNIT

REV. MARK	REVISION	BY	CHK	APP	DATE

CONSULTANT

URS

URS CORPORATION
GRAND RAPIDS, MI.,
3950 SPARKS DR. S.E.

URS CORPORATION
MIDLAND, MI.,
1078 BUILDING, DOOR 1

URS PROJECT NUMBER: 41569229

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF	DATE ISSUED FOR
2		ATTACH 30 - REV					01-30-13
1		ATTACH 30					12-03-12

DESIGNED	URS CORPORATION	8/2012
DRAWN	URS CORPORATION	8/2012
CHECKED	URS CORPORATION	8/2012
APPROVED	S. LUCAS	8/2012
PROJ. ENGR.		8/2012
MFG. REP.	S. LUCAS	8/2012

STATUS | PLANT NO.

P.E. SEAL

THE DOW CHEMICAL COMPANY

MICHIGAN OPERATIONS — MIDLAND, MICHIGAN

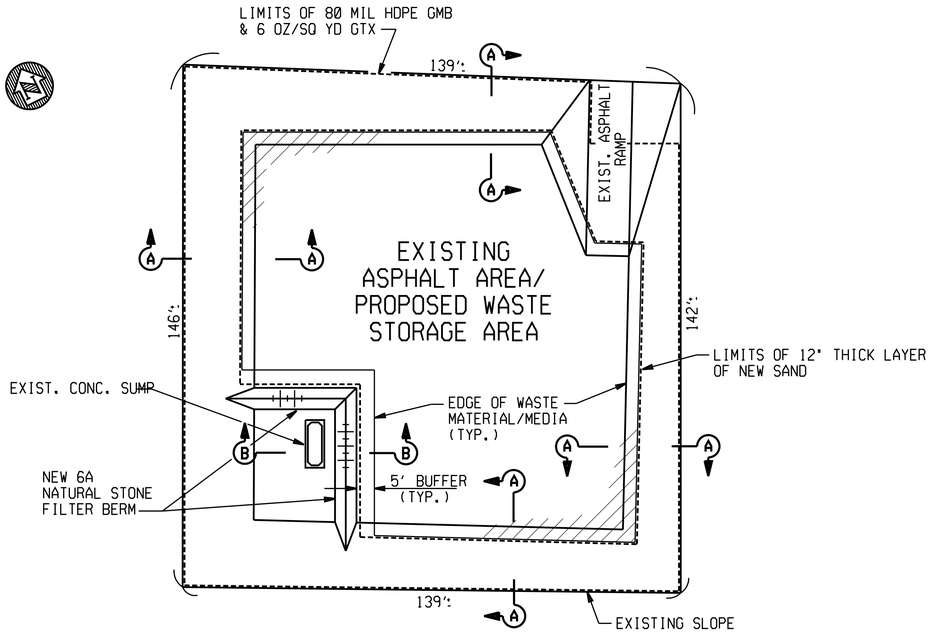
EVO — RGIS

CONTAINMENT UNIT

C.U. #1 - WASTE STORAGE AREA (GEOTUBE CONCEPT)

PROJECT NUMBER	SCALE	REV.
XXXXXX	NONE	B2-904B-994072

PRINTED | VER.

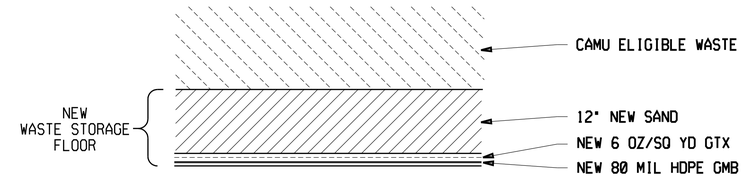


CONTAINMENT UNIT #2

PLAN VIEW

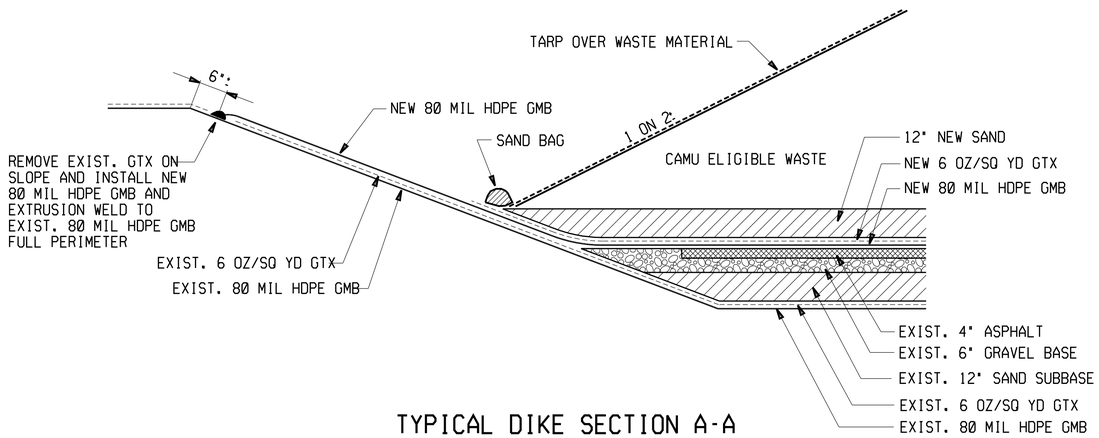
NOTES:

1. THE ESTIMATED MAXIMUM STORAGE VOLUME OF THE WASTE STORAGE AREA IN THE CONTAINMENT UNIT #2 IS APPROXIMATELY 2,500 CUIC YARDS.
2. IN CONTAINMENT UNIT #2, ALL STORMWATER RUN-ON IS EXPECTED TO BE CONTACT-STORMWATER, AND WILL BE MANAGED AS CONTAMINATED RUN-OFF.

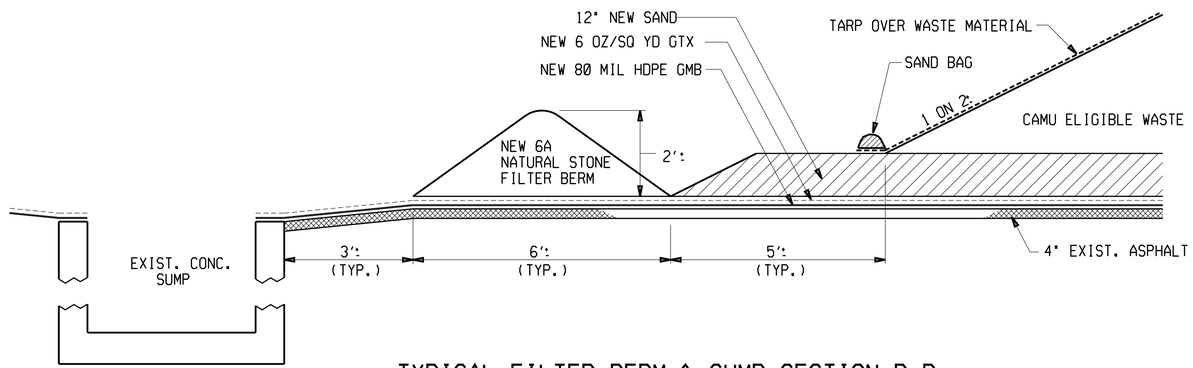


EXIST C.U. #2 CONTAINMENT FACILITY FLOOR PER B2-903A

TYPICAL FLOOR SECTION UNDER CAMU ELIGIBLE WASTE



TYPICAL DIKE SECTION A-A



TYPICAL FILTER BERM & SUMP SECTION B-B

REFER TO THE DOW CHEMICAL COMPANY OPERATING LICENSE, ATTACHMENT 30 CORRECTIVE ACTION MANAGEMENT FOR ADDITIONAL INFORMATION.

CAMU = CORRECTIVE ACTION MANAGEMENT UNIT

REV. MARK	REVISION	BY	CHK	APP	DATE

CONSULTANT

URS

URS CORPORATION GRAND RAPIDS, MI.. 3950 SPARKS DR. S.E.

URS CORPORATION MIDLAND, MI.. 1078 BUILDING, DOOR 1

URS PROJECT NUMBER: 41569229

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
2		ATTACH 30 - REV	DATE ISSUED FOR			01-30-13
1		ATTACH 30				12-03-12

DESIGNED	URS CORPORATION	8/2012
DRAWN	URS CORPORATION	8/2012
CHECKED	URS CORPORATION	8/2012
APPROVED	S. LUCAS	8/2012
PROJ. ENGR.		8/2012
MFG. REP.	S. LUCAS	8/2012

STATUS | PLANT NO.

P.E. SEAL

THE DOW CHEMICAL COMPANY

MICHIGAN OPERATIONS — MIDLAND, MICHIGAN

EVO — RGIS

CONTAINMENT UNIT

C.U. #2 - WASTE STORAGE AREA

PROJECT NUMBER	SCALE	REV.
XXXXXX	NONE	B2-905A-994072

PRINTED | VER.

ATTACHMENT XIV.B2

APPENDIX C

Worker Exposure Control Plan

Table of Contents

Attachments

1.0 INTRODUCTION

Efforts to address worker exposure to contaminated soil and groundwater at The Dow Chemical Company Michigan Operations (Facility) have been developed and incorporated into this Worker Exposure Control Plan. The objective of the Worker Exposure Control Plan is to describe the implementation of various interim measures at the Facility designed to address potential exposure pathways to on-site workers as part of final corrective action, in compliance with Part 111 of Michigan Public Act 451. On-site workers are inclusive of the following, as described in Section B2.C.1(b) of Attachment XIV.B2:

- Office Workers;
- Site Visitors;
- Outdoor Industrial Workers;
- Maintenance Workers / Landscapers; and
- Construction / Utility Workers.

The following exposure pathways are reasonably expected to be complete: direct contact with soils and groundwater, inhalation of outdoor air (e.g., airborne particles (dust), or vapors), and inhalation of indoor air (via vapor intrusion). The Worker Exposure Control Plan will address these potentially complete exposure pathways through the programs identified and summarized in the following table.

Contaminated Media	**Exposure Control Program**
Air (outdoors)	Fugitive Dust Control Program
Soil (surface, e.g., <2 ft)	Surface Soil Exposure Control Program
Soil (subsurface e.g., >2 ft)	Excavation Soil and Groundwater Management Program
Groundwater	
Air (indoors)	Industrial Hygiene Monitoring Program Enhancement

The above programs are or will be supplemented by monitoring and/or institutional controls to verify and maintain effectiveness. The basis for and details of implementation for each component within the Worker Exposure Control Program are described in the following sections.

2.0 FUGITIVE DUST CONTROL PROGRAM

The Fugitive Dust Control Program was first implemented in February 1990, and is periodically updated to reflect current operations. The Program objectives are to manage the exposure pathway of inhalation of particulates (dust) in outdoor air for workers at the facility and control off-site migration by reducing the generation of dust and track-out. This was accomplished by paving of unpaved roads and parking lots when deemed necessary, application of dust suppressant from April through October, periodic inspection for visible dust, periodic water flushing and wet sweeping of paved roads, managing staged soils or aggregates, using tarped trucks when hauling site soils, and limiting the vehicle speeds within the Facility. The current Fugitive Dust Control Program is presented in Attachment A.

3.0 SURFACE SOIL EXPOSURE CONTROL PROGRAM

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

Subsequent to completion of the improvements to the Phase I Areas, a significant amount of additional cover has been placed at the Facility to provide storm water detention, with the added benefit of providing a direct contact barrier to the existing soils. Some areas within the Facility have not yet been addressed. These areas will be identified and addressed in cooperation with MDEQ, typically utilizing the following techniques:

- Targeted soil sampling to demonstrate soil concentrations are below relevant direct contact cleanup criterion;
- Placement of barrier controls by covering existing contaminated surface areas within the Facility with six inches of topsoil and establishing vegetation;
- Placement of barrier controls by covering unused areas with stone or gravel;
- Restricting traffic patterns and traffic access to identified areas;
- Reducing potential to generate dust by installation of asphalt pavement; and
- In limited cases, removal of surface soils and backfilling with clean materials.

Figures 1 and 2 present a summary of the current cover at the site, and identify the locations of surface soil samples that have been collected.

3.1 Topsoil and Vegetative Cover

Placement of topsoil and vegetative cover is conducted as follows. Within the Facility, topsoil is considered “clean” if it does not contain hazardous substances in concentrations that exceed MDEQ Generic Non-residential Direct Contact Cleanup Criteria. Topsoil meeting this definition may be obtained from an off-site borrow source or be relocated from on-site pursuant to the provisions of Section 20120c of Part 201 of Michigan Act 451. The topsoil cover layer is placed by heavy equipment and dump trucks. The topsoil cover was applied by placing an

approximately eight inch lift of material, which after grading and some compaction yields a final thickness of six inches. After placement, topsoil is graded to produce a smooth and uniform surface. Truck traffic is minimized over the topsoil surface to avoid significant compaction. A water truck is utilized to spray the working area to prevent dust during construction activities. Equipment and roadways are inspected and maintained to prevent tracking of mud and materials during these activities.

Placed topsoil is hydroseeded or mechanically seeded to establish the final vegetative cover. Topsoil is fertilized at an appropriate rate and nutrient percentages. The seed mixture includes various grasses and is applied at the recommended rate. Along with the seeding, a mulch and/or mulch adhesive may be placed on top to protect and promote the vegetative growth.

3.2 Pavement Transition

In areas adjacent to certain existing roadways without curbing, an approximate four to eight foot wide stone/gravel shoulder is used to provide a buffer between the roadway and the vegetative cover to minimize impact to the vegetation due to road traffic, maintenance, and ice and snow removal. Dust suppressant will be utilized on an as-needed basis, to control dust from the stone/gravel shoulder.

3.3 Clean Stone or Gravel Cover

In certain areas where vegetation or paving are not practical, a four to six inch layer of clean stone or gravel material may be applied over the surface of the area being addressed. Stone or gravel is placed with heavy equipment and graded to produce a smooth and uniform surface in a manner that does not allow mixing with the underlying material. The material is compacted until it is stabilized. A water truck is utilized to spray the working area to prevent visible dust during construction activities. Stone material ranging in size from railroad ballast to MDOT 6AA is used in areas where access can be restricted. MDOT 23 gravel is typically used in areas where some vehicle traffic may be required. This technique is used in conjunction with limiting vehicle access and application of dust suppression.

3.4 Restricting Traffic Patterns and Access

Restricting traffic patterns and/or access may also be implemented to eliminate vehicular or truck traffic over portions of the Facility with gravel cover. Access will be restricted by placing traffic barriers and will be incorporated into the Fugitive Dust Control Program.

3.5 Asphalt Installation

Installation of asphalt pavement may be used to minimize vehicle traffic or parking in gravel areas. During the implementation of the Surface Soil Exposure Control Program, some existing gravel areas with heavy traffic were replaced with asphalt pavement. Asphalt pavement intended for use in traffic areas includes a three to four inch layer of asphalt. Prior to construction activities, appropriate soil and erosion devices will be installed, as necessary. The existing gravel base is appropriately graded to promote drainage and compacted to provide subgrade stability. During construction activities, a water truck is utilized to spray each working area and prevent visible dust.

3.6 On-going Activities

The ultimate goal of the Surface Soil Exposure Control Program is the elimination of unacceptable direct contact exposure to surface soils at the Facility. Although significant work has been completed to address direct contact exposure to surface soils, additional work must be completed. A site inventory of areas not yet addressed will be developed to facilitate a phased plan for addressing the exposure pathway by 2020. The inventory will be updated annually to track and evaluate progress. Many areas within the Facility have been opportunistically covered in conjunction with other projects, to the extent feasible. An example includes placement of over 300 acres of new topsoil cover or pavement in conjunction with site-wide storm water detention project.

As new areas are identified through investigation activities, Interim Measures may also be prioritized and completed on an as-needed basis. For example, an Interim Measure was completed in 2006 at the DOS-20 area, where soil samples identified an area of atypically high dioxin TEQ near the central portion of the site. As part of that project, an area of approximately one to one and a half acres in size was stripped of the upper six inches of soil and covered with both clean and vegetated topsoil as well as gravel. The area was barricaded to prevent unauthorized access and periodic inspections and maintenance of the final cover occurs, as needed.

All work that includes ground penetration is performed pursuant to the requirements of the Facility Excavation Soil and Groundwater Management Program, described in the following section.

4.0 EXCAVATION SOIL AND GROUNDWATER MANAGEMENT

Any activity within the Facility that includes excavation and earth penetration is currently managed through procedures designed to effectively manage any soil and/or groundwater generated by such activities, while at the same time providing adequate contaminant exposure controls for workers by managing the direct contact with soils and groundwater. These procedures will be employed during all excavation activities, and Dow is committed to continuously updating and maintaining these excavation management procedures.

The personnel responsible for any excavation or earth penetration activity are required to prepare an Environmental Excavation Plan (EEP) and obtain review and approval of the EEP before any subsurface work can be conducted. The minimum requirements for all EEPs are:

- A Personal Protective Equipment (PPE) Plan that stipulates no dermal contact with excavated soil or groundwater by workers, where concentrations of hazardous substances are not known or are known to exceed direct contact exposure thresholds. This PPE Plan provision protects the worker from dermal contact exposure with potentially impacted material. This incorporates a maximum level of conservativeness in determining appropriate levels of PPE to be used for the excavation.
- An air monitoring plan, as needed, at the project site and specification of appropriate level of respiratory PPE needed for workers that addresses the potential inhalation exposures for work involving earth penetrations.
- A Soil Staging Plan that ensures all excavated soils are appropriately covered and/or contained at the site of generation and do not spread or emanate from the excavation site.
- Any soil or groundwater generated during excavation activities that will not be replaced into the excavation but is designated for disposal will follow the requirements of Dow's Generator Waste Characterization Form (GWCF).
- Any excavated soil that will not be replaced into the excavation but is designated for relocation will follow the provisions of Section 20120c of Part 201 of Michigan Act 451. The following measures will be implemented to ensure compliance with this section of the Act:

    - Any soils relocated pursuant to 20120c will have gravel, asphalt, clean topsoil/vegetation, or other appropriate barrier installed over relocated soil.
    - Dust control procedures (tarps, water, etc.).

  - Soil staging controls.
  - Documentation of soil relocation site.
- All excavations will follow the requirements of Dow's Fugitive Dust Control Program with an emphasis on minimizing track-out.
- To address future potential exposures at excavation sites where clean cover has already been placed, gravel, asphalt, clean topsoil/vegetation, or other appropriate barriers will be installed or the existing clean cover restored after every excavation. In certain cases, specialized barriers may be present and need to be re-established (e.g. compacted clay, bentonite, and/or flexible membrane liners).

5.0 SAFETY AND INDUSTRIAL HYGIENE PROGRAM

Dow's Michigan Operations is a manufacturing Facility that maintains compliance with the Michigan occupational safety and health act, 1974 PA 154, MCL 408.1001 to 408.1094 and the rules promulgated under the act applicable to the exposure of hazardous substance. This includes the occupational and health standards for air contaminants, R 325.51101 to R 325.51108 of the Michigan administrative code. To maintain compliance with these requirements and ensure worker health and safety, Dow has developed and implemented advanced safety and industrial hygiene practices at the Dow Facility. These practices are designed to anticipate, recognize, evaluate and control chemical, physical or biological hazards that may be present in the work place.

Dow has implemented comprehensive hazard communication programs that ensure communication to employees on the potential hazards of chemicals they may be exposed to and appropriate protective measures. This is accomplished through the written hazard communication program including a list of hazardous chemicals present, worker training on hazards and protective measures, appropriate labeling and other means of identification and access to safety data sheets. The hazard communication program is compliant with the Michigan occupational safety and health act, 1974 PA 154, MCL 408.1014a and the hazard communication rules R325.77001 to R325.77003 of the Michigan administrative code. As Dow conducts investigation to evaluate the indoor air pathway, appropriate updates to the hazard communication program and appropriate worker training will be implemented to address potential for vapor intrusion of hazardous substances into work spaces that were not previously recognized.

Dow conducts both qualitative and quantitative exposure assessments to evaluate both the adequacy of existing control measures and the need for additional controls. Qualitative exposure assessment is an industrial hygiene practice used to assess potential worker exposures to chemical, physical and biological agents in the work place. The assessment looks at the tasks being conducted by the worker, the hazard of the chemicals or other agents, the degree of potential exposure to the chemicals or other agents and duration and frequency of the potential exposure. Based on the evaluation, the various jobs or task are prioritized for follow up action. The primary output of the qualitative exposure assessment is identification of jobs or tasks that require monitoring or quantitative exposure assessment. Dow performs routine on-site worker protection and compliance monitoring to ensure employee safety and to demonstrate compliance

with MIOSHA requirements and appropriate occupational exposure limits. Results of the monitoring is documented and communicated to affected workers.

Dow evaluates compliance with MIOSHA requirements by comparing the monitoring results to the exposure limits published by the following external sources for exposure guidelines: MIOSHA Permissible Exposure Limits (PELs), ACGIH Threshold Limit Values (TLVs), and AIHA Workplace Environmental Exposure Levels (WEELs). In addition, for compounds that do not have published exposure limits from these organizations, Dow developed internal exposure guidelines (called Dow Industrial Hygiene Guidelines (IHGs)) utilizing the same exposure assumptions as these external organizations.

In the event that significant exposures are identified to a chemical that does not have an existing guideline, Dow will use the available toxicological information for the chemical, as well as toxicological information and exposure limits for compounds that are chemically similar, to either set a new Dow IHG for the chemical, or perform a range-finding for the chemical to identify the general range that an Occupational Exposure Limit for this chemical would likely fall, and ensure that adequate controls are in place to maintain exposures below this range.

Based on the results of both qualitative and quantitative assessments, controls are put into place to reduce, eliminate or protect workers from potential hazards in the work place. Dow utilizes a hierarchy of controls philosophy where potential controls are prioritized based on effectiveness. Substitution (for example, replacing a more harmful substance with a less harmful substance) and engineering (for example, installation of ventilation or isolation) controls are given preference over administrative controls (for example, decreased duration or frequency). Use of personal protective equipment (PPE) is the least preferred control.

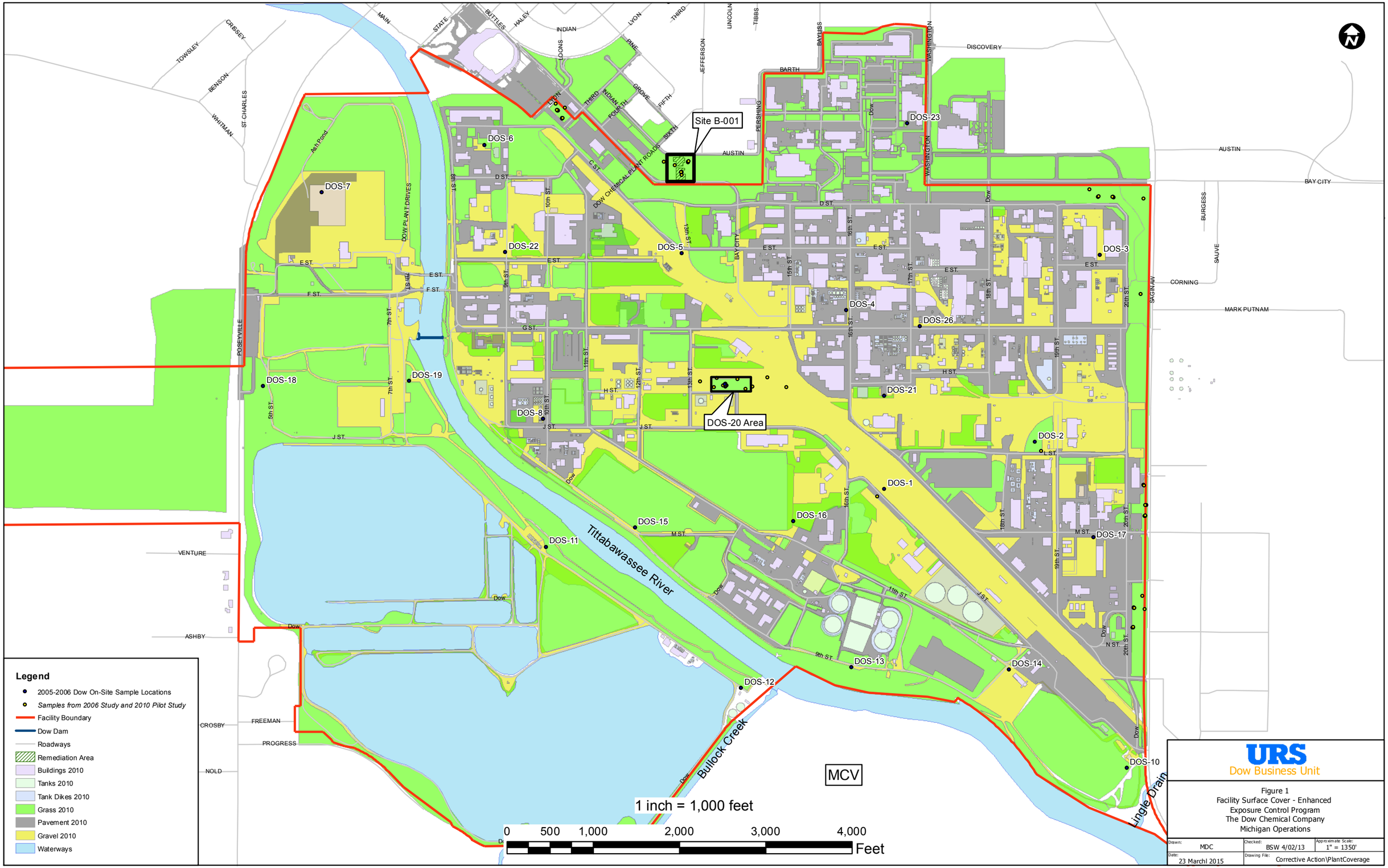
The indoor air exposure pathway is potentially complete for on-site workers via inhalation of vapors in indoor air of buildings where they work or routinely visit. By 2020, Dow will address the indoor air pathway by conducting on-site evaluations of areas of the Facility and focused assessments where it is determined to be necessary. As Dow conducts these evaluations Dow’s safety and industrial hygiene programs will be appropriately updated to include results and any appropriate controls.

6.0 SOIL EXPOSURE MONITORING PROGRAM

A Soil Exposure Monitoring Program has been established to evaluate the effectiveness of the Fugitive Dust Control and Shallow Soil Exposure Control Programs. The Monitoring Program consists of soil sampling and monitoring of eight dedicated soil test boxes at three high traffic facility exit locations and five Greenbelt Area locations.

Initially, Dow established a soil test box in the vicinity of the exit point from the Dow facility, between Dow 23 Gate and Saginaw Road (19 Gate), as part of the Exposure Control Project. Dow proposed and installed seven additional soil test boxes for this program. Two are located near the 1791 Gate and 608 Gate. Five are located in the Greenbelt Area, two along the northeast perimeter, and three along Saginaw Road. These test boxes are used to monitor the effectiveness of Dow's Exposure Control Program in preventing dispersion of contaminated dust. These monitoring points were established after Dow completed the soil exposure controls and dust suppression activities associated with the Green Belt Area and the Truck Staging Area. Initial monitoring of dioxins and furans in the test box at the 19 Gate began in October 2001.

A complete description of the soil box monitoring program is provided in the Facility Sampling and Analysis Plan (SAP), Attachment XIV.B5 Environmental Monitoring Programs.


Site B-001
DOS-1
DOS-2
DOS-3
DOS-4
DOS-5
DOS-6
DOS-7
DOS-8
DOS-10
DOS-11
DOS-12
DOS-13
DOS-14
DOS-15
DOS-16
DOS-17
DOS-18
DOS-19
DOS-20 Area
DOS-21
DOS-22
DOS-23
DOS-26
MCV
Tittabawassee River
Bullock Creek
Lingle Drain
Ash Pond
DOW PLANT DRIVES
DOW CHEMICAL PLANT ROADS
MAIN
STATE
BUTTLES
HALEY
INDIAN
LYON
PINE
THIRD
GROVE
FOURTH
FIFTH
SIXTH
JEFFERSON
LINCOLN
TIBBS
BAYLISS
WASHINGTON
DISCOVERY
BARTH
PERSHING
AUSTIN
BAY CITY
BURGESS
SAUVE
SAGINAW
CORNING
MARK PUTNAM
TOWSLEY
CRISSEY
BENSON
WHITMAN
ST CHARLES
POSEYVILLE
VENTURE
ASHBY
CROSBY
FREEMAN
PROGRESS
NOLD
D ST.
E ST.
F ST.
G ST.
H ST.
J ST.
L ST.
M ST.
N ST.
5th ST.
7th ST.
9th ST.
10th ST.
11th ST.
12th ST.
13th ST.
14th ST.
15th ST.
16th ST.
17th ST.
18th ST.
19th ST.
20th ST.
Dow
Legend
2005-2006 Dow On-Site Sample Locations
Samples from 2006 Study and 2010 Pilot Study
Facility Boundary
Dow Dam
Roadways
Remediation Area
Buildings 2010
Tanks 2010
Tank Dikes 2010
Grass 2010
Pavement 2010
Gravel 2010
Waterways
1 inch = 1,000 feet
0 500 1,000 2,000 3,000 4,000
Feet
URS
Dow Business Unit
Figure 1
Facility Surface Cover - Enhanced
Exposure Control Program
The Dow Chemical Company
Michigan Operations
Drawn: MDC
Checked: BSW 4/02/13
Approximate Scale: 1" = 1350'
Date: 23 March 2015
Drawing File: Corrective Action\PlantCoverage

Site B-001

B1-04 0-6" B1-35 0-6" B1-34 0-6" B1-07 0-6" B1-05 0-6" B1-06 0-6" B1-28 0-6" B1-08 0-6" B1-09 0-6" B1-10 0-6" B1-11 0-6" B1-02R10 B1-02R5 B1-02R2 B1-02 B1-30 0-6" B1-29 0-6" B1-01 B1-12 0-6" B1-13 0-6" B1-31 0-6" B-001 B1-14 0-6" B1-15 0-6" B1-16 0-6" B1-17 0-6" B1-18 0-6" B1-19 0-6" B1-33 0-6" B1-20 0-6" B1-21 0-6" B1-32 0-6" B1-23 0-6" B1-03R10 B1-22 0-6" B1-03R5 B1-03R2 B1-03 B1-24 0-6" B1-25 0-6" B1-26 0-6" B1-27 0-6"

Site B-001

DOS-6 DOS-7 DOS-22 DOS-5 DOS-23 DOS-3 DOS-4 DOS-26 DOS-20 Area DOS-21 DOS-18 DOS-19 DOS-8 DOS-2 DOS-1 DOS-15 DOS-16 DOS-17 DOS-11 DOS-13 DOS-14 DOS-12 DOS-10

DOS-20A,B,C,D DOS-20R

DOS-2 Resample Location for Leachability Study

DOS-1 Resample Location for Leachability Study

W1-01 W-001 W1-02 W1-02R2 W1-02R5 W1-02R10 W1-03 W1-03R2 W1-03R5 W1-03R10

I1a-01 J-001 I1a-02 I1a-02R2 I1a-02R5 I1a-02R10 I1a-03 I1a-03R2 I1a-03R5 I1a-03R10

K-001

N1-03 N1-03R2 N1-03R5 N1-03R10 N1-01 N-001 N1-02 N1-02R2 N1-02R5 N1-02R10

O1-02 O1-02R2 O1-02R5 O1-02R10 O-001 O1-01 O1-03 O1-03R2 O1-03R5 O1-03R10

Tittabawassee River

Bullock Creek

Lingle Drain

DISCOVERY BARTH JEFFERSON BAYLISS WASHINGTON PINE PERSHING Dow AUSTIN BAY CITY BURGESS SAUVE CORNING MARK PUTNAM SAGINAW ROOSEVILLE VENTURE ASHBY FREEMAN PROGRESS

D ST. E ST. F ST. G ST. H ST. J ST. L ST. M ST. N ST. 5th ST. 7th ST. 9th ST. 10th ST. 11th ST. 12th ST. 13th ST. 14th ST. 15th ST. 16th ST. 17th ST. 18th ST. 19th ST. 20th ST.

Legend

- 2005-2006 Dow On-Site Sample Locations
- *Samples from 2006 Study and 2010 Pilot Study*
- Facility Boundary
- Dow Dam
- Roadways
- Remediation Area
- Buildings 2010
- Tanks 2010
- Tank Dikes 2010
- Grass 2010
- Pavement 2010
- Gravel 2010
- Waterways

MCV

1 inch = 1,000 feet

0 500 1,000 2,000 3,000 4,000 Feet

URS
Dow Business Unit

Figure 2
Facility Surface Cover - Enhanced
Exposure Control Program
The Dow Chemical Company
Michigan Operations

Drawn:	Checked:	Approximate Scale:
MDC	BSW 4/02/13	1" = 1350'
Date: 23 March 2015	Drawing File:	Corrective Action\PlantCoverage

Attachment A
Current Fugitive Dust Control Program

The Dow Chemical Company
Michigan Operations, Midland Site
Building 1790
Midland, Michigan 48667
Attn: Responsible Care Leader

Fugitive Dust Control Program

As required by Act 451 Section 324.5524, this Fugitive Dust Control Program for The Dow Chemical Company in Midland, Michigan is submitted for the Manufacturing Facility

Attachment #1 - The Site fugitive dust control plan map shows the area affected by this dust control plan.
Attachment #2 – Dust suppressants and application rates

No waste oil or recycled oil will be used for dust suppression.

I. Manufacturing Facility

A. The Michigan Division Manufacturing Facility map shows the location of the following:
   a. Roads and Parking Lots (Paved & Unpaved)
   b. Current long term Storage Piles
   c. Incinerator Complex Area
   d. Staging Pile

B. Description of Practices
   a. Paved Roads & Parking Lots
      i. Cleaning of Roads and Parking Lots will only be done from April through October.
      ii. Paved Roads will be inspected for visible dust by Dow Security personnel during their normal rounds. Excessive dusting will be reported and the identified area will be cleaned as soon as practical.
      iii. All Paved roads (indicated on Map 1) will be cleaned a minimum of once per quarter during the months of April through September and once in October, if necessary. Paved roads will be cleaned when dusting can first be seen as vehicles travel on roadways. Cleaning consists of water flushing or wet sweeping.
      iv. Paved parking lots will be cleaned when dusting can first be seen as vehicles travel across lots, and a minimum of once per year.
      v. The posted speed limit will be no higher than 30 mph to minimize generation of dust.

e. Incinerator Complex Area
(Covered under its own plan as referenced in TABLE E-1.56c EG32INCINERATOR of the ROP)

f. Staging Pile
   i. Fugitive dust emissions will be minimized by covering the Staging Pile with a tarp when material is present, except when adding or removing inventory.
   ii. Trucks hauling remediation waste soils will be tarped and have sealed tailgates.
   iii. The trucks will enter the Staging Pile, deposit their load and then be decontaminated with brooms and shovels prior to exiting the facility.
   iv. The Staging Pile and its components will be inspected as defined in the approved Part 111 Operating License.
   v. Operations at the Staging Pile will follow any additional requirements set forth in an approved remediation project specific fugitive dust plan if applicable.

g. Other Fugitive Dust Sources
   i. Apparent dust generated by moving bulk materials by conveyor equipment will be controlled by enclosing all transfer points in the handling system.
   ii. Dust generated by the chipping/mulching of pallets will be minimized through the use of a water spray.

C. Records – Records of road cleaning, application of dust suppressant, and Staging Pile inspections will be retained for five years.

*D. **Maintenance/updating of the Map – The map attached to this plan shall be updated semi-annually to reflect any changes in parking area, traffic patterns or storage piles. The updated map shall be submitted to the Air Quality Division District Supervisor and to the Chief of the Waste and Hazardous Materials Division by March 15th and September 15th of each year.***

Attachment #2

Dust Suppressants Used

1. Water
2. Solution: Water
   Calcium Chloride (approximately 38%)
3. Solids Calcium Chloride Flake or
   Pellet

Application Rate for Dust Suppressant - Gravity feed

Dust suppressant will be applied at the rate of approximately 0.14 gallons/square yard.

Application Rate for Dust Suppressant (Spray/Flushing)

This method is generally used for paved surfaces and the dust on the surface is flushed/sprayed off the surface.

Application Rate for Dust Suppressant (Solids - Flake & Pellet)

1.0 lb per square yard for Flake
0.8 lb per square yard for Pellets

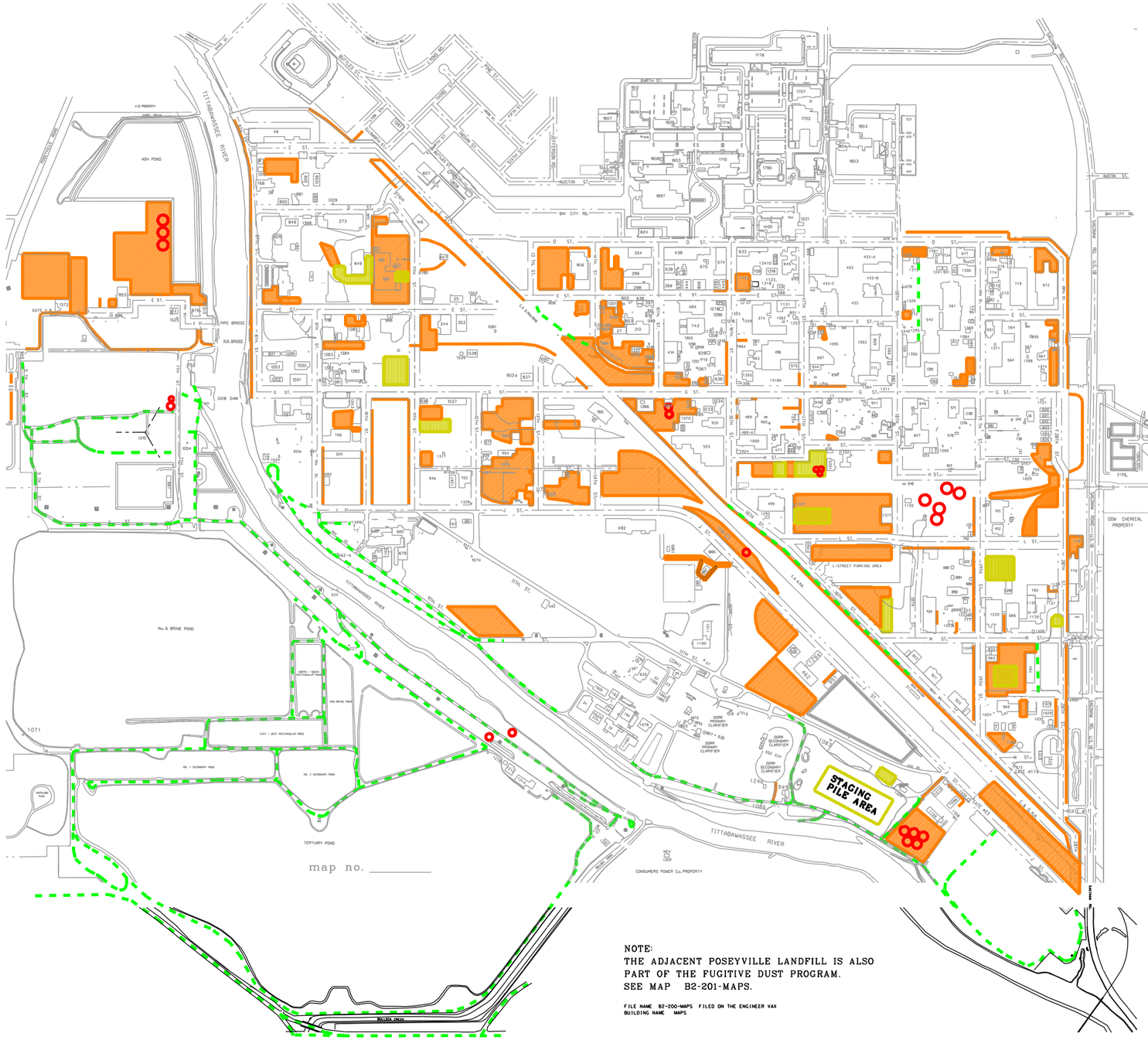
Attachment B
Identification of Surface Soil Direct Contact Remedy Areas

Attachment B: Identification of Surface Soil Direct Contact Remedy Areas

AREA	USE	GOAL	COMPLETED REMEDY	TIME PERIOD
GREEN BELT AREA				
North East Green Belt Area between D St. and Austin St., from 18th St. to E St.	Vehicle parking, buffer between 20th St. and fence, buffer between fence and Austin St.	Increase buffer and receptor area along Green Belt and minimize dust generation.	Topsoil cover and hydroseeded gravel areas. Removed asphalt parking; replaced with topsoil and vegetation. Upgraded road shoulders with new gravel. Incorporated into dust suppressant program. Installed two soil test boxes.	2001-2002, with additional improvements in 2006
North East Green Belt Area between 20th St. and Saginaw Rd., from E. St. south to G. St.	Vehicle parking, buffer between 20th St. and fence, buffer between fence and Saginaw Rd.	Increase buffer and receptor area along Green Belt and minimize dust generation.	Topsoil cover and hydroseeded gravel areas. Removed asphalt parking; replaced with topsoil and vegetation. Upgraded road shoulders with new gravel. Incorporated into dust suppressant program. Installed one soil text box.	2001-2002, with additional improvements in 2006
East Green Belt area between 20th St. and Saginaw Rd., from G St. south to 17 Gate	Vehicle parking, buffer between 20th St. and fence, buffer between fence and Saginaw Rd.	Increase buffer and receptor area along Green Belt and minimize dust generation.	Topsoil cover and hydroseeded gravel areas. Replaced gravel parking areas with asphalt. Removed asphalt parking; replaced with topsoil and vegetation. Upgraded road shoulders with new gravel. Incorporated into dust suppressant program. Installed two soil test boxes.	2001-2002, with additional improvements in 2006
CONTRACTOR PARKING AREA				
23 Gate Contractor Parking Area	Parking area for contract employee vehicles.	Minimize dust generation due to high vehicle traffic.	Eliminated gravel parking area with asphalt paving.	2001 – 2002 With drainage improvements in 2008

AREA	USE	GOAL	COMPLETED REMEDY	TIME PERIOD
ENVIRONMENTAL OPERATIONS AREA				
Environmental Area including the areas within 16th St, J St., 11th St. and M St., and along 11th St. to 23 Gate	Heavy traffic, equipment storage, and vacant areas.	Increase barrier and receptor areas and minimize dust generation.	Topsoil cover and hydroseeded gravel areas. Replaced gravel parking areas with asphalt. Removed asphalt parking; replaced with topsoil and vegetation. Upgraded road shoulders with new gravel. Incorporated into dust suppressant program. Restricted traffic access.	2001 - 2002
DOS-20	Vacant Area with grass cover and perimeter fence.		A portion of the existing rail spur was removed to the eastern boundary of the area, New railroad ballast and an approximately 20 ft strip of new gravel were added immediately south of the northern rail track to provide a clean roadway that railroad personnel could use to access the tracks. Along the southern portion of the area, approximately 6” of existing soil was stripped and new gravel was placed up to 14 ft north of the pipe rack. Stripped soil was moved to the central portion of the area. Six inches of clean topsoil were placed over the remaining area (including the relocated soil), and it was vegetated. It is periodically inspected, mowed and maintained. Barricades and fencing was installed around perimeter to prohibit vehicle access, including signage to identify that access was restricted.	October - December 2006

ENVIRONMENTAL OPERATIONS AREA, continued				
Site B-001	Grassed Facility greenbelt, both inside and outside the perimeter fenceline.	Address direct contact to surface soil by removal of impacted surface soils, backfill with clean topsoil and vegetated.	Outside of the facility fence, twelve inches of existing soil were removed (a total of 510 cubic yards). The area was backfilled with six inches of clean topsoil and vegetation re-established. Inside the fenceline, the area was covered with six inches of clean topsoil and a vegetative cover established.	October 2011
Southwest corner of 14th St. and E St.	Vacant area with grass cover.	Relocation of soil from an excavation, covered with clean barrier of 6 inches of topsoil and vegetated.	Soil relocated from a City of Midland storm sewer that was installed across Dow property, but outside the limits of the fenceline.	2004
Dow Powerhouse® Shingle Plant	New Office, Manufacturing Plant, Warehouse and parking.		The area was graded and a new plant, ancillary buildings and paved parking areas were constructed.	2011-2012
Site-Wide Stormwater Flooding Mitigation	Stormwater detention basins.	Construct stormwater detention to reduce runoff during heavy rain events, cover areas with six inches of clean topsoil and vegetation.	Approximately 300 acres of existing ground were graded and covered with six inches of clean topsoil and vegetated. Areas are mowed and maintained. Outfall structures are periodically inspected for outlet blockage.	2008 through 2011



- DUST CONTROL
- GRAVEL PARKING
- GRAVEL ROAD
- AGGREGATE PILE

NOTE:
THE ADJACENT POSEYVILLE LANDFILL IS ALSO PART OF THE FUGITIVE DUST PROGRAM.
SEE MAP B2-201-MAPS.

FILE NAME B2-200-MAPS FILED ON THE ENGINEER VAX
BUILDING NAME MAPS

FUGITIVE DUST CONTROL MAP

N W E S

SCALE 1" = 300'

REV. MARK	REVISION	BY	CHK	APP	DATE
A	REVISED DRAWINGS PER SITE CONDITIONS ON 3/8/2010	ML	TH	TH	3/8/2010
B	REVISED DRAWINGS PER SITE CONDITIONS ON 3/31/2010	ML	TH	TH	3/31/10
C	REVISED DRAWINGS PER SITE CONDITIONS ON 3/4/2011	ML	TH	TH	3/4/2011
D	REVISED DRAWINGS PER SITE CONDITIONS ON 9/7/2011	HG	TH	TH	9/7/11
E	REVISED DRAWINGS PER SITE CONDITIONS ON 3/8/2012	HG	KC	KC	3/8/2012
F	REVISED DRAWINGS PER SITE CONDITIONS ON 3/12/2013	HG	BG	BG	3/12/13
G	REVISED DRAWINGS PER SITE CONDITIONS ON 9/10/2013	HG	HS	HS	9/10/13
H	REVISED DRAWINGS PER SITE CONDITIONS ON 3/12/2014	HG	HS	HS	3/12/14
I	REVISED DRAWINGS PER SITE CONDITIONS ON 3/3/15	HG	HS	HS	3/03/15

REV. MARK	REVISION	BY	CHK	APP	DATE

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF
			DATE ISSUED FOR			

DESIGNED	TINA HARPER	9/08
DRAWN	M.L.LEWIS	9/08
CHECKED	TINA HARPER	9/08
APPROVED	TINA HARPER	9/08
PROJ. ENGR.	M.L.LEWIS	9/08
MFG. REP.	TINA HARPER	9/08

STATUS | PLANT NO.
P.E. SEAL

THE DOW CHEMICAL COMPANY
MICHIGAN DIVISION — MIDLAND, MICHIGAN
EVO — MAPS

EXHAUST AIR UPGRADE
FUGITIVE DUST CONTROL MAP

CHARGE NUMBER	SCALE		REV.
MAPS	AS NOTED	B2-200-MAPS	1

2 PLN

PRINTED | VER.

SPERSON $DATE $TIME $FILENAME $INSTRUCTIONS

PINE RIVER RD.

E. & W. 1/4 LINE - SEC. 20

PATTERSON ROAD

N. & S. 1/4 LINE - SEC. 20

POSEYVILLE ROAD

W.B.&A.R.R.

N. 1/8 LINE - SEC. 29

M.H.

S.923.72

SCALE: 1"=200'

LEGEND

= GRAVEL ROAD

= AGGREGATE PILE

FILE NAME: B2-201-MAPS FILED ON THE ENGINEER VAX
BUILDING NAME MAPS

REV. MARK	REVISION	BY	CHK	APP	DATE
A	MAP REVIEWS AND NO CHANGES WERE REQUIRED	ML	TH	TH	3/8/2010
B	MAP REVIEWED AND UPDATED	ML	TH	TH	3/4/2011
C	MAP REVIEWED AND UPDATED	ML	TH	TH	9/7/2011
D	MAP REVIEWED AND UPDATED	ML	KC	KC	3/8/2012
E	MAP REVIEWED AND UPDATED	HG	HS	HS	9/10/13
F	MAP REVIEWED AND NO CHANGES WERE REQUIRED	HG	HS	HS	3/12/14
G	MAP REVIEWED AND UPDATED	HG	HS	HS	9/4/2014
H	MAP REVIEWED AND NO CHANGES WERE REQUIRED	HG	HS	HS	3/03/15

REV. MARK	REVISION	BY	CHK	APP	DATE

DRAWING ISSUE RECORD

ISSUE NO.	REV	MATERIAL OR JOB SPEC	BID	FAB	CONST	REF

DATE ISSUED FOR

DESIGNED	TINA HARPER	9/08
DRAWN	M.LEWIS	9/08
CHECKED	TINA HARPER	9/08
APPROVED	TINA HARPER	9/08
PROJ. ENGR.	M.LEWIS	9/08
MFG. REP.	TINA HARPER	9/08

STATUS | PLANT NO.

P.E. SEAL

THE DOW CHEMICAL COMPANY

MICHIGAN DIVISION — MIDLAND, MICHIGAN

EVO — MAPS

EXHAUST AIR UPGRADE
POSEYVILLE LANDFILL FUGITIVE DUST MAP

PROJECT NUMBER	SCALE		REV.
MAPS	1"=200'	B2-201-MAPS	H

PRINTED | VER. | 2 PLN

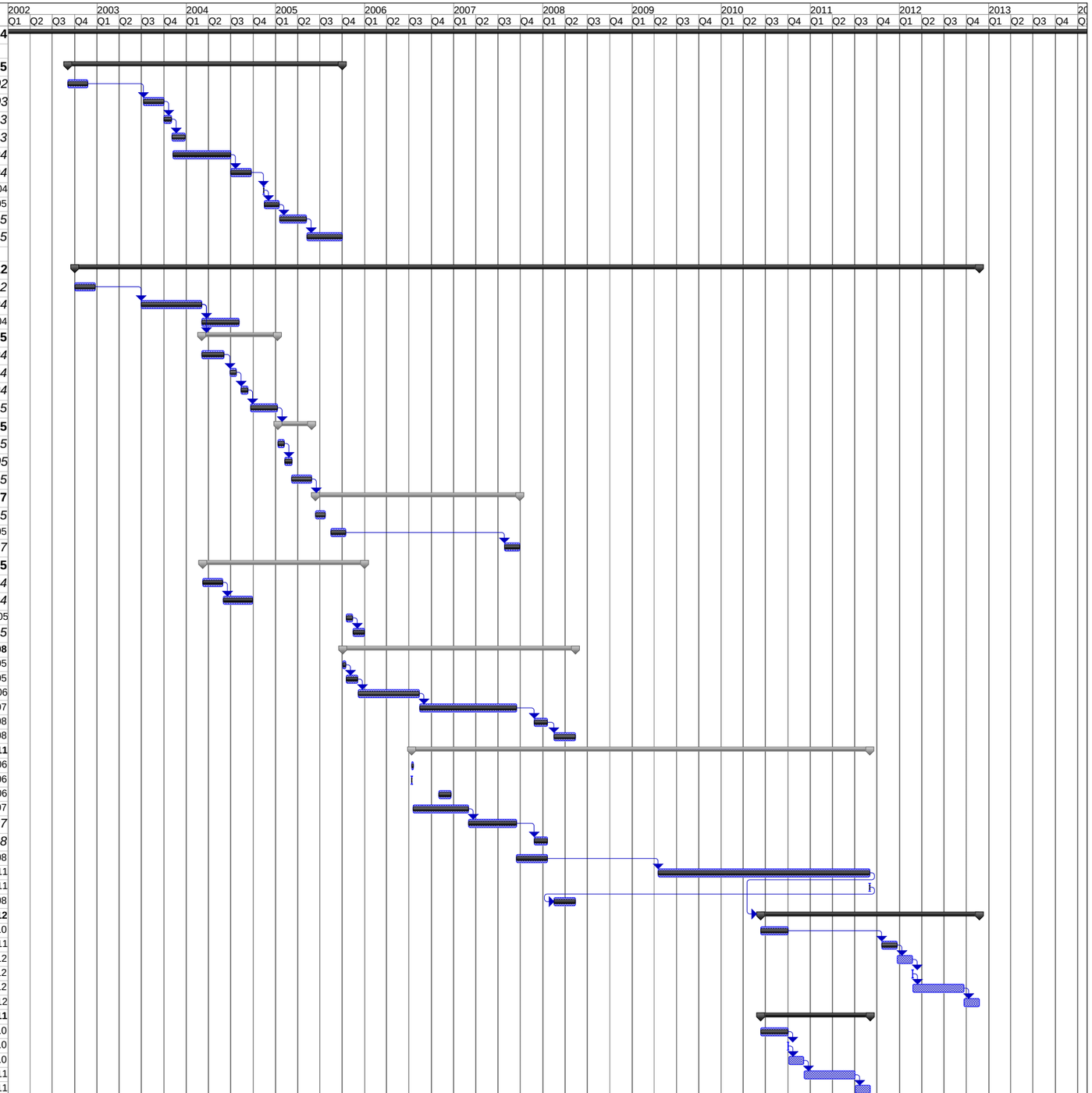
$PERSON $DATE $TIME $FILENAME $INSTRUCTIONS

ATTACHMENT XIV. B2

APPENDIX D

Current Compliance Schedule

ID	Complete	Task Name	Start	Finish
1		**Compliance Schedule Activities**	**Tue 10/16/01**	**Wed 5/28/14**
2				
3		**H-1. Investigation of Till Sand West of T-Pond**	**Mon 9/2/02**	**Fri 9/30/05**
4	✓	*Prepare Outline of Scope*	*Mon 9/2/02*	*Fri 11/22/02*
5	✓	*Review Outline w/ MDEQ and Agree on Scope*	*Wed 7/9/03*	*Tue 9/30/03*
6	✓	*Prepare Investigation Plan*	*Wed 10/1/03*	*Fri 10/31/03*
7	✓	*MDEQ Review of Investigation Plan*	*Mon 11/3/03*	*Fri 12/26/03*
8	✓	*Implementation of Field Investigation*	*Fri 11/7/03*	*Wed 6/30/04*
9	✓	*Prepare and Submit Investigation Report*	*Thu 7/1/04*	*Wed 9/22/04*
10	✓	MDEQ Approval of Interim Response Activity (IRA)	Fri 11/12/04	Fri 11/12/04
11	✓	Implement IRA - Sample Residential Wells	Mon 11/15/04	Fri 1/14/05
12	✓	*Submit Completion of IRA*	*Mon 1/17/05*	*Fri 5/6/05*
13	✓	*MDEQ Approval of Completion Report in Lic Mod*	*Mon 5/9/05*	*Fri 9/30/05*
14				
15		**H-2. Northeast Perimeter GW Monitoring Program**	**Tue 10/1/02**	**Thu 11/22/12**
16	✓	*Prepare Outline of Scope*	*Tue 10/1/02*	*Mon 12/23/02*
17	✓	*Review Outline w/ MDEQ and Agree on Scope-Verbal*	*Mon 6/30/03*	*Wed 3/3/04*
18	✓	MDEQ Issues Formal Written Approval of Scope	Thu 3/4/04	Tue 8/3/04
19		**Develop and Initiate Monitoring Program Activities**	**Thu 3/4/04**	**Fri 1/7/05**
20	✓	*Data Gap Evaluation*	*Thu 3/4/04*	*Wed 6/2/04*
21	✓	*Prepare and Submit Investigation Activity Plan(s)*	*Mon 6/28/04*	*Fri 7/23/04*
22	✓	*Meet w/MDEQ and Obtain Activity Plan Approval-written*	*Thu 8/12/04*	*Wed 9/8/04*
23	✓	*Implement Field Activities*	*Mon 9/20/04*	*Fri 1/7/05*
24		**Evaluations and Development of Monitoring Program**	**Mon 1/10/05**	**Fri 5/27/05**
25	✓	*Propose Add'tnl Field Work Incl. Screening Study -Waived by MDEQ*	*Mon 1/10/05*	*Fri 2/4/05*
26	✓	*Obtain MDEQ Approval of Program Activity Plans - Verbal*	*Mon 2/7/05*	*Tue 3/8/05*
27	✓	*Implement Field Work and Screening Study*	*Mon 3/7/05*	*Fri 5/27/05*
28		**Propose Final Monitoring Program**	**Mon 6/13/05**	**Thu 9/27/07**
29	✓	*Propose Final Monitoring Program*	*Mon 6/13/05*	*Fri 7/22/05*
30	✓	Prepare and Submit Addendum to Final Monitoring Program	Mon 8/15/05	Fri 10/14/05
31	✓	*MDEQ Review and Approval of Final Monitoring Program*	*Fri 7/27/07*	*Thu 9/27/07*
32		**Assessment of Area of Concern**	**Mon 3/8/04**	**Fri 12/30/05**
33	✓	*Prepare Activity Plan and Schedule for AOC Investigation*	*Mon 3/8/04*	*Fri 5/28/04*
34	✓	*MDEQ Review of AOC Investigation Activity Plan*	*Mon 5/31/04*	*Mon 9/27/04*
35	✓	Propose Alternate Investigation Method & Review w/MDEQ	Mon 10/17/05	Fri 11/11/05
36	✓	*Implementation of AOC Alternate Investigation*	*Mon 11/14/05*	*Fri 12/30/05*
37		**Assessment of Well 6178 Area**	**Mon 10/3/05**	**Mon 5/12/08**
38	✓	Prepare Outline of Scope and Schedule for Well 6178 Area	Mon 10/3/05	Fri 10/14/05
39	✓	MDEQ Review of Well 6178 Investigation Outline of Scope - verbal	Mon 10/17/05	Fri 12/2/05
40	✓	Implementation of Well 6178 Investigation	Mon 12/5/05	Fri 8/11/06
41	✓	Submit Investigation Summary Report	Mon 8/14/06	Fri 9/14/07
42	✓	Submit Corrective Action Summary Report	Mon 11/26/07	Fri 1/18/08
43	✓	Prepare and Submit Update to SAP	Fri 2/15/08	Mon 5/12/08
44		**Assessment of Well 6175 Area**	**Wed 7/12/06**	**Wed 8/31/11**
45	✓	Prepare Outline of Scope and Schedule for Well 6175 Area	Wed 7/12/06	Tue 7/18/06
46	✓	MDEQ Approval of Well 6175 Invest. Outline of Scope-verbal	Wed 7/12/06	Wed 7/12/06
47	✓	MDEQ Approval of Outline of Scope for Well 6175	Tue 10/31/06	Tue 12/19/06
48	✓	Implementation of Well 6175 Investigation	Tue 7/18/06	Thu 3/1/07
49	✓	*Submit Investigation Summary Report*	*Fri 3/2/07*	*Fri 9/14/07*
50	✓	*Submit Corrective Action Summary Report*	*Mon 11/26/07*	*Fri 1/18/08*
51	✓	Submit Mixing Zone Request	Fri 9/14/07	Fri 1/18/08
52	✓	MDEQ Review and Approval of Mixing Zone Request	Fri 4/17/09	Wed 8/31/11
53	✓	Mixing Zone Request Withdrawn	Wed 8/31/11	Wed 8/31/11
54	✓	Prepare and Submit Update to SAP	Fri 2/15/08	Mon 5/12/08
55		**Assess CFCs Near Wells 3540-A and 4358**	**Fri 6/11/10**	**Thu 11/22/12**
56	✓	Work Plan for Freon-11 and -21 Evaluation near Wells 3540-A and 4358	Fri 6/11/10	Thu 9/30/10
57	✓	Submit Work Plan Addendum	Thu 10/20/11	Wed 12/21/11
58		MDEQ Review and Approval of Work Plan Addendum	Thu 12/22/11	Wed 2/22/12
59		* Project on hold pending MDEQ Approval	Thu 2/23/12	Thu 2/23/12
60		Implement Work Plan	Fri 2/24/12	Thu 9/20/12
61		Prepare and submit CFC Investigation Summary Report	Fri 9/21/12	Thu 11/22/12
62		**Assess Free Product Near SSRT Piezometer SC**	**Fri 6/11/10**	**Fri 9/2/11**
63	✓	Prepare and Submit Work Plan to Evaluate NAPL Extent	Fri 6/11/10	Thu 9/30/10
64		* Project on hold pending MDEQ Approval	Fri 10/1/10	Fri 10/1/10
65		MDEQ Review and Approval	Mon 10/4/10	Fri 12/3/10
66		Implement Work Plan	Mon 12/6/10	Fri 7/1/11
67		Prepare and submit Free Product Assessment Summary Report	Mon 7/4/11	Fri 9/2/11



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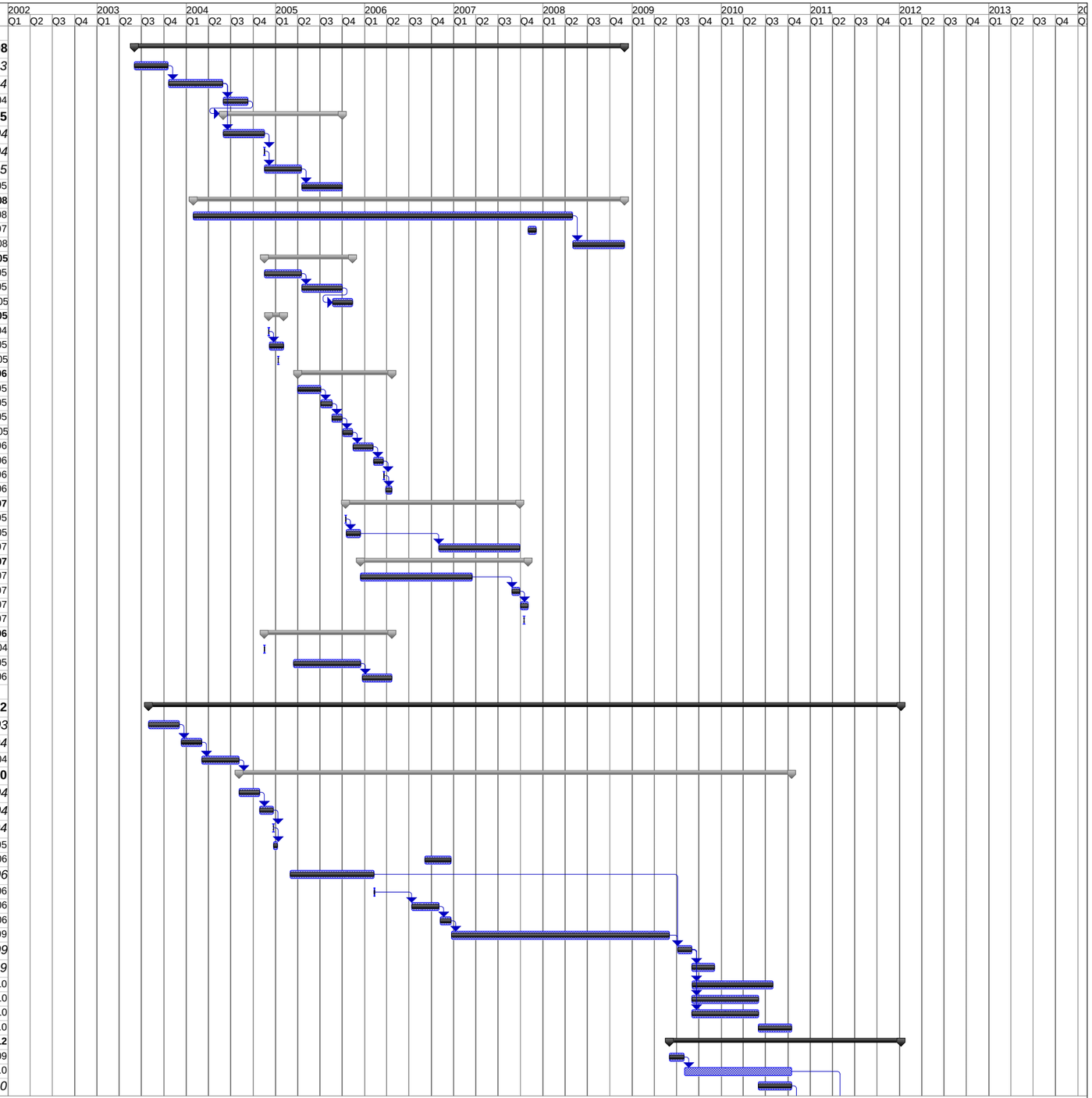
Task
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary
Group By Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Progress
Deadline

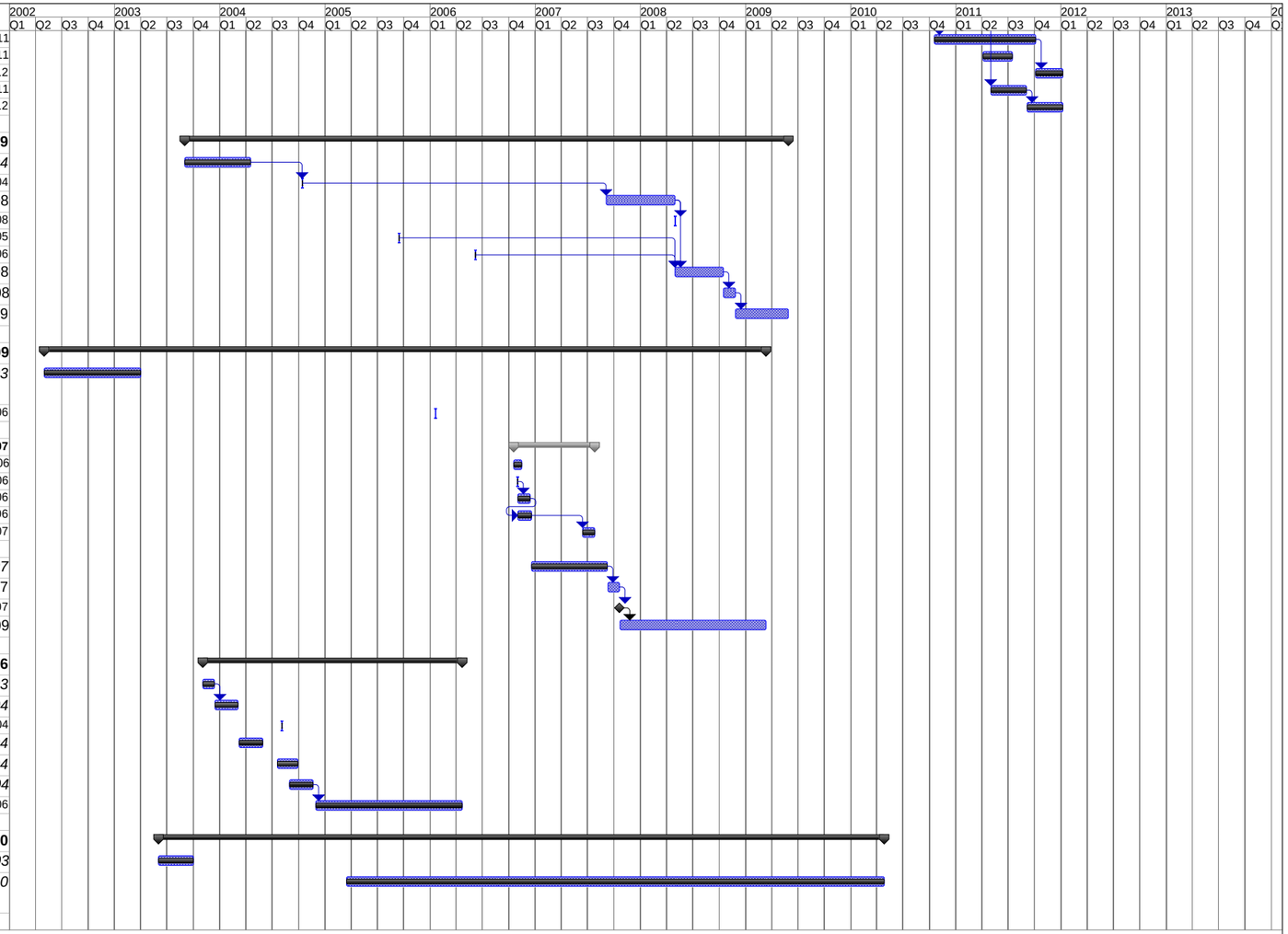
ID	Complete	Task Name	Start	Finish
68				
69		**H-3. Facility Surface Water Monitoring Program**	**Mon 6/2/03**	**Sat 11/29/08**
70	✓	*Prepare Outline of Scope*	*Mon 6/2/03*	*Fri 10/17/03*
71	✓	*Review Outline w/ MDEQ and Agree on Scope*	*Mon 10/20/03*	*Fri 5/28/04*
72	✓	Written Approval Granted by MDEQ on Outline of Scope	Mon 5/31/04	Wed 9/8/04
73		**Prepare Monitoring Program**	**Mon 5/31/04**	**Fri 9/30/05**
74	✓	*Identify Data Needs & Field Investigation(s)*	*Mon 5/31/04*	*Mon 11/15/04*
75	✓	*Submit Field Investigation Data*	*Mon 11/15/04*	*Mon 11/15/04*
76	✓	*Evaluate Data & Propose Monit. Program w/ Update & Schedule for Remaining Areas*	*Tue 11/16/04*	*Fri 4/15/05*
77	✓	Written SAP Approval by MDEQ (License Minor Mod)	Mon 4/18/05	Fri 9/30/05
78		**Sandbar Area**	**Thu 1/29/04**	**Sat 11/29/08**
79	✓	Monitor Piezometers During Spring/Fall High Water Events	Thu 1/29/04	Wed 4/30/08
80	✓	Automate Piezometers for Hydraulic Monitoring	Thu 11/1/07	Mon 12/3/07
81	✓	Submit Formal Revision of SAP for this Area, if Needed	Fri 5/2/08	Sat 11/29/08
82		**LS-9 Area**	**Tue 11/16/04**	**Fri 11/11/05**
83	✓	Submit Formal Revision to SAP for this Area	Tue 11/16/04	Fri 4/15/05
84	✓	MDEQ Review of SAP Revisions (License Minor Mod)	Mon 4/18/05	Fri 9/30/05
85	✓	Implementation of Monitoring Program for this Area	Mon 8/22/05	Fri 11/11/05
86		**Notification to MDEQ that an IRA is Needed for LS-11 Area**	**Fri 12/3/04**	**Tue 2/1/05**
87	✓	Notification that IRA is Needed	Fri 12/3/04	Fri 12/3/04
88	✓	Prepare and Submit IRA Work Plan (within 60 cal days)	Mon 12/6/04	Tue 2/1/05
89	✓	MDEQ Approval of IRA Needed	Tue 1/11/05	Tue 1/11/05
90		**LS-11 Area IRA**	**Fri 4/1/05**	**Fri 4/21/06**
91	✓	Complete Installation of New Tile & Monitoring System	Fri 4/1/05	Mon 7/4/05
92	✓	Prepare Outline of Scope for IRA Completion Summary	Tue 7/5/05	Fri 8/19/05
93	✓	Review Outline w/ MDEQ and Agree on Scope - verbal	Fri 8/19/05	Thu 9/29/05
94	✓	Conduct Field Investigation, as Needed	Mon 10/3/05	Fri 11/11/05
95	✓	Summarize and Submit Field Investigation Data	Mon 11/14/05	Fri 2/3/06
96	✓	Review Montoring Program for this Area w/MDEQ-verbal	Mon 2/6/06	Fri 3/17/06
97	✓	Initiate Monitoring Program for this Area	Mon 3/20/06	Mon 3/20/06
98	✓	Submit Formal Revision to SAP for this Area	Tue 3/28/06	Fri 4/21/06
99		**Notification to MDEQ that an IRA is Needed for Six Wells Shallow Program**	**Fri 10/14/05**	**Thu 9/27/07**
100	✓	Notification that IRA is Needed	Fri 10/14/05	Fri 10/14/05
101	✓	Prepare and Submit IRA Work Plan (within 60 cal days)	Mon 10/17/05	Tue 12/13/05
102	✓	MDEQ Approval of IRA Work Plan	Tue 10/31/06	Thu 9/27/07
103		**Six Purge Wells Area - Shallow Groundwater Program**	**Wed 12/14/05**	**Wed 10/31/07**
104	✓	Implement IRA Work Plan for Six Wells Area	Wed 12/14/05	Fri 3/16/07
105	✓	Prepare and Submit Field Investigation Results	Mon 8/27/07	Thu 9/27/07
106	✓	MDEQ Approval of Field Investigation Results	Mon 10/1/07	Wed 10/31/07
107	✓	Submit Formal Revision to SAP for this Area	Mon 10/15/07	Mon 10/15/07
108		**Ash Pond Area**	**Mon 11/15/04**	**Fri 4/21/06**
109	✓	Submit Field Investigation Results	Mon 11/15/04	Mon 11/15/04
110	✓	Review Results of Field Investigation w/MDEQ	Tue 3/15/05	Wed 12/14/05
111	✓	Submit Formal Revision to SAP for this Area	Thu 12/22/05	Fri 4/21/06
112				
113		**H-4. Deep Sand Monitoring Program**	**Wed 7/30/03**	**Fri 1/6/12**
114	✓	*Prepare Outline of Scope*	*Wed 7/30/03*	*Tue 12/2/03*
115	✓	*Review Outline w/ MDEQ and Agree on Scope-verbal*	*Thu 12/11/03*	*Wed 3/3/04*
116	✓	MDEQ Written Approval of Outline of Scope	Thu 3/4/04	Tue 8/3/04
117		**Develop and Initiate Monitoring Program Activities**	**Wed 8/4/04**	**Fri 10/15/10**
118	✓	*Data Evaluation and Gap Determination*	*Wed 8/4/04*	*Tue 10/26/04*
119	✓	*Prepare and Submit Investigation Activity Plan*	*Wed 10/27/04*	*Tue 12/21/04*
120	✓	*Meet w/MDEQ and Obtain Activity Plan Approval-verbal*	*Wed 12/22/04*	*Wed 12/22/04*
121	✓	Revise Activity Plan per 12/22/04 Meeting	Thu 12/23/04	Fri 1/7/05
122	✓	MDEQ Written Approval of Activity Plan	Mon 9/4/06	Tue 12/19/06
123	✓	*Conduct Field Investigations*	*Tue 3/1/05*	*Tue 2/7/06*
124	✓	Meet w/MDEQ and Discuss Results to Date	Wed 2/8/06	Fri 2/10/06
125	✓	Propose Revised Activity Plan to MDEQ	Wed 7/12/06	Tue 10/31/06
126	✓	MDEQ Written Approval of Revised Activity Plan	Mon 11/6/06	Tue 12/19/06
127	✓	Continue Field Investigations	Fri 12/22/06	Mon 6/1/09
128	✓	*Evaluate Data & Propose Monitoring Program (SAP)*	*Mon 7/6/09*	*Tue 9/1/09*
129	✓	*MDEQ Review of Monitoring Program*	*Wed 9/2/09*	*Thu 12/3/09*
130	✓	Implement Monitoring at C-7, C-8 and C-9	Thu 9/3/09	Fri 7/30/10
131	✓	Complete Field Investigation To Determine Down-Gradient Intervals from Cluster C-3	Wed 9/2/09	Tue 6/1/10
132	✓	Summary Report and Presentation of Cluster C-3 Monitoring Results	Wed 9/2/09	Tue 6/1/10
133	✓	Implementation of Monitoring at C-10 and C-11	Tue 6/1/10	Fri 10/15/10
134		**Additional Deep Sands**	**Tue 6/2/09**	**Fri 1/6/12**
135	✓	Prepare Outline of Scope for additional Deep Sand Units	Tue 6/2/09	Fri 7/31/09
136		MDEQ review and approval of Scope	Mon 8/3/09	Fri 10/15/10
137	✓	*Prepare Work Plan for Priority 1 Areas Additional Deep Sands*	*Tue 6/1/10*	*Fri 10/15/10*



Revision 30: 06/26/2015

Task
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary
Group By Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Progress
Deadline

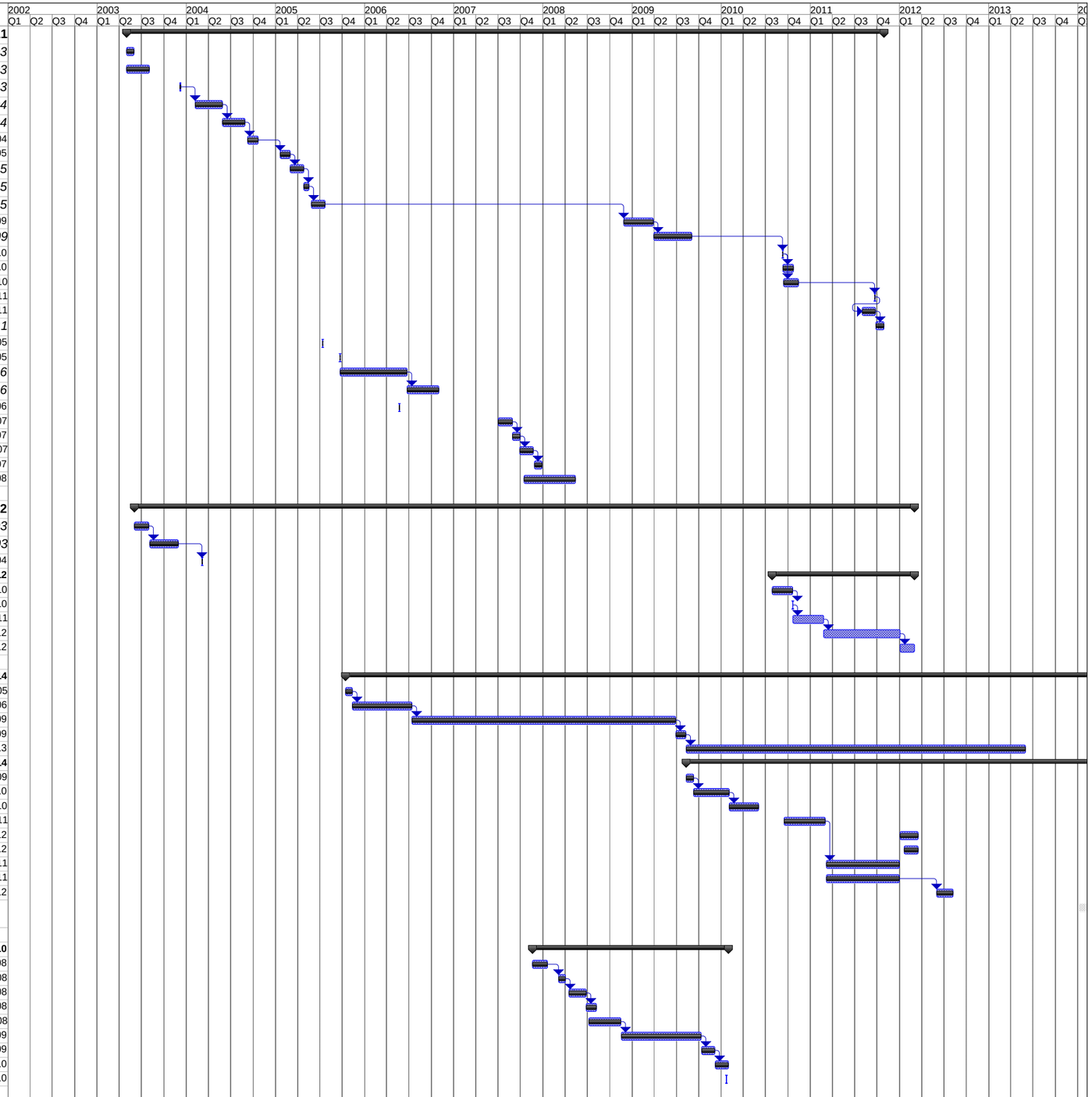
ID	Complete	Task Name	Start	Finish
138	✓	Implement Work Plan	Mon 10/18/10	Tue 10/4/11
139	✓	Processing and Presentation of Geophysical Survey Results	Tue 4/5/11	Fri 7/15/11
140	✓	Prepare and Submit Additional Deep Sands Field Investigation Results	Wed 10/5/11	Fri 1/6/12
141	✓	Conduct Shallow Groundwater Screening	Mon 5/2/11	Fri 9/2/11
142	✓	Evaluate Data and List Any Potential Source Areas	Mon 9/5/11	Fri 1/6/12
143				
144		**H-5. Direct Contact To Soil Pathway Analysis**	**Mon 9/1/03**	**Thu 5/28/09**
145	✓	*Prepare Outline of Scope*	*Mon 9/1/03*	*Fri 4/16/04*
146	✓	Presentation to MDEQ on Outline of Scope	Wed 10/13/04	Wed 10/13/04
147		Review Outline w/MDEQ and Agree on Scope	Tue 9/4/07	Tue 4/29/08
148		**Activities on Outline of Scope Delayed until Site-Specific Direct Contact Methodology Resolved	Wed 4/30/08	Wed 4/30/08
149	✓	Collect Soil Samples On-Site w/MDEQ	Wed 9/14/05	Wed 9/14/05
150	✓	Collect Soil Samples On-Site w/MDEQ	Tue 6/6/06	Wed 6/7/06
151		Prepare Evaluation Plan	Wed 4/30/08	Tue 10/14/08
152		MDEQ Review of Evaluation Plan	Wed 10/15/08	Tue 11/25/08
153		Implementation of Evaluation Plan	Wed 11/26/08	Thu 5/28/09
154				
155		**H-6. Enhanced Exposure Control, Phase II**	**Wed 5/1/02**	**Wed 3/11/09**
156	✓	*Review Existing Data from Phase I (12/23/02) and Identify Phase II Area Activities in an Outline*	*Wed 5/1/02*	*Mon 3/31/03*
157		**The H-6 Activities are Dependent on Work Done in H-5	Thu 1/19/06	Thu 1/19/06
158				
159		**Define DOS-20 Area of Concern**	**Wed 10/18/06**	**Wed 7/25/07**
160	✓	Define DOS-20 Area of Concern	Wed 10/18/06	Tue 11/14/06
161	✓	Notification to MDEQ that an IRA is Needed in DOS-20 Sample Area	Tue 10/31/06	Tue 10/31/06
162	✓	Implement IRA Voluntarily	Wed 11/1/06	Wed 12/13/06
163	✓	Prepare and Submit Summary of IRA for DOS-20	Wed 11/1/06	Mon 12/18/06
164	✓	MDEQ Approval of IRA for DOS-20 Area	Thu 6/14/07	Wed 7/25/07
165				
166	✓	*Prepare Phase II Activities w/'05-'06 Data*	*Tue 12/19/06*	*Fri 9/7/07*
167		MDEQ Review of Phase II Area Activities	Mon 9/10/07	Fri 10/19/07
168		* Project on hold pending MDEQ approval of Phase II	Fri 10/19/07	Fri 10/19/07
169		Implementation of Phase II Activities	Mon 10/22/07	Wed 3/11/09
170				
171		**H-7. Chemical Disposal Well 3 (CD-3) Hydraulic Assessment**	**Mon 11/3/03**	**Fri 4/21/06**
172	✓	*Prepare Activity Plan*	*Mon 11/3/03*	*Fri 12/12/03*
173	✓	*Review Activity Plan w/ MDEQ and Agree on Scope -verbal*	*Mon 12/15/03*	*Wed 3/3/04*
174	✓	MDEQ Approval of Activity Plan -written	Tue 8/3/04	Tue 8/3/04
175	✓	*Conduct Initial Hydraulic Assessment*	*Mon 3/8/04*	*Fri 5/28/04*
176	✓	*MDEQ Review of Initial Hydraulic Assessment and Approval*	*Mon 7/19/04*	*Mon 9/27/04*
177	✓	*Implementation of Hydraulic Monitoring*	*Mon 8/30/04*	*Fri 11/19/04*
178	✓	Propose Sampling and Analysis Plan Modifications	Mon 11/29/04	Fri 4/21/06
179				
180		**H-8. Source Control**	**Mon 6/2/03**	**Mon 4/26/10**
181	✓	*Prepare and Submit Report Identifying Known Areas of Free Product*	*Mon 6/2/03*	*Tue 9/30/03*
182	✓	*Prepare and Submit Subsequent Reports - 3/16/05, 5/11/05, 9/30/05, 5/11/07, 12/9/09, 4/26/10*	*Wed 3/16/05*	*Mon 4/26/10*
183				



Revision 30: 06/26/2015

Task	Rolled Up Milestone	Project Summary	Inactive Summary	Manual Summary	Deadline
Milestone	Rolled Up Progress	Group By Summary	Manual Task	Start-only	
Summary	Split	Inactive Task	Duration-only	Finish-only	
Rolled Up Task	External Tasks	Inactive Milestone	Manual Summary Rollup	Progress	

ID	Complete	Task Name	Start	Finish
184		**H-9. Soil Monitoring Program**	**Thu 5/1/03**	**Fri 10/28/11**
185	✓	*Agree on Location w/ MDEQ and Install Soil Boxes at 2 Gate and 11 Gate*	*Thu 5/1/03*	*Fri 5/30/03*
186	✓	*Prepare Phase I Plan and Submit to MDEQ (w/in 60 Cal. Days of LIicense)*	*Thu 5/1/03*	*Fri 8/1/03*
187	✓	*Replaced soil in boxes at 2 gate and 11 gate*	*Fri 12/5/03*	*Mon 12/8/03*
188	✓	*Review Phase I Plan w/ MDEQ*	*Fri 2/6/04*	*Thu 5/27/04*
189	✓	*Prepare and Submit Phase II Conceptual Evaluation Plan Scope*	*Fri 5/28/04*	*Fri 8/27/04*
190	✓	Review Conc. Eval. & Sample Plan w/MDEQ Obtain Verbal Approval	Wed 9/8/04	Wed 10/20/04
191	✓	Revise and Submit Conceptual Evaluation and Sample Plan	Wed 1/19/05	Mon 2/28/05
192	✓	*Implementation of Phase I Plan*	*Tue 3/1/05*	*Mon 4/25/05*
193	✓	*Prepare final Phase II Evaluation Plan Scope - waived by MDEQ*	*Tue 4/26/05*	*Mon 5/16/05*
194	✓	*Review Phase II Plan Scope w/ MDEQ and Agree on Plan Scope*	*Fri 5/27/05*	*Thu 7/21/05*
195	✓	Prepare and submit Revised Soil Box and Greenbelt Data Evaluation Plan	Thu 11/27/08	Fri 3/27/09
196	✓	*MDEQ Review of Soil Box and Greenbelt Data Evaluation Plan*	*Mon 3/30/09*	*Tue 9/1/09*
197	✓	Joint evaluation of Soil Box and Greenbelt Data Evaluation Plan	Thu 9/9/10	Thu 9/9/10
198	✓	Submit additional Flux Charts	Fri 9/10/10	Fri 10/22/10
199	✓	Submit Revised Soil Box Monitoring/Greenbelt Data Evaluation Plan	Mon 9/13/10	Fri 11/12/10
200	✓	Re-Submit Soil Box Monitoring/Greenbelt Data Evaluation Plan	Wed 9/21/11	Wed 9/21/11
201	✓	MDEQ Review and Approval of Soil Box Monitoring/Data Evaluation Plan	Mon 8/1/11	Fri 9/23/11
202	✓	*Implementation of the Soil Box Data Evaluation Plan*	*Mon 9/26/11*	*Fri 10/28/11*
203	✓	Propose US-10 Reference Area Location	Tue 7/12/05	Tue 7/12/05
204	✓	Withdraw US-10 Reference Area Location	Wed 9/21/05	Wed 9/21/05
205	✓	*Propose I-75 Rest Stop Reference Location & Agree w/MDEQ*	*Thu 9/22/05*	*Thu 6/22/06*
206	✓	*Implement Reference Area Monitoring Program*	*Fri 6/23/06*	*Mon 10/30/06*
207	✓	Notify MDEQ of 2-Gate Soil Box Re-Location	Mon 5/22/06	Mon 5/22/06
208	✓	Propose New Soil Box Location When New Gate is Constructed	Mon 7/2/07	Tue 8/28/07
209	✓	Obtain MDEQ Approval of New Gate Soil Box Location	Wed 8/29/07	Fri 9/28/07
210	✓	Construct Soil Box Located at New Gate	Fri 9/28/07	Wed 11/21/07
211	✓	Implement Soil Box Monitoring Program at New Gates	Tue 11/27/07	Thu 12/27/07
212	✓	Propose Final Sampling and Analysis Plan Modifications (two new boxes)	Mon 10/15/07	Mon 5/12/08
213				
214		**H-10. Six Purge Wells**	**Mon 6/2/03**	**Thu 3/1/12**
215	✓	*Sample and Analyze System w/in 60 Calendar Days of License*	*Mon 6/2/03*	*Wed 7/30/03*
216	✓	*Prepare and Submit Results of Samples*	*Mon 8/4/03*	*Fri 11/28/03*
217	✓	MDEQ Shares 7/30/03 Data with Dow	Fri 3/5/04	Fri 3/5/04
218		**Target List Investigation**	**Wed 7/28/10**	**Thu 3/1/12**
219	✓	Prepare and Submit Work Plan for Chemical Screening of Six Purge Wells	Wed 7/28/10	Tue 10/19/10
220		*Project on hold pending MDEQ Approval	Wed 10/20/10	Wed 10/20/10
221		MDEQ Review and Approval of Work Plan	Thu 10/21/10	Wed 2/23/11
222		Field Sampling (in accordance with Approved Work Plan)	Thu 2/24/11	Mon 1/2/12
223		Prepare and Submit Summary Report with recommendations	Tue 1/3/12	Thu 3/1/12
224				
225		**H-11. West Side Shallow Groundwater Hydraulic Assessment**	**Fri 10/14/05**	**Wed 5/28/14**
226	✓	Prepare and Submit Outline of Scope for All West Side Areas Hydraulic Assessments	Fri 10/14/05	Thu 11/10/05
227	✓	Review Outline of Scope with MDEQ and Agree on Outline	Fri 11/11/05	Wed 7/12/06
228	✓	Conduct Hydraulic Assessment of W. Side Shallow Groundwater Areas	Thu 7/13/06	Fri 6/26/09
229	✓	West Side Shallow Groundwater Hydraulic Assessment Investigation Summary Report	Mon 6/29/09	Fri 8/7/09
230	✓	MDEQ Review and approval of Monitoring Program	Mon 8/10/09	Thu 5/30/13
231		**Monitoring Well 6172 Area**	**Mon 8/10/09**	**Wed 5/28/14**
232	✓	Monitoring Well 6172 Area Work Plan	Mon 8/10/09	Tue 9/8/09
233	✓	Monitor Well 6172 Area Summary Report	Wed 9/9/09	Mon 2/1/10
234	✓	Submit Amended Monitor Well 6172 Area Summary Report	Tue 2/2/10	Tue 6/1/10
235	✓	Submit Final Monitor Well 6172 Area Summary Report	Wed 9/15/10	Tue 3/1/11
236	✓	Submit Results of RI Testing	Tue 1/3/12	Fri 3/16/12
237	✓	CD3 IRA Work Plan Submittal	Fri 1/20/12	Fri 3/16/12
238	✓	Quarterly Monitoring of Piezometers in MW-6172 Area	Mon 3/7/11	Fri 12/30/11
239	✓	Conduct RI Activities for CD3 Area	Mon 3/7/11	Fri 12/30/11
240	✓	CD3 Source Removal Excavation	Fri 6/1/12	Mon 8/6/12
241		(note: final monitoring program to be developed as part of Corrective Action Implementation Plan, Attachment XIV.B2, Appendix G of this operating licenase reapplication)		
242				
243		**H-12. T-River Outfall Investigation**	**Mon 11/19/07**	**Fri 1/29/10**
244	✓	Prepare and Submit Scope of Work	Mon 11/19/07	Fri 1/18/08
245	✓	MDEQ Review of Scope	Wed 3/5/08	Tue 4/1/08
246	✓	Prepare and submit Investigation Plan	Wed 4/16/08	Wed 6/25/08
247	✓	MDEQ Review and Approval of Work Plan	Thu 6/26/08	Wed 8/6/08
248	✓	Implementation of Phase 1 Investigation Plan	Mon 7/7/08	Fri 11/14/08
249	✓	MDEQ and Dow Evaluate Phase I results and define Phase 2 Investigation	Mon 11/17/08	Fri 10/9/09
250	✓	Implementation of Phase 2 Investigation	Mon 10/12/09	Fri 12/4/09
251	✓	Historic Outfall Investigation Summary Report	Mon 12/7/09	Fri 1/29/10
252		Note: future H-12 work addressed by AOC/CERCLA Docket No V-W-10-C-942.	Thu 1/21/10	Thu 1/21/10
253				



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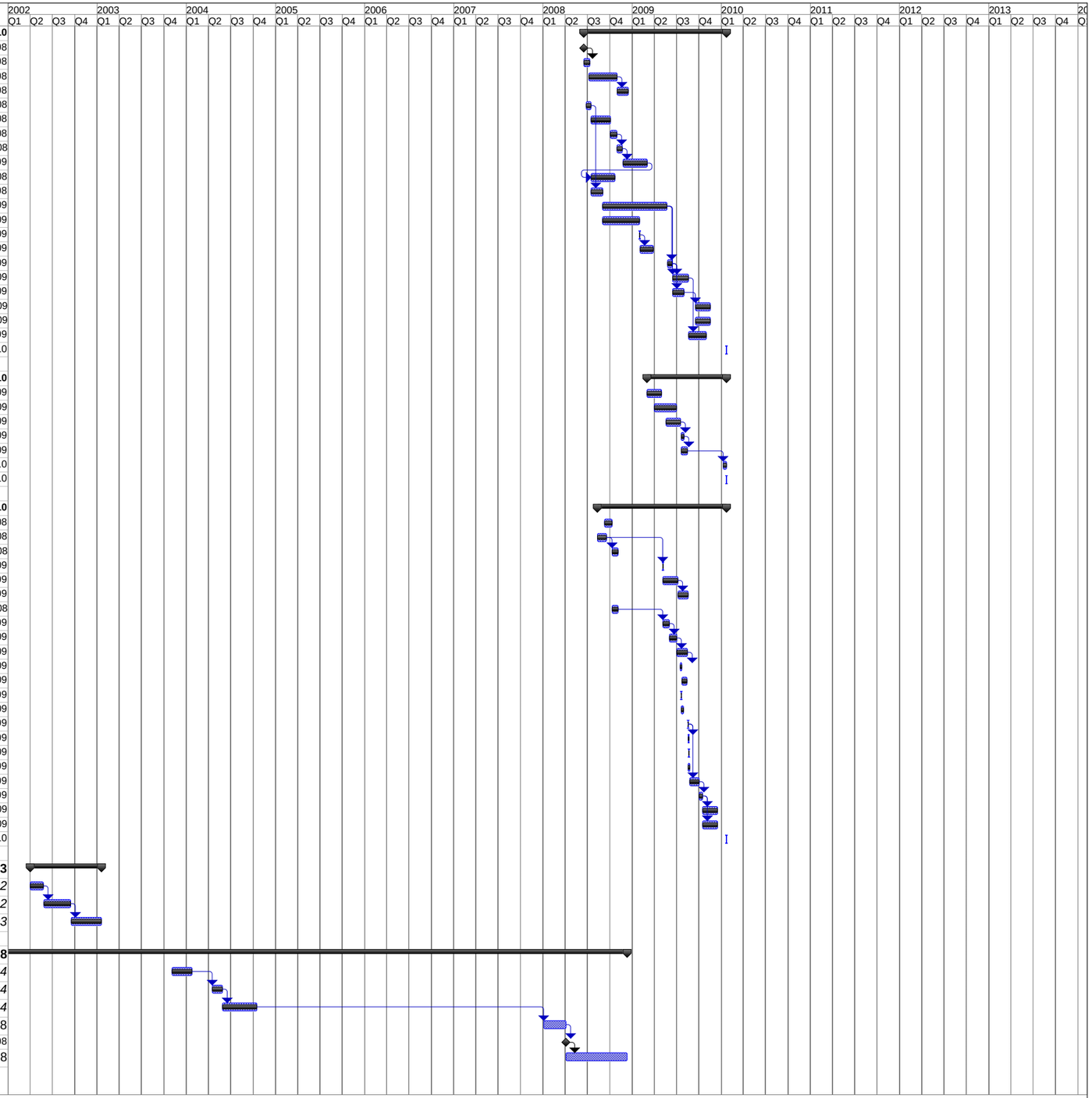
Task
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary
Group By Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Progress
Deadline

ID	Complete	Task Name	Start	Finish
254		**H-13. Reach D IRA**	**Mon 6/16/08**	**Thu 1/21/10**
255	✓	Submit Work Plan	Mon 6/16/08	Mon 6/16/08
256	✓	MDEQ Approval of Work Plan	Mon 6/16/08	Thu 7/10/08
257	✓	Collect Sediment Corings	Mon 7/7/08	Thu 10/30/08
258	✓	Receive Analytical Data from Corings	Fri 10/31/08	Mon 12/15/08
259	✓	Sediment Toxicity Work Plan/Schedule Submittal	Thu 6/26/08	Tue 7/15/08
260	✓	MDEQ Review/Comments	Wed 7/16/08	Fri 10/3/08
261	✓	Sediment Toxicity Work Plan/Schedule Submittal (Revision 1)	Fri 10/3/08	Wed 10/29/08
262	✓	MDEQ review/approval of Toxicity Work Plan	Thu 10/30/08	Thu 11/20/08
263	✓	Conduct toxicity testing/report results (contingent on safe river conditions)	Mon 11/24/08	Mon 3/2/09
264	✓	Sediment Characterization Field Data Summary Submittal	Wed 7/16/08	Tue 10/21/08
265	✓	Sediment Cap Design and Preliminary O&M Monitoring Plan Submittal	Wed 7/16/08	Mon 9/1/08
266	✓	MDEQ Review/Partial Approval of Cap Design	Mon 9/1/08	Fri 5/22/09
267	✓	Reach D Sediment Cap Installation/Sheet Piling Removal Work Plan	Mon 9/1/08	Fri 1/30/09
268	✓	Joint Permit Application Submittal	Sat 1/31/09	Sat 1/31/09
269	✓	Permit Approval and Issuance	Mon 2/2/09	Fri 3/27/09
270	✓	MDEQ Conditional Approval of Work Plan	Mon 5/25/09	Fri 6/12/09
271	✓	Sediment Cap Installation Complete	Mon 6/15/09	Tue 8/18/09
272	✓	Final MDEQ Approval of Reach D Cap	Mon 6/15/09	Fri 7/31/09
273	✓	Reach D IRA Completion and Summary Report	Thu 9/17/09	Mon 11/16/09
274	✓	Tittabawassee River Reach D IRA - Pilot Cap Monitoring Plan	Thu 9/17/09	Mon 11/16/09
275	✓	Removal of Temporary Sheet Piling wall complete	Wed 8/19/09	Fri 10/30/09
276		Note: future Reach D work addressed by AOC/CERCLA Docket No V-W-10-C-942.	Thu 1/21/10	Thu 1/21/10
277				
278		**Reach D Outside Sheetpile**	**Mon 3/2/09**	**Thu 1/21/10**
279	✓	Evaluate Bathymetry Outside Sheetpile	Mon 3/2/09	Thu 4/30/09
280	✓	Conduct Additional Characterization Outside Sheetpile	Wed 4/1/09	Tue 6/30/09
281	✓	Evaluate Sediment Toxicity Outside Sheetpile	Tue 5/19/09	Fri 7/17/09
282	✓	Reach D IRA Plan to Address Area Outside Temporary Sheet Piling at Reach D	Mon 7/20/09	Fri 7/31/09
283	✓	Reach D IRA Plan to Proceed with Monitoring of Natural Cap Formation	Mon 7/20/09	Fri 8/14/09
284	✓	MDEQ Review and Approval of Plan	Fri 1/8/10	Thu 1/21/10
285		Note: future Reach D work addressed by AOC/CERCLA Docket No V-W-10-C-942.	Thu 1/21/10	Thu 1/21/10
286				
287		**H-14. Former 47 Building/Reach B IRA**	**Mon 8/11/08**	**Thu 1/21/10**
288	✓	Begin Debris Removal Upstream of Original Excavation	Tue 9/9/08	Thu 10/9/08
289	✓	Submit IRA Work Plan Rev. 2	Mon 8/11/08	Tue 9/16/08
290	✓	Complete Riverbank Stabilization	Fri 10/10/08	Mon 11/3/08
291	✓	MDEQ Approval of Work Plan	Wed 5/6/09	Wed 5/6/09
292	✓	Complete Installation of Permanent GSI Monitoring Wells	Wed 5/6/09	Mon 7/6/09
293	✓	IRA Completion and Summary Report - Former 47 Building Area	Tue 7/7/09	Mon 8/17/09
294	✓	Initial Reach B Characterization	Fri 10/10/08	Mon 11/3/08
295	✓	Complete Supplemental Reach B Characterization	Wed 5/6/09	Mon 6/1/09
296	✓	Submit Reach B Corrective Action Plan and Summary of Reach B Field Data	Tue 6/2/09	Wed 7/1/09
297	✓	MDEQ Review and Approval of Reach B Corrective Action Plan	Thu 7/2/09	Fri 8/14/09
298	✓	Floodplain Permitting - Access Road	Thu 7/16/09	Wed 7/22/09
299	✓	Floodplain Permitting - Sediment Cap	Thu 7/23/09	Wed 8/12/09
300	✓	Mobilization/Site Preparation	Mon 7/20/09	Mon 7/20/09
301	✓	Diver-assisted Mass Removal in Reach B	Mon 7/20/09	Wed 7/29/09
302	✓	Submit CQA Plan	Mon 8/17/09	Mon 8/17/09
303	✓	Submit Revised CQA Plan	Tue 8/18/09	Thu 8/20/09
304	✓	MDEQ Approval of Revised CQA Plan	Thu 8/20/09	Thu 8/20/09
305	✓	Additional Data Acquisition and Submittal	Mon 8/17/09	Mon 8/24/09
306	✓	Reach B Sediment Cap Placement	Mon 8/24/09	Thu 10/1/09
307	✓	Reach B Site Restoration and Demobilization	Fri 10/2/09	Thu 10/15/09
308	✓	Submit Tittabawassee River Reach B IRA Corrective Action Summary Report	Fri 10/16/09	Tue 12/15/09
309	✓	Submit Tittabawassee River Reach B IRA Pilot Cap Monitoring Plan	Fri 10/16/09	Tue 12/15/09
310		Note: future Reach B work addressed by AOC/CERCLA Docket No V-W-10-C-942.	Thu 1/21/10	Thu 1/21/10
311				
312		**M-1. SDF Installation of Seven New Piezometers**	**Mon 4/1/02**	**Fri 1/17/03**
313	✓	*Prepare Activity Plan*	*Mon 4/1/02*	*Fri 5/24/02*
314	✓	*MDEQ Review of Activity Plan*	*Mon 5/27/02*	*Fri 9/13/02*
315	✓	*Implementation of Activity Plan*	*Mon 9/16/02*	*Fri 1/17/03*
316				
317		**M-2. Pure Oil RFI Phase I-type Investigation**	**Tue 10/16/01**	**Wed 12/10/08**
318	✓	*Prepare General Outline of Scope*	*Mon 11/3/03*	*Fri 1/23/04*
319	✓	*Review Outline w/ MDEQ and Agree Verbally on Scope*	*Fri 4/16/04*	*Thu 5/27/04*
320	✓	*Prepare Preliminary Assessment (PA)*	*Fri 5/28/04*	*Fri 10/15/04*
321		MDEQ Review of PA	Fri 1/4/08	Thu 4/3/08
322		* Project on hold pending MDEQ approval of PA	Fri 4/4/08	Fri 4/4/08
323		Implementation of PA (Preliminary Completion)	Fri 4/4/08	Wed 12/10/08
324				



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Task
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Rolled Up Milestone
Rolled Up Progress
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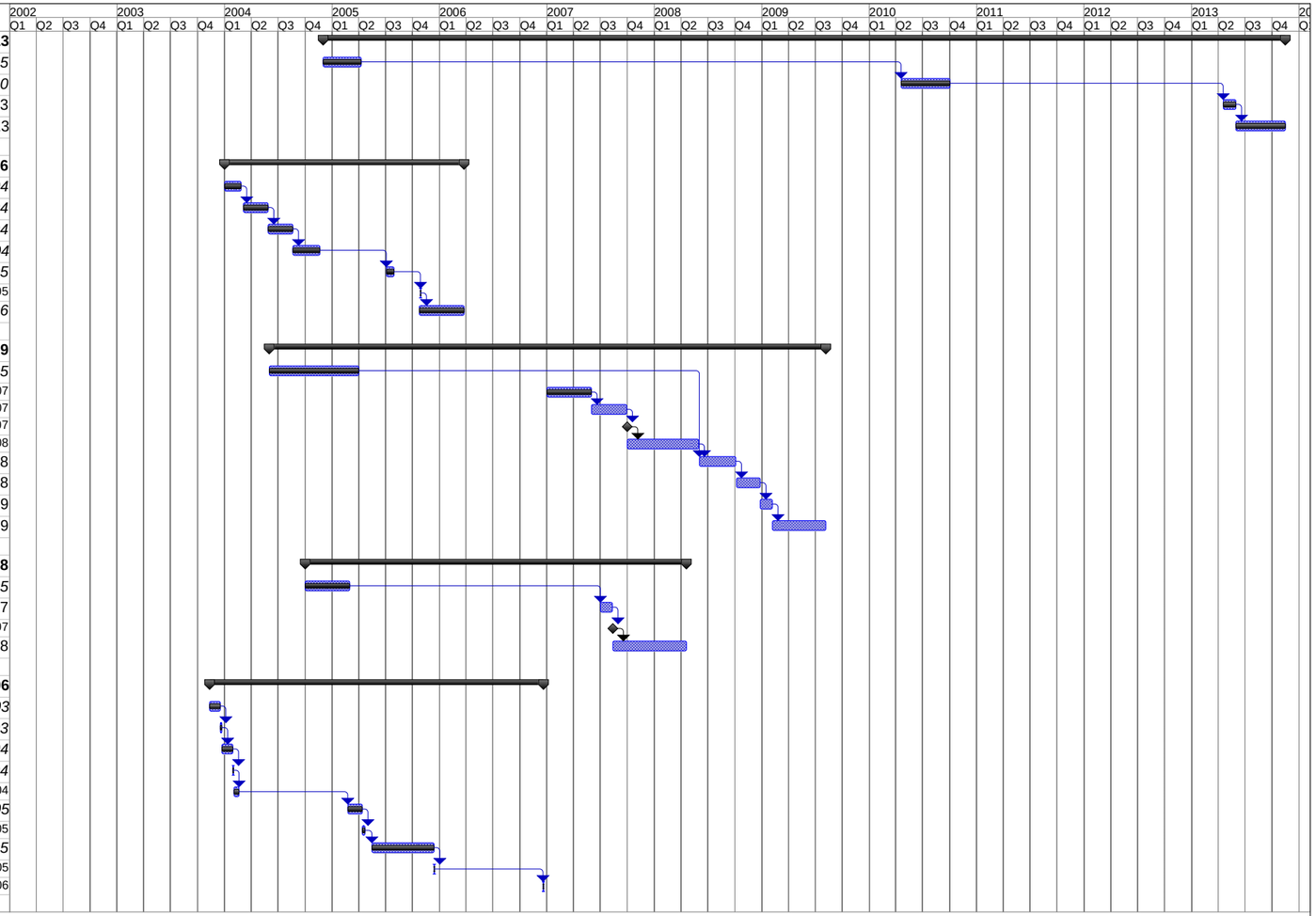
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Progress
Deadline

ID	Complete	Task Name	Start	Finish
325		**M-3. LEL I, II, III Hydraulic Monitoring/Maintenance Plan**	**Wed 12/1/04**	**Thu 11/14/13**
326	✓	*Prepare Outline of Scope for Post Closure Management Plan*	*Wed 12/1/04*	*Fri 4/8/05*
327	✓	*Prepare Post-Closure Management Plans*	*Mon 4/19/10*	*Fri 10/1/10*
328	✓	MDEQ Review of Management Plans	Thu 4/18/13	Thu 5/30/13
329	✓	Implementation of Management Plans (Preliminary Completion)	Fri 5/31/13	Thu 11/14/13
330				
331		**M-4. Investigation of Channel Depth/Topography of the Tittabawassee River**	**Thu 1/1/04**	**Fri 3/24/06**
332	✓	*Prepare Outline of Scope*	*Thu 1/1/04*	*Wed 2/25/04*
333	✓	*Review Outline w/ MDEQ and Agree Verbally on Scope*	*Fri 3/5/04*	*Thu 5/27/04*
334	✓	*Prepare Investigation Plan*	*Fri 5/28/04*	*Thu 8/19/04*
335	✓	*MDEQ Review of Investigation Plan*	*Fri 8/20/04*	*Fri 11/19/04*
336	✓	*Implementation of Investigation Plan (Preliminary Completion)*	*Mon 7/4/05*	*Fri 7/29/05*
337	✓	MDEQ Agrees to Use CH2MHill Data	Fri 10/28/05	Fri 10/28/05
338	✓	*Prepare and Submit Depth Study to MDEQ*	*Mon 10/24/05*	*Fri 3/24/06*
339				
340		**M-5. Indoor Air Pathway Analysis**	**Tue 6/1/04**	**Wed 8/5/09**
341	✓	*Prepare Outline of Scope*	*Tue 6/1/04*	*Thu 3/31/05*
342	✓	Prepare Phased Approach for Development of Indoor Air Program	Mon 1/1/07	Thu 5/31/07
343		MDEQ Review Phased Approach and Agree	Fri 6/1/07	Fri 9/28/07
344		* Project on hold pending MDEQ approval of plan	Mon 10/1/07	Mon 10/1/07
345		Implement Phased Approach Upon Approval	Mon 10/1/07	Fri 5/30/08
346		Review 3/31/05 Outline w/MDEQ and Agree on Scope	Mon 6/2/08	Fri 10/3/08
347		Prepare Evaluation Plan	Mon 10/6/08	Thu 12/25/08
348		MDEQ Review of Evaluation Plan	Fri 12/26/08	Wed 2/4/09
349		Implementation of Evaluation Plan	Thu 2/5/09	Wed 8/5/09
350				
351		**M-6. Former East Power Plant Cooling Pond RFI Phase I-type Investigation**	**Fri 10/1/04**	**Fri 4/18/08**
352	✓	*Prepare Preliminary Assessment (PA)*	*Fri 10/1/04*	*Mon 2/28/05*
353		MDEQ Review of PA	Mon 7/2/07	Fri 8/10/07
354		* Project on hold pending MDEQ approval of PA	Mon 8/13/07	Mon 8/13/07
355		Implementation of PA (Preliminary Completion)	Mon 8/13/07	Fri 4/18/08
356				
357		**M-7. RGIS Lift Station 8 to Manhole 8E Upgrade**	**Tue 11/11/03**	**Tue 12/19/06**
358	✓	*Evaluate Performance of LS8 - MH8E*	*Tue 11/11/03*	*Tue 12/16/03*
359	✓	*Prepare and Submit Data to Determine 2004/2005 Construction*	*Wed 12/17/03*	*Mon 12/22/03*
360	✓	*MDEQ Review of Data Submittal*	*Tue 12/23/03*	*Wed 1/28/04*
361	✓	*Determine Construction Timing (2004/2005)*	*Thu 1/29/04*	*Fri 1/30/04*
362	✓	MDEQ Concurs with 2005 Construction Season	Mon 2/2/04	Wed 2/18/04
363	✓	*Submit Standard RGIS Design Pkg for MDEQ Review and Obtain Approval*	*Wed 2/23/05*	*Tue 4/12/05*
364	✓	Submit Supplemental Information to MDEQ	Wed 4/13/05	Thu 4/21/05
365	✓	*Conduct Upgrade Constuction to RGIS by 2005*	*Mon 5/16/05*	*Mon 12/12/05*
366	✓	Submit As-builts of Construction	Tue 12/13/05	Tue 12/13/05
367	✓	MDEQ Approval for Construction	Tue 12/19/06	Tue 12/19/06
368				



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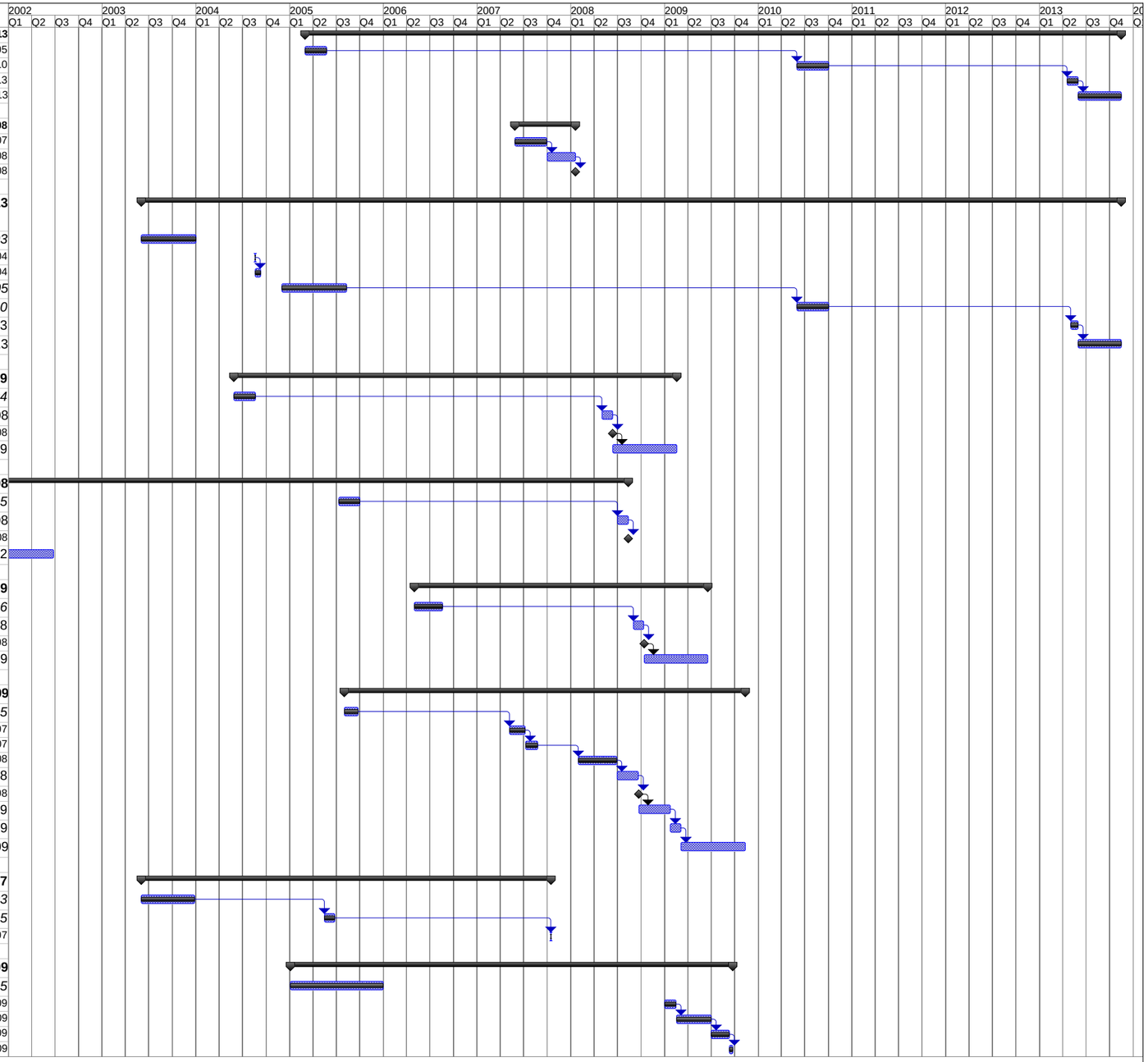
Task	Rolled Up Milestone	Project Summary	Inactive Summary	Manual Summary	Deadline
Milestone	Rolled Up Progress	Group By Summary	Manual Task	Start-only	
Summary	Split	Inactive Task	Duration-only	Finish-only	
Rolled Up Task	External Tasks	Inactive Milestone	Manual Summary Rollup	Progress	

ID	Complete	Task Name	Start	Finish
369		**M-8. 1925 Landfill Corrective Action Monitoring/Maintenance Program**	**Tue 3/1/05**	**Thu 11/14/13**
370	✓	Prepare Outline of Scope for CA Monitoring/Maintenance Program	Tue 3/1/05	Mon 5/23/05
371	✓	Prepare Corrective Action Monitoring/Maintenance Program (CAMMP)	Mon 5/31/10	Fri 10/1/10
372	✓	MDEQ Review of CAMMP	Thu 4/18/13	Thu 5/30/13
373	✓	Implementation of CAMMP (Preliminary Completion)	Fri 5/31/13	Thu 11/14/13
374				
375		**M-9. Deep Sands Area Surficial RFI Phase I-type Investigation**	**Mon 5/28/07**	**Fri 1/18/08**
376	✓	M-9. Deep Sands Area Surficial RFI Phase I-type Investigation	Mon 5/28/07	Fri 9/28/07
377		MDEQ Review of PA	Mon 10/1/07	Fri 1/18/08
378		* Project on hold pending MDEQ approval of PA	Fri 1/18/08	Fri 1/18/08
379				
380		**L-1. Poseyville Landfill Post-Closure Corrective Action Monitoring/Maintenance Program**	**Mon 6/2/03**	**Thu 11/14/13**
381	✓	*Prepare Chemical Program for Plume Perimeter Monitoring*	*Mon 6/2/03*	*Wed 12/31/03*
382	✓	MDEQ Approval of Plume Perimeter Program-verbal	Wed 8/18/04	Wed 8/18/04
383	✓	MDEQ Approval of Plume Perimeter Program-written	Thu 8/19/04	Wed 9/8/04
384	✓	*Prepare Outline of Scope for Post-Closure Monitoring/Maintenance Program*	*Wed 12/1/04*	*Tue 8/9/05*
385	✓	*Prepare Corrective Action Monitoring/Maintenance Program (CAMMP)*	*Mon 5/31/10*	*Fri 10/1/10*
386	✓	MDEQ Review of CAMMP	Thu 5/2/13	Thu 5/30/13
387	✓	Implementation of CAMMP (Preliminary Completion)	Fri 5/31/13	Thu 11/14/13
388				
389		**L-2. Ash Pond RFI Phase I-type Investigation**	**Fri 5/28/04**	**Mon 2/16/09**
390	✓	*Prepare Preliminary Assessment (PA)*	*Fri 5/28/04*	*Thu 8/19/04*
391		MDEQ Review of PA	Thu 5/1/08	Wed 6/11/08
392		* Project on hold pending MDEQ approval of PA	Thu 6/12/08	Thu 6/12/08
393		Implementation of PA (Preliminary Completion)	Thu 6/12/08	Mon 2/16/09
394				
395		**L-3. Overlook Park RFI Phase I-type Investigation**	**Tue 10/16/01**	**Tue 8/12/08**
396	✓	*Prepare Preliminary Assessment (PA)*	*Mon 7/11/05*	*Fri 9/30/05*
397		MDEQ Review of PA	Tue 7/1/08	Mon 8/11/08
398		* Project on hold pending MDEQ approval of PA	Tue 8/12/08	Tue 8/12/08
399		Implementation of PA (Preliminary Completion)	Tue 10/16/01	Mon 6/24/02
400				
401		**L-4. Triangle Pond RFI Phase I-type Investigation**	**Mon 5/1/06**	**Wed 6/17/09**
402	✓	*Prepare Preliminary Assessment*	*Mon 5/1/06*	*Fri 8/18/06*
403		MDEQ Review of PA	Mon 9/1/08	Fri 10/10/08
404		* Project on hold pending MDEQ approval of PA	Mon 10/13/08	Mon 10/13/08
405		Implementation of PA (Preliminary Completion)	Mon 10/13/08	Wed 6/17/09
406				
407		**L-5. No.6 Brine Pond (6-Pond) Research Study and Post Closure**	**Mon 8/1/05**	**Tue 11/10/09**
408	✓	*Prepare Outline of Scope for Management Plan*	*Mon 8/1/05*	*Fri 9/23/05*
409	✓	Prepare and Submit 6-Pond Sediment Screening Study Workplan	Mon 5/7/07	Fri 7/6/07
410	✓	MDEQ Review and Approval of Screening Study Worklplan	Mon 7/9/07	Fri 8/24/07
411	✓	Conduct Screening Study and Submit Results	Wed 1/30/08	Fri 6/27/08
412		MDEQ Review 9/23/05 Outline and Agree on Scope	Mon 6/30/08	Fri 9/19/08
413		* Project on hold pending MDEQ approval of outline	Mon 9/22/08	Mon 9/22/08
414		Prepare Management Plan	Mon 9/22/08	Thu 1/22/09
415		MDEQ Review of Management Plan	Fri 1/23/09	Wed 3/4/09
416		Implementation of Management Plan (Preliminary Completion)	Thu 3/5/09	Tue 11/10/09
417				
418		**L-6. US-10 Tank Farm Report**	**Mon 6/2/03**	**Mon 10/15/07**
419	✓	*Prepare Report*	*Mon 6/2/03*	*Fri 12/26/03*
420	✓	*MDEQ Review of Report*	*Mon 5/16/05*	*Fri 6/24/05*
421	✓	Submit Revision to Facility SAP for this Area	Mon 10/15/07	Mon 10/15/07
422				
423		**L-7. WSA II A Closure Plan Submittal**	**Mon 1/3/05**	**Tue 9/22/09**
424	✓	*Prepare Detailed Closure Plan for Submittal to MDEQ*	*Mon 1/3/05*	*Fri 12/30/05*
425	✓	Update and Submit Revised Closure Plan	Thu 1/1/09	Fri 2/13/09
426	✓	MDEQ Approval of Closure Plan	Mon 2/16/09	Tue 6/30/09
427	✓	Decontamination/demolition of remaining structures	Wed 7/1/09	Wed 9/9/09
428	✓	Engineer Certification/Closure Report Submittal	Thu 9/10/09	Tue 9/22/09



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Milestone	Rolled Up Progress	Group By Summary	Manual Task	Start-only			
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Rolled Up Task	External Tasks	Inactive Milestone	Manual Summary Rollup	Progress			

ATTACHMENT XIV. B2

APPENDIX E

Environmental Indicator Forms

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

DEQ adapted to Word 8/07

RCRA Corrective Action Environmental Indicator (EI) RCRA Info Code (CA725)
Current Human Exposures Under Control

Facility Name: The Dow Chemical Company, Midland, Michigan Operations
Facility Address: 1790 Building - Washington Street - Midland, MI 48674
Facility EPA ID #: MID 000 724 724

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to Resource Conservation Recovery Act of 1976 (RCRA) Corrective Action (e.g., waste management unit [WMU], regulated unit [RU], and area of concern [AOC]), been **considered** in this EI determination?

   ☒ If yes – check here and continue with #2 below.

   ☐ If no – reevaluate existing data, or

   ☐ If data are not available, skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

EIs are measures being used by the RCRA Corrective Action Program to go beyond programmatic activity measures (reports received and approved, etc.) to track changes in the quality of the environment. The two EIs developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for nonhuman (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA Corrective Action at or from the identified facility [i.e., site-wide]).

Relationship of EI to Final Remedies

While final remedies remain the long-term objective of the RCRA Corrective Action Program the EIs are near-term objectives that are currently being used as program measures for the Government Performance and Results Act of 1993 (GPRA). The "Current Human Exposures Under Control" EIs are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action Program's overall mission to protect human health and the environment requires that final remedies address these issues

(i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration/Applicability of EI Determinations
EI determinations status codes should remain in the RCRAInfo national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary information).

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from WMUs, RUs or AOCs)?

	Yes	No	?	Rationale/Key Contaminants
Groundwater	☒	☐	☐	**See Attachment for media-specific summary table**
Air (indoors)[2]	☐	☐	☒	
Surface Soil (e.g., <2ft)	☒	☐	☐	
Surface Water	☐	☒	☐	
Sediment	☒	☐	☐	
Subsurf. Soil (e.g., >2ft)	☒	☐	☐	
Air (outdoors)	☐	☒	☐	

☐ If no (for all media) – skip to #6, and enter "YE", status code after providing or citing appropriate "levels" and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

☒ If yes (for any media) – continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

☒ If unknown (for any media) – skip to #6 and enter "IN" status code.

Rationale and Reference(s):

For soil analytical data, refer to Table B2-4. For groundwater analytical data results, refer to Table B2-5. In addition, the Quarterly and Annual Environmental Monitoring Reports for the years 2003 through 2012 present the results for all monitoring programs. Surface water and sediment results are presented in the Historic Outfall Investigation Summary Report (URS, 2010). Ambient air data is presented in the monthly Ambient Air Monitoring Program summary data submittals.

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Department of Public Health and Environment, and others) suggests that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above [and adjacent to] groundwater with volatile contaminants) does not present unacceptable risks.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

Contaminated Media	**Residents**	**Workers**	**Day-Care**	**Construction**	**Trespassers**	**Recreation**	**Food[3]**
Midland Plant Facility							
Groundwater	No	No	--	Yes	No	--	No
Air (indoors)	No	Yes	--	Yes	No	--	--
Soil (surface, e.g., <2 ft)	--[d]	Yes	--	Yes	No	--	No
~~Surface Water~~[a]	--	--	--	--	--	--	--
~~Sediment~~[b]	--	--	--	--	--	--	--
Soil (subsurface e.g., >2 ft)	--[d]	No	--	Yes	No	--	No
~~Air (outdoors)~~[c]	--	--	--	--	--	--	--
Midland Area Soils (off-site impacts from historic aerial releases)							
Groundwater	No	No	--	No	--	No	No
Air (indoors)	No	No	--	No	--	No	--
Soil (surface, e.g., <2 ft)	Yes	No	Yes	No	--	Yes	No
~~Surface Water~~[a]	--	--	--	--	--	--	--
~~Sediment~~[b]	--	--	--	--	--	--	--
Soil (subsurface e.g., >2 ft)	No	No	--	No	--	No	No
~~Air (outdoors)~~[c]	--	--	--	--	--	--	--
Contaminated Media	**Residents**	**Workers**	**Day-Care**	**Construction**	**Trespassers**	**Recreation**	**Food[4]**
Tittabawassee River and its floodplain (off-site)							
~~Groundwater~~	--	--	--	--	--	--	--
~~Air (indoors)~~	--	--	--	--	--	--	--
Soil (surface, e.g., <2 ft)	Yes	Yes	No	Yes	--	Yes	--
~~Surface Water~~	--	--	--	--	--	--	--

[a]For the facility, surface water is monitored in the surface water monitoring program and current results indicate no impacts. Historic surface water impacts are being addressed under the CERCLA program.
[b]Historic off-site sediment impacts are being addressed under the CERCLA program (See Tittabawassee River, Saginaw River, and Saginaw Bay categories below).
[c]Currently, the air (outdoor) at the facility is monitored in the Ambient Air Monitoring program which demonstrates no significant impacts from the facility.
[d]Off-site impacts to soil from historic aerial exposure are addressed in the "Midland Area Soils" category below.
-- = Not applicable
[3]Indirect Pathway/Receptor (vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.).

Sediment	--	--	--	No	--	Yes	Yes
Soil (subsurface e.g., >2 ft)	No	No	No	Yes	--	No	--
~~Air (outdoors)~~	--	--	--	--	--	--	--
Saginaw River and its floodplain (off-site)							
~~Groundwater~~	--	--	--	--	--	--	--
~~Air (indoors)~~	~~--~~	--	--	--	--	--	--
Soil (surface, e.g., <2 ft)	Yes	Yes	No	Yes	--	Yes	--
~~Surface Water~~	--	--	--	--	--	--	--
Sediment	--	--	--	No	--	Yes	Yes
Soil (subsurface e.g., >2 ft)	No	No	No	Yes	--	No	--
~~Air (outdoors)~~	--	--	--	--	--	--	--
Saginaw Bay (off-site)							
~~Groundwater~~	--	--	--	--	--	--	--
~~Air (indoors)~~	--	--	--	--	--	--	--
~~Soil (surface, e.g., <2 ft)~~	--	--	--	--	--	--	--
~~Surface Water~~	--	--	--	--	--	--	--
Sediment	--	--	--	--	--	--	Yes
~~Soil (subsurface e.g., >2 ft)~~	--	--	--	--	--	--	--
~~Air (outdoors)~~	--	--	--	--	--	--	--

[a]For the facility, surface water is monitored in the surface water monitoring program and current results indicate no impacts. Historic surface water impacts are being addressed under the CERCLA program.
[b]Historic off-site sediment impacts are being addressed under the CERCLA program (See Tittabawassee River, Saginaw River, and Saginaw Bay categories below).
[c]Currently, the air (outdoor) at the facility is monitored in the Ambient Air Monitoring program which demonstrates no significant impacts from the facility.
[d]Off-site impacts to soil from historic aerial exposure are addressed in the "Midland Area Soils" category below.
-- = Not applicable
[4]Indirect Pathway/Receptor (vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.).

Instructions for Summary Exposure Pathway Evaluation Table:

A. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated" as identified in #2 above.

B. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media – Human Receptor Combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media – Human Receptor combinations (Pathways) do not have check spaces ("__"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

☐ If no (Pathways are not complete for any contaminated media-receptor combination) –

skip to #6, and enter "YE" status code, after explaining and/or referencing conditions(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

☒ If yes (Pathways are complete for any "Contaminated" Media – Human Receptor combination) – continue after providing supporting explanation.

☐ If unknown (for any "Contaminated" Media – Human Receptor combination) – skip to #6 and enter "IN" status code.

Rationale and Reference(s)

MIDLAND PLANT FACILITY
Residents:
Off-site impacts from historic aerial releases are discussed below in "Midland Area Soils"
Groundwater = Exposure pathway not complete. No exposure point is present as there are no known groundwater plumes extending off-site to residential areas.
Air (indoors) = Exposure pathway not complete. No exposure point is present as no off-site residences are located above or adjacent to volatile contaminated soil or groundwater resulting from a release from the facility.

Workers:
Groundwater = Exposure pathway not complete. No exposure point is present as all facility water used for production and drinking water is supplied by the City of Midland from Lake Huron.
Air (indoors) = **Exposure pathway is reasonably expected to be complete** (under current conditions) if a building on-site is located above or adjacent to volatile contaminated soil or groundwater.
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are managed according to the Soil and Groundwater Exposure Control Program (Attachment 27 of the Operating License).
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as workers are very unlikely to be exposed to soils at depths greater than 2 feet.

Construction Workers:
Groundwater = **Exposure pathway is reasonably expected to be complete** only in the event that a construction job includes the digging of a trench to a depth where shallow groundwater may be encountered. "Contaminated" groundwater is present and exposure points exist, however exposure routes are controlled by Soil and Groundwater Exposure Control Program (Attachment 27 of the Operating License)
Air (indoors) = **Exposure pathway is reasonably expected to be complete** (under current conditions) if a building on-site is located above or adjacent to volatile contaminated soil or groundwater.
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). "Contaminated" soils less than 2 feet deep are present. Work to control exposure from direct contact is on-going as part of corrective action at the facility.
Soil (subsurface) = **Exposure pathway is reasonably expected to be complete** (only in the event that a construction job includes the digging of a trench to a depth where subsurface contamination may be encountered). Exposure routes are controlled by Soil and Groundwater Exposure Control Program (Attachment 27 of the Operating License)

Trespassers:
Exposure pathways are not complete for this receptor. No exposure point is present as no trespassers are expected since the facility is surrounded by well-maintained fence and security with controlled access points. Furthermore, inspections of the facility have not provided evidence of trespassers being present under current conditions.

Food:
Exposure pathways are not complete. No exposure point is present as no food items are grown at the facility. This exposure pathway is being considered under the "Midland Area Soils" category below.

MIDLAND AREA SOILS (Off-site corrective action)
Off-site Soil Impacts from Historic Aerial Releases
Residents:
Groundwater = Exposure pathway not complete. No exposure point is present as there are no known groundwater plumes.
Air (indoors) = Exposure pathway not complete. No exposure point is present as no residences are located above or adjacent to volatile contaminated soil or groundwater.
Soil (surface) = **Exposure pathway is reasonably anticipated to be complete** (under current conditions). MDEQ approved a site-specific cleanup level for dioxins and furans in Midland residential soil. Concentrations of dioxins and furans in surface soil in excess of the site-specific criteria are being addressed through corrective actions underway to mitigate direct contact to soil in off-site residential areas, pursuant to Operating License Part XI.B and the *Interim Response Activity Plan Designed to Meet Criteria*, submitted May 25, 2012 and approved by MDEQ June 1, 2012.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as no residences are located above or adjacent to contaminated soil greater than 2 feet deep.

Workers:
Groundwater = Exposure pathway not complete. No exposure point is present as there are no known groundwater plumes.
Air (indoors) = Exposure pathway not complete. No exposure point is present as no businesses are located above or adjacent to volatile contaminated soil or groundwater.
Soil (surface) = Exposure pathway not complete. No exposure point is present as no off-site properties have been identified above non-residential direct contact cleanup criterion.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as no businesses are located above or adjacent to contaminated soil greater than 2 feet deep.

Day Care (or other non-production and possibly sensitive receptor uses: e.g. schools, hospitals, etc.):
Soil (surface) = **Exposure pathway is reasonably anticipated to be complete** (under current conditions). Corrective action are in process to mitigate direct contact to soil in off-site residential areas, pursuant to Operating License Part XI.B and the approved *Interim Response Activity Plan Designed to Meet Criteria*, submitted May 25, 2012 and approved by MDEQ June 1, 2012.

Construction Workers:
Groundwater = Exposure pathway not complete. No exposure point is present as there are no known groundwater plumes.
Air (indoors) = Exposure pathway not complete. No exposure point is present as no businesses are located above or adjacent to volatile contaminated soil or groundwater.

Soil (surface) = Exposure pathway not complete. No exposure point is present as no off-site properties have been identified above non-residential direct contact cleanup criterion.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as no properties are located above or adjacent to contaminated soil greater than 2 feet deep.

Recreation (users):
Groundwater = Exposure pathway not complete. No exposure point is present as there are no known groundwater plumes.
Air (indoors) = Exposure pathway not complete. No exposure point is present as no properties are located above or adjacent to volatile contaminated soil or groundwater.
Soil (surface) = **Exposure pathway is reasonably anticipated to be complete** (under current conditions). MDEQ approved a site-specific cleanup level for dioxins and furans in Midland residential soil. Concentrations of dioxins and furans in surface soil in excess of the site-specific criteria are being addressed through corrective actions underway to mitigate direct contact to soil in off-site residential areas, pursuant to Operating License Part XI.B and the *Interim Response Activity Plan Designed to Meet Criteria*, submitted May 25, 2012 and approved by MDEQ June 1, 2012.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as no properties are located above or adjacent to contaminated soil greater than 2 feet deep.

Food:
Groundwater = Exposure pathway not complete. No food items are produced/grown in contact with contaminated groundwater.
Soil (surface) = Exposure pathway is not complete. In 1987, USEPA Region 5 conducted preliminary screening of homegrown vegetables in two Midland gardens. Although dioxins and furans were present in the soils of both gardens, they were not detected in any vegetable tissue samples (USEPA, 1988). EPA recommends that homegrown vegetables are washed or peeled prior to eating to eliminate risk.
Soil (subsurface) = Exposure pathway is not complete. In 1987, USEPA Region 5 conducted preliminary screening of homegrown vegetables in two Midland gardens. Although dioxins and furans were present in the soils of both gardens, they were not detected in any vegetable tissue samples (USEPA, 1988). EPA recommends that homegrown vegetables are washed or peeled prior to eating to eliminate risk

TITTABAWASSEE RIVER AND ITS FLOODPLAIN (Off-site corrective action)
Off-site Impacts from Historic Outfall Discharges
The Tittabawassee River and its Floodplain will be addressed as a part of the January 2010 Administrative Settlement Agreement and Order on Consent (AOC). The AOC specifies the steps for the Remedial Investigation, Feasibility Study and/or Engineering Evaluation and Cost Analysis (EE/CA), and the Response Design to be taken by Dow, the EPA and the MDEQ to evaluate current conditions and assess response options for the Tittabawassee River/Saginaw River & Bay Site ("Site").

Residents:
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are being addressed under the AOC.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as residents are very unlikely to be exposed to soils at depths greater than 2 feet.

Workers:

Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are being addressed under the AOC.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as workers are very unlikely to be exposed to soils at depths greater than 2 feet.

Day Care (or other non-production and possibly sensitive receptor uses: e.g. schools, hospitals, etc) via "contaminated" media.
Soil (surface) = Exposure pathway not complete. No exposure point is present as no Day Care or other non-production (e.g. sensitive receptors) are located above or adjacent to contaminated surface soil.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as no Day Care or other non-production (e.g. sensitive receptors) are located above or adjacent to contaminated soil greater than 2 feet deep.

Construction Workers:
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are being addressed under the AOC.
Soil (subsurface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are being addressed under the AOC.

Recreation (users):
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are being addressed under the AOC.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as recreational users are very unlikely to contact contaminated soil greater than 2 feet deep.

Food:
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes related to livestock and game are being addressed under the AOC. Exposure pathway related to vegetables is not complete. In 1987, USEPA Region 5 conducted preliminary screening of homegrown vegetables in two Midland gardens. Although dioxins and furans were present in the soils of both gardens, they were not detected in any vegetable tissue samples (USEPA, 1988). EPA recommends that homegrown vegetables are washed or peeled prior to eating to eliminate risk.
Sediment = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes related to fish are being addressed under the AOC.
Soil (subsurface) = Exposure pathway is not complete. In 1987, USEPA Region 5 conducted preliminary screening of homegrown vegetables in two Midland gardens. Although dioxins and furans were present in the soils of both gardens, they were not detected in any vegetable tissue samples (USEPA, 1988). EPA recommends that homegrown vegetables are washed or peeled prior to eating to eliminate risk.

SAGINAW RIVER AND ITS FLOODPLAIN (Off-site corrective action)
Off-site Impacts from Historic Outfall Discharges
The Saginaw River and its Floodplain will be addressed as a part of the January 2010 Administrative Settlement Agreement and Order on Consent (AOC). The AOC specifies the steps for the Remedial Investigation, Feasibility Study and/or Engineering Evaluation and Cost Analysis (EE/CA), and the Response Design to be taken by Dow, the EPA and the MDEQ to evaluate current conditions and assess response options for the Tittabawassee River/Saginaw River & Bay Site ("Site").

Residents:
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are being addressed under the AOC.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as residents are very unlikely to be exposed to soils at depths greater than 2 feet.

Workers:
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are being addressed under the AOC.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as workers are very unlikely to be exposed to soils at depths greater than 2 feet.

Day Care (or other non-production and possibly sensitive receptor uses: e.g. schools, hospitals, etc) via "contaminated" media.
Soil (surface) = Exposure pathway not complete. No exposure point is present as no Day Care or other non-production (e.g. sensitive receptors) are located above or adjacent to contaminated surface soil.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as no Day Care or other non-production (e.g. sensitive receptors) are located above or adjacent to contaminated soil greater than 2 feet deep.

Construction Workers:
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are being addressed under the AOC.
Soil (subsurface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are being addressed under the AOC.

Recreation (users):
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes are being addressed under the AOC.
Soil (subsurface) = Exposure pathway not complete. No exposure point is present as recreational users are very unlikely to contact contaminated soil greater than 2 feet deep.

Food:
Soil (surface) = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes related to wildlife and game are being addressed under the AOC. Exposure pathway related to vegetables is not complete. In 1987, USEPA Region 5 conducted preliminary screening of homegrown vegetables in two Midland gardens. Although dioxins and furans were present in the soils of both gardens, they were not detected in any vegetable tissue samples (USEPA, 1988). EPA recommends that homegrown vegetables are washed or peeled prior to eating to eliminate risk.

Sediment = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes related to fish are being addressed under the AOC.
Soil (subsurface) = Exposure pathway is not complete. In 1987, USEPA Region 5 conducted preliminary screening of homegrown vegetables in two Midland gardens. Although dioxins and furans were present in the soils of both gardens, they were not detected in any vegetable tissue samples (USEPA, 1988). EPA recommends that homegrown vegetables are washed or peeled prior to eating to eliminate risk.

SAGINAW BAY (Off-site corrective action)
Off-site Impacts from Historic Outfall Discharges
The Saginaw Bay will be addressed as a part of the January 2010 Administrative Settlement Agreement and Order on Consent (AOC). The AOC specifies the steps for the Remedial Investigation, Feasibility Study and/or Engineering Evaluation and Cost Analysis (EE/CA), and the Response Design to be taken by Dow, the EPA and the MDEQ to evaluate current conditions and assess response options for the Tittabawassee River/Saginaw River & Bay Site ("Site").

Food:
Sediment = **Exposure pathway is reasonably expected to be complete** (under current conditions). Exposure routes related to fish will be addressed under the AOC.

4. Can the **exposures** from any of the complete Pathways identified in #3 be reasonably expected to be **"significant"**[5] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: (1) greater in magnitude [intensity, frequency and/or duration] than assumed in the derivation of the acceptable "levels" [used to identify the "contamination"]; or (2) the combination of exposure magnitude [perhaps even though low] and contaminant concentrations [that may be substantially above the acceptable "levels"] could result in greater than acceptable risks)?

☐ If no (exposures cannot be reasonably expected to be significant [i.e., potentially "unacceptable"] for any complete exposure pathway) – skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant".

☒ If yes (exposures could be reasonably expected to be "significant" [i.e., potentially "unacceptable"] for any complete exposure pathway) – continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

☒ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

MIDLAND PLANT FACILITY
Workers
Air (indoors) = **Unknown** (under current conditions). Work is on-going to demonstrate compliance pursuant to 324.20120a(19).
Soil (surface) = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. The MDEQ generic non-residential direct contact cleanup criterion for dioxins and furans (990 ppt TEQ) is based on an assumption of an ingestion exposure of 245 days per year and a dermal exposure frequency of 160 days, over a 21 year career. While exposure frequency on-site is likely to be lower than these assumptions, portions of the facility have concentrations above the generic cleanup criterion. Exposure routes are managed according to the Soil and Groundwater Exposure Control Program (Attachment 27 of the Operating License). The Enhanced Exposure Control program is on-going at the facility (Compliance Schedule H-5 and H-6) to manage the direct contact exposure pathway.

[5]If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

Construction Workers
Groundwater = Exposure is not reasonably expected to be significant (under current conditions). Exposure routes are managed according to the Soil and Groundwater Exposure Control Program (Attachment 27 of the Operating License) (e.g., PPE requirements).
Air (indoors) = **Unknown** (under current conditions). Work is on-going to demonstrate compliance pursuant to 324.20120a(19).
Soil (surface) = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. The MDEQ generic non-residential direct contact cleanup criterion for dioxins and furans (990 ppt TEQ) is based on an assumption of an ingestion exposure of 245 days per year and a dermal exposure frequency of 160 days, over a 21 year career. While exposure frequency on-site is likely to be lower than assumptions, portions of the facility have concentrations above the generic cleanup criterion. Exposure routes are managed according to the Soil and Groundwater Exposure Control Program (Attachment 27 of the Operating License). The Enhanced Exposure Control program is on-going at the facility (Compliance Schedule H-5 and H-6) to manage the direct contact exposure pathway.
Soil (subsurface) = Exposure is not reasonably expected to be significant (under current conditions). The generic non-residential direct contact cleanup criterion for dioxins and furans (990 ppt TEQ) is based on an assumption of an ingestion exposure of 245 days per year and a dermal exposure frequency of 160 days, over a 21 year career. While exposure frequency on-site is unlikely consistent with assumptions, portions of the facility have concentrations above the generic cleanup criterion. Exposure routes are managed according to the Soil and Groundwater Exposure Control Program (Attachment 27 of the Operating License) (e.g., PPE requirements). The Enhanced Exposure Control program is on-going at the facility (Compliance Schedule H-5 and H-6) to manage the direct contact exposure pathway.

MIDLAND AREA SOILS (Off-site corrective action)
Off-site Impacts from Historic Aerial Releases
Residents:
Soil (surface) = **Exposure could be significant** (under current conditions). MDEQ approved a site-specific cleanup level for dioxins and furans in Midland residential soil. Concentrations of dioxins and furans in surface soil in excess of the site-specific criteria are being addressed through corrective actions underway to mitigate direct contact to soil in off-site residential areas, pursuant to Operating License Part XI.B and the *Interim Response Activity Plan Designed to Meet Criteria*, submitted May 25, 2012 and approved by MDEQ June 1, 2012.

Day Care (or other non-production and possibly sensitive receptor uses: e.g. schools, hospitals, etc.)
Soil (surface) = **Unknown** (under current conditions). MDEQ approved a site-specific cleanup level for dioxins and furans in Midland residential soil. Concentrations of dioxins and furans in surface soil in excess of the site-specific criteria are being addressed through corrective actions underway to mitigate direct contact to soil in off-site residential areas, pursuant to Operating License Part XI.B and the *Interim Response Activity Plan Designed to Meet Criteria*, submitted May 25, 2012 and approved by MDEQ June 1, 2012.

Recreation (users)
Soil (surface) = **Exposure could be significant** (under current conditions). MDEQ approved a site-specific cleanup level for dioxins and furans in Midland residential soil. Concentrations of dioxins and furans in surface soil in excess of the site-specific criteria are being addressed through

corrective actions underway to mitigate direct contact to soil in off-site residential areas, pursuant to Operating License Part XI.B and the *Interim Response Activity Plan Designed to Meet Criteria*, submitted May 25, 2012 and approved by MDEQ June 1, 2012.

TITTABAWASSEE RIVER AND ITS FLOODPLAIN (Off-site corrective action)
Off-site Impacts from Historic Outfall Discharges
Residents:
Soil (surface) = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Workers:
Soil (surface) = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Construction Workers:
Soil (surface) = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.
Soil (subsurface) = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Recreation (users):
Soil (surface) = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Food:
Soil (surface) = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.
Sediment = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

SAGINAW RIVER AND ITS FLOODPLAIN (Off-site corrective action)
Off-site Impacts from Historic Outfall Discharges
Residents:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Workers:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Construction Workers:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.
Soil (subsurface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Recreation (users):
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Food:
Soil (surface) = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.
Sediment = **Exposure could be significant** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

SAGINAW BAY (Off-site corrective action)
Off-site Impacts from Historic Outfall Discharges
Food:
Sediment = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure to contaminants in fish will be addressed under the AOC.

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

☐ If yes (all "significant" exposures have been shown to be within acceptable limits) – continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

☒ If no (there are current exposures that can be reasonably expected to be "unacceptable") – continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

☒ If unknown (for any potentially "unacceptable" exposure) – continue and enter "IN" status code.

Rationale and Reference(s):

MIDLAND PLANT FACILITY
Workers
Air (indoors) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Work is on-going to demonstrate compliance pursuant to 324.20120a(19).
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Significant work has been completed related to the Enhanced Exposure Control at the facility, however additional work must be completed to demonstrate all significant exposures are within acceptable limits and/or fully control all exposure routes.

Construction Workers
Air (indoors) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Work is on-going to demonstrate compliance pursuant to 324.20120a(19).
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Significant work has been completed related to the Enhanced Exposure Control at the facility, however additional work must be completed to demonstrate all significant exposures are within acceptable limits and/or fully control all exposure routes.

MIDLAND AREA SOILS (Off-site corrective action)
Off-site Impacts from Historic Aerial Releases
Residents:
Soil (surface) = **Exposure could be unacceptable** (under current conditions). Corrective actions are in process to mitigate direct contact to soil in off-site residential areas, pursuant to Operating License Part XI.B and the approved *Interim Response Activity Plan Designed to Meet Criteria*, submitted May 25, 2012 and approved by MDEQ June 1, 2012. Once the corrective action program is complete, this exposure pathway will be within acceptable limits.

Day Care (or other non-production and possibly sensitive receptor uses: e.g. schools, hospitals, etc.)
Soil (surface) = **Unknown** (under current conditions). MDEQ approved a site-specific cleanup level for dioxins and furans in Midland residential soil. Concentrations of dioxins and furans in surface soil in excess of the site-specific criteria are being addressed through corrective actions underway to mitigate direct contact to soil in off-site residential areas, pursuant to Operating License Part XI.B and the *Interim Response Activity Plan Designed to Meet Criteria*, submitted May 25, 2012 and approved by MDEQ June 1, 2012.

Recreation (users):
Soil (surface) = **Exposure could be unacceptable** (under current conditions). Corrective actions are in process to mitigate direct contact to soil in off-site residential areas, pursuant to Operating License Part XI.B and the approved *Interim Response Activity Plan Designed to Meet Criteria*, submitted May 25, 2012 and approved by MDEQ June 1, 2012. Once the corrective action program is complete, this exposure pathway will be within acceptable limits.

TITTABAWASSEE RIVER AND ITS FLOODPLAIN (Off-site corrective action)
Off-site Impacts from Historic Outfall Discharges
Residents:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Workers:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Construction Workers:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Soil (subsurface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Recreation (users):
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Food:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.
Sediment = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

SAGINAW RIVER AND ITS FLOODPLAIN (Off-site corrective action)
Off-site Impacts from Historic Outfall Discharges
Residents:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Workers:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Construction Workers:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.
Soil (subsurface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Recreation (users):
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

Food:
Soil (surface) = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.
Sediment = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

SAGINAW BAY (Off-site corrective action)
Off-site Impacts from Historic Outfall Discharges
Food:
Sediment = **Unknown** (under current conditions) based on generic exposure assumptions developed in accordance with Part 201 of Michigan Act 451. Exposure routes are being addressed under the AOC.

6. Check the appropriate RCRA Info status codes for the Current Human Exposures Under Control EI Code (CA725), obtain supervisory signature and date on the EI determination below, and attach appropriate supporting documentation as well as a map of the facility.

☐ YE – Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the _____ facility, EPA ID # _____, located at _____ under current and reasonably expected conditions. This determination will be reevaluated when the agency/state becomes aware of significant changes at the facility.

☐ NO – "Current Human Exposures" are NOT "Under Control."

☒ IN – More information is needed to make a determination.

Completed by: _____ Date: (type date)
(type name)
(type title)
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality

517- -

Supervisor: _____ Date: (type date)
(type name)
(type title)
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
517- -

Locations where references may be found:

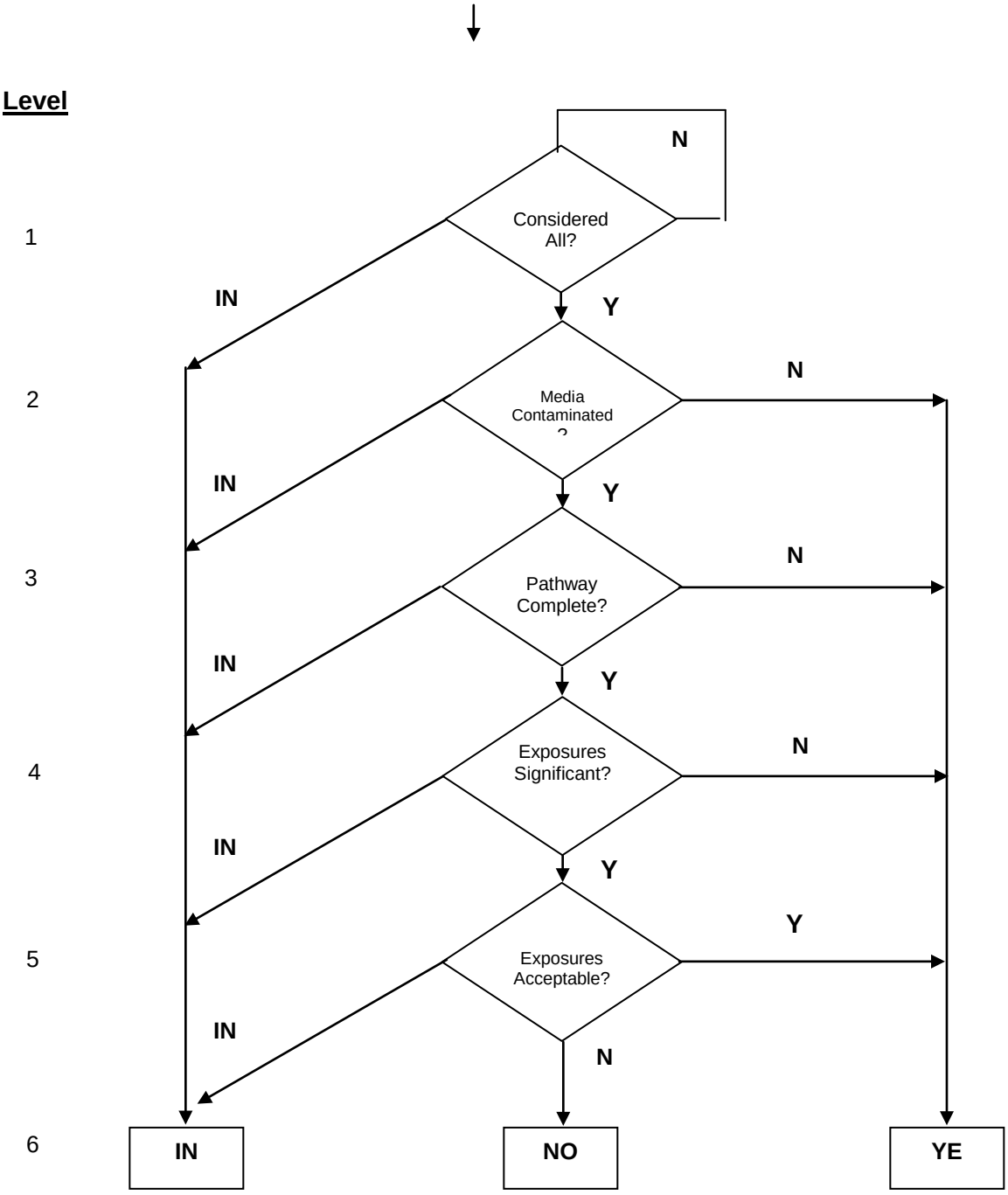
Hazardous Waste Section facility files at:
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
525 West Allegan Street
Lansing, Michigan 48933

Contact e-mail addresses:

(type name) - (type e-mail)
(type name) - (type e-mail)

Final Note: The human exposures EI is a qualitative screening of exposures and the determinations within this document should not be used as the sole basis for restricting the scope of more detailed (e.g., site-specific) assessments of risk.

Facility Name: **The Dow Chemical Company, Midland, Michigan Operations**
EPA ID#: **MID 000 724 724**
City/State: **Midland, Michigan**



DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

DEQ adapted to Word 8/07

RCRA Corrective Action Environmental Indicator (EI) RCRAInfo Code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: The Dow Chemical Company, Midland, Michigan Operations
Facility Address: 1790 Building - Washington Street - Midland, MI 48674
Facility EPA ID #: MID 000 724 724

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from waste management units (WMU), regulated units (RU), and areas of concern (AOC)), been **considered** in this EI determination?

   ☒ If yes - check here and continue with #2 below.

   ☐ If no - reevaluate existing data, or

   ☐ **I**f data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)
EIs are measures being used by the RCRA Corrective Action Program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EIs developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for nonhuman (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI
A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA Corrective Action at or from the identified facility [i.e., site-wide]).

Relationship of EI to Final Remedies
While final remedies remain the long-term objective of the RCRA Corrective Action Program the EIs are near-term objectives that are currently being used as program measures for the Government Performance and Results Act of 1993, (GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., nonaqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration/Applicability of EI Determinations
EI determinations status codes should remain in the RCRAInfo national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately

protective “levels” (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

☒ If yes - continue after identifying key contaminants, citing appropriate “levels,” and referencing supporting documentation.

☐ If no - skip to #8 and enter “YE” status code, after citing appropriate “levels,” and referencing supporting documentation to demonstrate that groundwater is not “contaminated.”

☐ If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

A summary of groundwater analytical data results is presented in Table B2-5. In addition, the Quarterly and Annual Environmental Monitoring Reports for the years 2003 through 2012 present the results for all groundwater monitoring programs. Dissolved compounds in groundwater have been identified at concentrations which exceed generic MDEQ Cleanup Criteria.

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within “existing area of contaminated groundwater” as defined by the monitoring locations designated at the time of this determination)?

☒ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the “existing area of groundwater contamination”[2].

☐ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the “existing area of groundwater contamination”) – skip to #8 and enter “NO” status code, after providing an explanation.

☐ If unknown - skip to #8 and enter “IN” status code.

[2] “Existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) location proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring, Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation} allowing a limited area for natural attenuation

Rationale and Reference(s):

The *Michigan Operations, Midland Plant* facility employs a '"site-wide containment" strategy. The site-side containment strategy is a comprehensive set of measures with the objective of preventing the migration of contaminated soil, storm water and groundwater above applicable criteria from migrating beyond the RCRA Facility Boundary. These objectives are met by a combination of monitoring and engineered controls. Groundwater monitoring demonstrates control of contaminated groundwater by determining flow direction for the surface permeable zone through hydraulic monitoring. Where groundwater has the potential to migrate beyond the RCRA Facility Boundary, on-going chemical monitoring is conducted to verify compliance with relevant and

applicable MDEQ cleanup criteria. Groundwater monitoring networks have been designed and installed for those areas. See Attachment XIV.B5 Environmental Monitoring Programs for further details.

The following engineered systems have been designed, constructed and maintained to prevent groundwater from migrating beyond the point of compliance:

- Revetment Groundwater Interception System (RGIS);
- South Saginaw Road Collection Tile;
- Tertiary Pond RGIS;
- Tertiary Pond Slurry Wall;
- 6 Pond collection Tile;
- 7th Street Purge Wells;
- Sandbar steel sheet piling and horizontal well;
- LEL I Slurry Wall;
- LEL II Slurry Walls;
- LEL III Slurry Walls;
- Deep Well 5964;
- Poseyville Landfill Slurry Wall;
- Poseyville Landfill Purge Wells.

HORIZONTAL MIGRATION: Quarterly hydraulic contours indicate natural shallow groundwater movement on the plant is primarily in the direction of the Tittabawassee River. The engineered systems listed above prevent contaminated groundwater from migrating beyond the Facility Boundary. The systems generally consist of permeable backfill, a sloped and perforated collection tile, purge wells and sheet-piling acting as a hydraulic barrier. The engineered systems listed above are operated on a continuous basis and are monitored to confirm effective performance, using piezometers, automated level instruments and computer controls for continuous monitoring to insure hydraulic capture of groundwater. Much of the system has been modernized, upgraded and replaced since 1994. Operation, monitoring and maintenance requirements are specified in Dow's Hazardous Waste Operating License (Operating License). Significant groundwater collection and removal also occurs via leakage into existing interior sewers. All collected groundwater is sent for treatment to Dow's on-site Wastewater Treatment Plant prior to discharge.

In areas identified where the potential for groundwater to migrate beyond the Facility Boundary, groundwater has been characterized for the presence of contaminants. Under the conditions of the Operating License, appropriate groundwater monitoring programs have been established and are on-going. The purpose of the established groundwater monitoring programs is to verify that groundwater contamination does not expand beyond the current extent. The details of the monitoring programs are included in Attachment XIV.B5 Environmental Monitoring Programs. Existing characterization data indicates groundwater contaminants in the areas where groundwater flows beyond the Facility Boundary do not exceed the applicable groundwater and surface water protection standards.

VERTICAL MIGRATION: Geologic and hydraulic evidence indicates that, in general, a ninety-five to one hundred forty feet of very low permeability (8.2×10^{-8} to 4.6×10^{-9} cm/sec) glacial aquitard separates shallow and deeper aquifers within the Facility Boundary. Groundwater contamination does not extend through the aquitard, as no impacts to the Regional Aquifer have been identified from quarterly detection monitoring of wells screened in the glacial till and Regional Aquifer. The vertical extent of groundwater contamination is significantly retarded by the underlying aquitard. In

some areas where till sands are in communication with the shallow unconfined groundwater, contamination extends into those till sands. The extent of contamination is dependent on the degree of communication with the unconfined groundwater and degree of shallow contamination present. Vertical migration of dissolved phase contaminants is limited to predominantly diffusive transport due to the compact nature of the underlying glacial sediments and the artesian nature of the underlying Regional Aquifer (demonstrated by quarterly hydraulic monitoring), resulting in upward vertical gradient across the Facility. Attachment XIV.B5 Environmental Monitoring Programs provides further details on the groundwater monitoring programs in place. Groundwater monitoring data (both hydraulic and chemistry are regularly reported in Quarterly and Annual Environmental Monitoring Reports.

Reference(s);

- Attachment XIV.B2, Corrective Actions (April 12, 2013)
- Attachment XIV.B5, Environmental Monitoring Programs (April 12, 2013)
- Attachment XIV.B3, Updates to the Hydrogeologic Report (April 12, 2013)
- The Operating License for the Dow Chemical Company, Michigan Operations, Midland, Michigan, MID 000 724 724, issued June 12, 2003.
- Annual Part 111 Groundwater Monitoring Reports, EPA Facility ID Number MID 000 724 724 (2003 through 2012)
- Quarterly Environmental Monitoring Reports Part 111 Groundwater Monitoring Report; EPA Facility lD Number MID 000 724 724 Third Quarter, 2003 through Fourth Quarter, 2012)
- Hydrogeologic Report, Section III, TDCC RCRA License Application (September 2002)
- Midland Plant Ground Water Study, EDI Engineering and Science (March 1989)

4. Does “contaminated” groundwater **discharge** into **surface water** bodies?

☐ If yes - continue after identifying potentially affected surface water bodies.

☒ If no - skip to #7 (and enter a “YE” status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater “contamination” does not enter surface water bodies.

☐ If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

As described above, natural shallow groundwater movement on the plant is primarily in the direction of the Tittabawassee River. Engineered systems prevent contaminated groundwater from discharging to the Tittabawassee River. The systems generally consist of permeable backfill, a sloped and perforated collection tile, purge wells and sheet-piling acting as a hydraulic barrier. The engineered systems listed above are operated on a continuous basis and are monitored to confirm effective performance, using piezometers, automated level instruments and computer controls for continuous monitoring to insure hydraulic capture of groundwater. The RGIS tile system is designed to reverse the natural groundwater gradient toward the river by Collecting groundwater in the tile or purge wells along the Tittabawassee River. The system also incorporates instrumentation for continuous computer monitoring of the hydraulic gradients to insure that the groundwater that could vent to the river is captured at all times. Between the river and RGIS on the east riverbank 'the manufacturing side of the river), sheet-piling is driven into the underlying clay and acts as a hydraulic barrier.

A comprehensive set of hydraulic and chemical monitoring programs make up the Surface Water Protection Monitoring Program. This program has been established to address the potential for current surface water impact related to groundwater along the Tittabawassee River. This program focuses on those areas where groundwater has the greatest potential for release to the surface water. The details of the Surface Water Protection Monitoring program are included in Attachment XIV.B5, Environmental Monitoring Programs, and requirements are included in Part X of the current Operating License.

Reference(s);
- Attachment XIV.B2, Corrective Actions (April 12, 2013)
- Attachment XIV.B5, Environmental Monitoring Programs (April 12, 2013)
- Attachment XIV.B3, Updates to the Hydrogeologic Report (April 12, 2013)
- The Operating License for the Dow Chemical Company, Michigan Operations, Midland, Michigan, MID 000 724 724, issued June 12, 2003.
- Annual Part 111 Groundwater Monitoring Reports, EPA Facility ID Number MID 000 724 724 (2003 through 2012)
- Quarterly Environmental Monitoring Reports Part 111 Groundwater Monitoring Report; EPA Facility ID Number MID 000 724 724 Third Quarter, 2003 through Fourth Quarter, 2012)
- Hydrogeologic Report, Section III, TDCC RCRA License Application (September 2002)
- Midland Plant Ground Water Study, EDI Engineering and Science (March 1989)

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions [e.g., the nature, and number, of discharging contaminants, or environmental setting], that significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

   ☐ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: (1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and (2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

   ☐ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: (1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and (2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

   ☐ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

This section does not apply.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented)?

   ☐ If yes - continue after either: (1) identifying the final remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR (2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors that should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

   ☐ If no - (the discharge of "contaminated" groundwater cannot be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

   ☐ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):

This section does not apply.

7. Will groundwater **monitoring**/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

   ☒ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

   ☐ If no - enter "NO" status code in #8.

☐ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

A comprehensive set of hydraulic and chemical monitoring programs make up the Facility Groundwater Monitoring Programs. The purpose of the established groundwater monitoring programs is to verify that groundwater contamination does not expand beyond the current extent. The details of the monitoring programs are included in Attachment XIV.B5 Environmental Monitoring Programs. The frequencies at which the monitoring data are to be provided to the MDEQ are included in Part X of the Operating License. In addition, corrective measures and timely notification requirements are specified in Part X of the Operating License if the potential for upset is identified from monitoring data.

HORIZONTAL MIGRATION: Groundwater monitoring programs which generally protect against horizontal migration are:

- Surface Water Protection Monitoring;
- Sludge Dewatering Facility Detection Monitoring;
- Northeast Perimeter Groundwater;
- South Saginaw Road monitoring program;
- West side shallow groundwater monitoring;
- Tertiary Pond recovery monitoring;
- Tertiary Pond slurry wall monitoring;
- Poseyville Landfill corrective action hydraulic monitoring; and
- Poseyville landfill corrective action chemical monitoring.

VERTICAL MIGRATION: Groundwater monitoring programs which generally protect against horizontal migration are:

- Glacial Till and Regional Aquifer Groundwater Detection Monitoring Program;
- Poseyville Landfill Leak Detection Monitoring;

Reference(s):

- Attachment XIV.B5, Environmental Monitoring Programs (April 12, 2013)
- The Operating License for the Dow Chemical Company, Michigan Operations, Midland, Michigan, MID 000 724 724, issued June 12, 2003.

8. Check the appropriate RCRAInfo status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), obtain supervisor signature and date on the EI determination below, and (attach appropriate supporting documentation as well as a map of the facility.

   ☒ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Dow Chemical Midland Plant facility, EPA ID # **MID 000 724 724**, located at Midland, Michigan. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater." This determination will be reevaluated when the agency/state becomes

aware of significant changes at the facility.

☐ NO - Unacceptable migration of contaminated groundwater is observed or expected.

☐ IN - More information is needed to make a determination.

Completed by: _____ Date (type date)
(type name)
(type title)
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
517- -

Supervisor: _____ Date (type date)
(type name)
(type title)
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality

Locations where references may be found:
Hazardous Waste Section facility files at:
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
525 West Allegan Street
Lansing, Michigan 48933

Contact e-mail addresses:

(type name) - (type e-mail)
(type name) - (type e-mail)

Facility Name: **The Dow Chemical Company, Midland, Michigan Operations**
EPA ID#: **MID 000 724 724**
City/State: **Midland, Michigan**

MIGRATION OF CONTAMINATED GROUNDWATER UNDER CONTROL (CA 750)