

**DTE Energy®**



*Prepared for*

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**2017 ANNUAL INSPECTION REPORT  
RANGE ROAD LANDFILL  
ASH DISPOSAL FACILITY**

**China Township, St. Clair County, Michigan**

*Prepared by*

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engineers | scientists | innovators

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## 1. INTRODUCTION

### 1.1 Overview

This 2017 Annual Inspection Report (AIR) was prepared by Geosyntec Consultants (Geosyntec) to provide the results of the annual inspection of the coal combustion residuals (CCR) Range Road Ash Disposal Facility (Landfill) located in China Township, St. Clair County, Michigan. The annual inspection has been prepared to comply with United States Environmental Protection Agency (USEPA) Coal Combustion Residuals Rule (CCR Rule) published on 17 April 2015 (40 CFR 257.84). Under the CCR Rule, the Landfill is an “existing landfill” per 40 CFR 257.53 and must be inspected by a qualified professional engineer on a periodic basis, not to exceed one year.

The Landfill is located approximately one mile west of the St. Clair River between Lake Huron and Lake St. Clair. The Landfill is licensed by the Michigan Department of Environmental Quality (MDEQ) as a Type III Low Hazard Industrial Landfill. The property encompasses 514 acres of which 402 are designated for landfill development. The MDEQ Facility ID Number is 392562 and License Number 9395. The current license is set to expire on June 26, 2019.

During 2017 the Landfill accepted bottom ash and fly ash from the St. Clair, Belle River, and Harbor Beach Power Plants. The Marysville Power plant is included in the license, but has been decommissioned and no longer sends ash to the landfill. The Harbor Beach Power plant is no longer operating, but is transferring ash to the Landfill in accordance with the Harbor Beach Power Plant Closure Project. Filling operations at the site began in the 1950s and the current Operating License issued to Detroit Electric Company and defined as Number 9395 replaced the previous license (#9207) which was issued to Detroit Edison Company on April 6, 2009. The Landfill has had an operating license since 1966.

The Landfill has multiple operating and planned phases defined by work areas as discussed in the Landfill Development Plan design drawings and draft drawings and memorandum on RRLF Waste Filling Sequence. Currently nine work areas are certified closed, four now active (Area F3, Area G2 Phase I, Area D3, Area F3/D3), and four unconstructed (Area G2 Phase II, Area G2 Phase III, Area G1, and Area E). For permit purposes Area G2 was not subdivided and Area F3/D3 may have been a western portion of Area G1. Area E was not included in a current waste filling sequence overall site plan (Draft September 26, 2017), and may not be needed depending on actual future volumes of CCR disposed of during the life of the plants.

### 1.2 Purpose

The purpose of the inspection under the CCR Rule [40 CFR 257.84(b)(1)] is:

“...to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards. The inspection must, at a minimum, include:

- (i) A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., the results of inspection by a qualified person, and results of previous annual inspections); and
- (ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit.”

The purpose is accomplished through periodic visual inspection (and photo-documentation) of the Landfill, review of construction certification documentation, review of available operating records, and review of instrumentation monitoring data and evaluations intended to detect signs of instability.

### 1.3 **Report Organization**

The remainder of this report is organized as follows:

- Section 2 – Review of available information: summarizes various historical documents that were reviewed as part of this inspection
- Section 3 - Facility Description: provides information about the facility
- Section 4 – Visual Inspection Results: summarizes visual observations during inspections of the Landfill
- Section 5 – Instrumentation Monitoring: discusses the instrumentation and monitoring program
- Section 6 – Operation Activities: describes the operations organization and activities
- Section 7 – Evaluation: evaluates the results of the annual inspection
- Section 8 – Conclusions: provides the overall conclusions of the annual inspection

### 1.4 **Terms of Reference**

The annual visual inspection was performed by Mr. Daniel G. Bodine, P.E. of Geosyntec whose qualifications as a “qualified professional engineer” under the CCR Rule are presented in Appendix A. DTE’s “qualified person” accompanied Mr. Bodine.

This report was prepared by Mr. Daniel G. Bodine, P.E. of Geosyntec. The senior review was completed by Mr. John Seymour, P.E., of Geosyntec. He is a qualified professional engineer per the requirements of §257.53 of the CCR Rule.

## 2. REVIEW OF AVAILABLE INFORMATION

Geosyntec reviewed the documents listed in Table 1 for the 2017 annual inspection. Geosyntec is not responsible for the accuracy of the documents reviewed that have been prepared by others and has prepared this inspection report based on good engineering judgement and data review. References to TRC refer to TRC Environmental Corporation, NTH to NTH Consultants, Ltd., AECOM to AECOM and Headwaters to Headwaters Plant Services, a division of Headwaters Inc.

**Table 1 Available Information Reviewed for the 2017 Annual Inspection**

<b>Title</b>	<b>Prepared by</b>	<b>Month and Year</b>	<b>Content with 2017 Update Status</b>
2016 Annual Inspection Report - Range Road Landfill Ash Disposal Facility	Geosyntec Consultants	January 2017	Results of 2016 RRLF Inspection Report on Review of Documents and Files Related to the Operating Record and Conducting a Visual Site Inspection of the Facility.
Landfill Development Plan with Plan Sheets	TRC	Final November 2013	Overall Development Plan for Landfill Including Design, Construction, Surface Water Management, Operation, Monitoring and Site Closure. The 2013 Plan Remains Unchanged for the 2017 Inspection.
Range Road Ash Disposal Operating Number and License  Facility No. 392562 License No. 9395	MDEQ	June 2014	Solid Waste Disposal Area Operating License, Including Terms and Conditions. License Remains Active for the 2017 and Beyond.
Construction Certification /Soil Verification (Area G2) Range Road Landfill	MDEQ	September 2015	MDEQ Authorization for Waste Placement in Area G2. Waste Placement in Area G2 was Active During 2017 Inspection.
2014 Site Plan TRC Figure 1	TRC	March 2014	Landfill Area Plan Locations and Designations, Status and Phasing Legend. Figure Marked up for Discussion and Use in 2017 Report by DTE and Geosyntec.

<b>Title</b>	<b>Prepared by</b>	<b>Month and Year</b>	<b>Content with 2017 Update Status</b>
Soil Erosion and Sedimentation Control Permit No. SE2017-41	St. Clair County Health Department	April 2017	Permit Issued 4/10/2017 and Expires 4/10/2019. Activity Associated with Final Cover Construction and Installation of Landfill Cap of Approximately 18 Acres and Borrow Pit of 14 Acres.
NPDES Permit No. MIR11436	State of Michigan DEQ	June 2017	Permit Authorizing Discharge of Storm Water from Construction Activities at DECO-Belle River Pit (Site Name).
Surface Water Flow Figure 00 (Working Copy)	TRC	December 2015	Plan Showing Ditch Flow Directions, Locations of Staff Gauges, Monitoring Wells Piezometers, Slurry Wall and Offsite Capture Systems. Copy used as Reference Drawing.
Closure Plan for Existing CCR Unit 40CFR 257.102 (b)	AECOM	October 2016	Closure Plan Description, Inventory and Area Estimates, Schedule and PE Certification. Plan Remains Unchanged.
Post Closure Plan for Existing CCR Unit 40CFR 257.104	AECOM	October 2016	Post Closure Plan Description, Monitoring & Maintenance, Owner Operator Requirements and PE Certification. Plan Remains Unchanged.
Run-On/Run-Off Control System Plan for CCR Disposal Facility-Range Road	AECOM	October 2016	Plan to Address §257.81(c) of the USEPA CCR Final Rule. Appendices Included Historical Design Drawings and HydroCAD Analysis Output. Plan Remains Unchanged.
Groundwater Contour Maps November 2016, March 2017 and April 2017	TRC	January, April and July 2017	Groundwater Flow Directions and Elevations Outside & Inside of Slurry Wall. Perimeter Ditch Water Elevations at Staff Gauge Locations.



<b>Title</b>	<b>Prepared by</b>	<b>Month and Year</b>	<b>Content with 2017 Update Status</b>
Memorandum Regard to DTE Range Road Waste Filling Sequence with Draft RRLF Estimated Life Expectancy and Capacity Analysis	NTH	September 2017	Ash Volume Projections for Years 2017 through 2030 and Comparison to Available Volume Remaining in Landfill. Plans for Developing Remaining Disposal Areas (Area F3 and Area G2).
DTE Energy Company – Range Road Landfill Waste Filling Sequence - Drawings	NTH	September 2017	Sequence of Waste Filling Grades for Phases 1, 2 and 3 of Waste Area G2 and Area F3-D3.
DTE Energy Company - Range Road Area F3 Final Closure - Drawings	NTH	March 2017	Bid Issue Cover Drawing Listing Sheet Index of 8 Drawings
Range Road Landfill Coal Combustion Residuals Fugitive Dust Plan	DTE	September 2015	Plan Certified by Professional Engineer to 40 CFR 257.80(b)(7) Revision 0. Plan Remains Unchanged.
DTE Electric Company – Range Road Landfill Coal Combustion Residuals Annual Fugitive Dust Report	DTE	December 2016	Annual Fugitive Dust Control Report Pursuant to 40CFR 257.80(c). Descriptions and Actions Taken to Control CCR Fugitive Dust.
CCR Groundwater Monitoring Well Locations (Working Copy)	TRC	April 2016	Plan Showing Name & Locations of Seven (7) Monitoring Wells Around Landfill
First & Second Quarter 2017 Elevation Monitoring Tables 1 & 2	TRC	April 2017 and July 2017	Summary Tables of Groundwater Well/Piezometer and Perimeter Ditch Staff Gauge Elevation Monitoring.
2017 Quarterly Comprehensive Inspection Log (s)	DTE	March, June & Aug 2017	Inspection Condition and Notes: Final Cover for Areas, Surface Water Ditches & Signage.

<b>Title</b>	<b>Prepared by</b>	<b>Month and Year</b>	<b>Content with 2017 Update Status</b>
2016 Weekly General Inspection Log (s)	DTE	Weekly Logs Jan. thru Sept. 2016	Inspection for General Site, Waste & Nuisance Control, Final Cover, Leachate & Surface Water Control. Viewed Weekly File Onsite. Logs reviewed onsite.
Environmental Outside Rounds Log Sheet (A Daily Inspection Log)	DTE	September 2017	An Example of Daily Plant Environmental Inspection Log Sheet. Record Unusual Conditions, Gate Conditions, Flow Meter Readings, and Other Unusual Observations Report for 9/26/17 was reviewed.
Mobil & Fixed System Equipment Training Record	Headwaters, Inc.	August 2017	Classroom, Field Discussion, Observation, Operation and Unassisted Operation Training Record for New Employee.
Four Geosyntec Selected Headwaters Resources Standardized Work Sheet JHAs Representing Added New Site Employee and Four Work Processes	Headwaters, Inc.	2/17/17, 2/22/17, 5/25/17, 6/08/17	Training Records for Added Employee for the Four Different Work Item. JHA Procedures. Additional JHAs were Provided for Onsite Inspection.
Appendix D to §1910.134 (Mandatory) Information for Employees Using Respirators When No Required Under the Standard	Headwaters, Inc.	9/09/17	Discussion of Respirator Use, Selection, Cleaning, Related Hazards and Respirator Labeling.
Employee Acknowledgement of Receipt of Safety Consequence Policy	Headwaters, Inc.	9/09/17	Employee Acknowledgement of Reading, Understanding of Policy and Safety Guidelines. Copy Applicable to New Employee Obtained.
Groundwater Monitoring System - Summary Report	TRC	October 2017	Summary Report Figure 2 Used for Identifying Monitoring Well Locations

### 3. FACILITY DESCRIPTION

#### 3.1 Overall Site Description

The overall site facility property is composed of the 514 acres of which 402 are designated for landfill development. The Landfill work areas are currently divided into fourteen (14) work areas, eight (8) that have been identified as “Certified Closed”, three (3) identified as “Active” and three (3) identified as “Unconstructed”. The work areas are listed below in **Table 2** and shown in **Figure 1**. **Figure 1** is taken from a Phasing Plan dated November 2013, but modified to include Active Area D3 shown on a Phasing Plan dated March 2014 and discussed in the current operating license. The March 2014 plan did not show the breakdown areas of Area G that have been referenced in the September 2015 area certification for waste placement. Area G2 has now been divided into Phase I, II and III waste filling areas as shown in the September 26, 2017 Range Road Landfill Waste Filling Sequence Drawings.

**Table 2 Site Phasing Summary-October 2017**

<u>Area</u>	<u>Status</u>	<u>Size, Acres</u>	<u>Comments</u>
A	Closed	7	Certified Closed, May 17, 2002
B	Closed	102	Certified Closed prior to Sept 2, 1999
B1	Closed	9	Certified Closed prior to Sept 2, 1999
C	Closed *	16	Cert. Report Approved Aug 25, 2009
D1	Closed*	21	Cert. Report Approved Aug 25, 2009
D2	Closed *	10	Cert. Report Approved Aug 25, 2009
D3	Active	3	Active with Interim Cover Placed
E	Unconstructed	117	No Cell Construction or Waste Placed
F1	Closed	17	Cert. Report Approved Jan 4, 2010
F2	Closed *	12	Cert. Report Approved Feb 28, 2013
F3	Active *	22	Active Disposal & Preparing for Cap
F3-D3	Active	1	Acreage From Drawing Set, 9/26/17

G1	Unconstructed (see below)		No Cell Construction or Waste Placed
G2	Active	<u>48.4</u> (Total Permitted)	Active Disposal G2 (Phase I)
	G2 Phase I	15.5	Acreage From Drawing Set, 9/26/17
	G2 Phase II	10.1	Acreage From Drawing Set, 9/26/17
	G2 Phase III	9.0	Acreage From Drawing Set, 9/26/17
G3	Unconstructed (see below)		No Cell Construction or Waste Placement

\* Areas C, D1, D2 and F2 have been certified closed, but documents note that the southern edge or slopes that join active or unconstructed areas, such as E, F3, G1, G2 and/or G3 may have interim cover as designed and approved.

**Table 2** does not list acreages for Areas G1 or G3 because the areas have not yet been developed. However, the total acreage for the combined G areas is 110 acres, as reported in the operating license. Using the 110 acres for G areas and adding the acreage for the other areas in Table 2 gives a Total Area of 447 acres that is 1 acre over the totals given in the operating license for the active, certified and unconstructed areas. This is because of the F3-F2 one (1) acre area was previously discussed or identified as a possible G1 area and active F2 area (see **Figure 1** taken from 2016 inspection report). Therefore, the Unconstructed G areas would actually be less than 110 acres because of G1 name change. This is less than the 514-property acreage, but greater than the 402 acres stated in the November 2013 Landfill Development Plan. Geosyntec realizes that acreages for future unconstructed areas may only be estimates until actual design is complete and waste placement approved. Additional documents reviewed, and observations made during the 2017 site inspection, resulted in updating the status of placement of ash close to final grade in Area F3 and placement of ash at the north end of Area G2, now identified as G2 (Phase I).

The Landfill Site includes perimeter ditches, roadways, a shallow perimeter slurry wall, earth berms, a 10 Acre NPDES Stormwater Detention Basin (SDB) and Basin Pump House. The detention basin has also been referred to as the sedimentation basin in some of the reviewed documents and figures. The SDB is located in the southeast corner of the property, the slurry wall, reported to be approximately 10 to 15 ft deep, surrounds the entire landfill along the property perimeter. The perimeter ditch surrounds nearly all of the closed and active portions of the landfill connecting and draining to the SDB. **Figure 2**, taken from TRC's December 2015 Surface Water Flow drawing, shows the location of these items, including flow and capture details of the two Offsite Groundwater Capture Systems. The pump control areas for these systems and the SDB pumping system were observed during the 2017 annual inspection.

The Landfill is a dry-handled (conditioned) CCR landfill licensed by MDEQ as a Type III low hazard industrial landfill with maximum 4 horizontal to 1 vertical final cover side slopes and 3 horizontal to 1 vertical or flatter interim cover slopes. The current revised estimated annual total

ash disposal rate is 225,500 in-place cubic yards/year (average) based on historical ash production rates and calculations of volumes by NTH using aerial flyovers performed in 2013 and 2017. Based on ash volume expected to come from Harbor Beach in 2018, St. Clair volumes assuming the plant to close in 2023 and Belle River plant to close in 2030, the total remaining ash volume has been estimated to be approximately 218,540 cubic yards over the calculated storage volume. This has been reported in waste filling sequence memorandum by NTH, dated September 26, 2017, but is qualified and subject to details of future closure designs and area certifications that will result in refinement of the volume calculations. Since the current waste volume estimates are less than previously estimated, the total landfill waste volume should be less than the approximate 20 million cubic yards reported in the 2016 Annual Inspection Report.

The Landfill subbase is reported to be, on the average, a 70-foot thick in-situ naturally occurring clay soil layer over most of the landfill. An exception to this is on the east side of the site where an approximately 10-foot thick near-surface sand layer exists. To cutoff this sand layer and any near surface flow the entire site has been encircled along the property perimeter with a soil-bentonite slurry wall with a reported depth of 10 to 15 ft designed to key into the underlying clay Landfill subbase.

### 3.2 **Design**

The Landfill design and operation is summarized in the Landfill Development Plan, Remedial Action Plan, Run-on/Run-off Control System Plan and the Quarterly Monitoring Reports. The key components of the Landfill include:

- Perimeter Slurry Wall keyed into top of 70-foot thick subbase clay layer;
- Perimeter Drainage Ditch capturing surface water and near surface groundwater;
- 10-Acre Stormwater Detention Basin collecting ditch water and pumping to plant;
- Two Offsite Groundwater Capture Systems collecting impacted water;
- Final Cover installation from top to bottom that includes:
  - 6-inch thick vegetated topsoil layer (erosion layer);
  - 24-inch thick infiltration layer (select clay layer with hydraulic conductivity,  $k \leq 1 \times 10^{-7}$  cm/sec);
  - Maximum 4H to 1V side slopes;
  - Minimum 1% grade top of closed areas and minimum 2% grade for future, and

- Phasing plans and special conditions detailed in drawings, plans and the operating license.
- Closure and Post Closure Plans

Landfill design and construction are supported by construction phasing plans, surface water management plans and details, site operation (waste placement) plans and details, and leachate and environmental monitoring plans and reporting. Additionally, landfill monitoring systems maintenance and inspection, and site closure and post closure plans with long term care procedures are covered.

### 3.3 **Construction**

The Landfill has been operating since the 1950s. The Landfill Operating License discusses the work areas (see Section 3.1), references design, construction and monitoring documents submitted by DTE and includes conditions and criteria required for the Landfill operation, phase construction and monitoring. New Closure and Post Closure Plans in accordance with 40 CFR 257.102 (b) and 40 CFR 257.104, respectively, have been prepared with an operating record date of October 17, 2016. Permits, from St. Clair County Health Department for Soil Erosion and Sedimentation Control and from MDEQ for a NPDES permit for discharge of stormwater, have been issued.

The Landfill Development Plan discusses Site Operations in Section 4 of the plan. Included are discussions on dust control, noise control, odor control, and access and security requirements, among other operating aspects. Ash filling procedures and requirements for construction observation and documentation are also included in the development plan.

#### 4. VISUAL INSPECTION RESULTS

The annual inspection onsite was completed on 02 October 2017. The annual inspection log and photographs are presented in **Appendix B**.

In summary, no evidence of landfill instability, significant perimeter slope erosion or detrimental settlement was noted. The perimeter ditch, perimeter slurry wall, and pumping of water in the SDB appeared to be working as designed and in accordance with recognized and generally accepted good engineering standards. The northwest groundwater capture system pumping and collection, although working intermittently, is undergoing pump replacement and other maintenance activities. The two pumps in the sump were in the process of being replaced at the time of the inspection. A temporary contractor pump with hoses, operating manually as needed, has been used to transfer the captured water to the perimeter ditch for gravity flow to the SDB. At the time of the inspection the temporary pumping system was not operating, and very little water was visible or available for transfer.

Specific results of the visual inspection are summarized below. All photographs referenced are provided in Appendix B. The weather on the day of the inspection was clear skies with temperatures ranging from 44° F at 0800 hrs to low 70's in midafternoon. At 0923 the local weather reported a temperature of 50° F, humidity of 93% and a barometric pressure of 30.32 in Hg. The dew point was 48° F. Rain had occurred the day and night before the inspection.

Stormwater Detention Basin: The basin and pump system appeared in good condition. Basin slopes and entrance flume also appeared in good condition with vegetation recently cut as shown in Photographs 1 and 2. Pumps were tested for operation and all operated. Control panel and pumps are shown in Photographs 3 and 4. The discharge flow meter, shown in Photograph 5, appeared to be working correctly. The basin intake screen was unblocked as shown in Photograph 6.

Landfill Final Cover: Closed work area phases were inspected including slopes. Conditions appeared generally good considering agreements approved with the MDEQ allowing trees remaining along and on the downstream slope at the north end of the Landfill, predominately in historical Areas A and B. Recent operating maintenance activities for areas, such as Area F1, has had the removal of woody vegetation from the perimeter landfill slopes that are part of the final cover. This was recommended during the 2016 inspection and was completed on 9 November 2016, as reported by DTE. Isolated small woody vegetation remains on berm slopes west side of unconstructed areas of Area G2 and along the east side of the northern most historically closed areas. DTE has indicated that woody vegetation will be removed in the G2 area when the slope is prepared for development into an active placement and containment area. No new locations of woody vegetation were observed on top of the closed landfill areas. There also were no observed areas of pooled water on the top cover from the recent rain. In conclusion, the top and slopes of

the closed landfill final cover areas appeared well vegetated and acceptable. Photographs 17 and 18 show portions of the unconstructed Area G2 west slope. Photographs 37, 39, 41, 61, 70-72, and 74-82 show views of the landfill top and slopes of closed areas or areas recently capped. The site typically does not have problems getting cover vegetation to grow, but does have a battle getting the phragmite vegetation under control within the landfill ditches. The one cover related significant erosion noted and shown in Photographs 67 and 69 is the gully erosion in the slope runoff downchute. Repair should be scheduled in near future maintenance activates. However, this does not pose any current structural stability problem.

Active Area G2 Phase I and Continued Clay Borrow Development: Area G2 Waste Filling Sequence has been divided into Phase I (currently active waste placement), Phase II and Phase III future development areas based on draft Drawings dated September 26, 2017. The G2 Phase I area ties in with Area F2. As such the temporary clay covered slope over F2 CCR waste was removed for reuse together with a small portion of the F2 solidified waste. That F2 cut-slope and solidified waste is shown in Photographs 15 and 16. The cut slope appeared stable, although steeper than 2H to 1V, but still included small surface water erosion gullies, as shown in the photographs. That slope will be bench cut and tied into the G2 CCR as the material is raised in elevation based on discussions with DTE.

New or fresh conditioned CCR waste in Area G2 Phase I is shown in Photographs 13 and 14. Placement and compaction procedures of conditioned CCR waste closely follows the Ash Filling Procedures discussed in the Landfill Development Plan. CCR waste is now being placed and compacted in horizontal lifts. The waste slope along the east side of Area F3 was reported by DTE as constructed in horizontal layers. The slope is now being capped with clay as shown in Photographs 10 and 11 and discussed below.

Area F3 is in the process of closure capping. Clay obtained during subgrade excavation for a portion of Area G2 Phase II is being used for Area F3 Capping. Photographs 31, 32 and 33 show the borrow area, adjacent internal ditch, and newly installed culvert to discharge surface water from the borrow area during rain storms.

Perimeter Ditch System: The perimeter ditch and ditch flow directions to the SDB or northwest pump location are shown on **Figure 2**. Vegetation in the bottom of most ditch areas appeared excessive, but is of the non-woody type vegetation. If ditch flow is maintained and monitored to confirm adequate flow the vegetation can remain until maintenance activity can be performed. The plant has put together a 3-year rotation ditch maintenance program where 1/3 of the ditch alignment length is cleared of excessive vegetation. The plan for 2017, 2018 and 2019 is one of the new documents provided in 2016. In 2017 some of the scheduled maintenance was performed in the perimeter ditch alignment on the north side of the Landfill and along the SDB perimeter slopes. The SDB slopes were cleared of excessive vegetation and portions of the north ditch



alignment were in progress during the 2017 site inspection. In 2018 the scheduled maintenance is the eastern ditch alignment and in 2019 the southwest corner ditch alignment of the Landfill. Modifications are possible subject to the needs of the site.

A ditch staff gauge system is used to monitor water level in the perimeter ditch. Review of the monitoring summary tables prepared by TRC together with the current maintenance activities for the NW Groundwater Capture System indicates ditch flow is occurring in the appropriate flow direction. This was verified during field visual examinations during the annual inspection and review of the ditch water elevations measured and reported by TRC. See Photographs 46, 48, 50, 52, 54, 56 to 58, 66 and 68 that show typical ditch conditions at various staff gauge locations. Two videos were also taken that show actual ditch water flow within generally heavy phragmite vegetation. Additional perimeter and internal ditch vegetation, flume locations and culvert discharge conditions are shown in Photographs 7, 8, 19, 20 to 23, 25 to 27, 29 to 33, 35, 36, 42, 47 and 53. Note that many of these photographs are also referenced in report Section 7.3 on Maintenance. Photographs 28 and 43 also show white slurry wall markers. Many of the slurry wall markers have been removed for road construction or general maintenance activities. The slurry wall is located outside of the ditch perimeter and along the property boundary.

Operation Activates Including Waste Placement: The landfill operating contractor is Headwaters Inc. Loaded trucks hauling conditioned CCR material were observed hauling to active waste placement Area G2. CCR dumping, placement and grading was discussed in report Section 4 above. Observations during the inspection indicated procedures were satisfactory.

DTE provides operation monitoring through daily log monitoring of pumping from the SDB (NPDES pond flow monitoring) and weekly and quarterly check list monitoring. SDB Pump operation and flow is inspected by DTE daily and weekly.

Record Keeping: At the start of the 2017 annual inspection, records of current DTE monitoring inspections and new or updated reports were obtained from the landfill engineer. Additional records exist, electronically or in project files not checked or specifically requested. The current operating license dated June 26, 2014 lists many documents that have been submitted to the MDEQ by DTE as part of the landfill design, plan preparation, construction certification and documentation, surface and groundwater monitoring, and landfill operation. The records for the Landfill appear comprehensive.

## 5. INSTRUMENTATION MONITORING

### 5.1 Surface Water and Groundwater Collection

Surface water and groundwater monitoring are conducted under a monitoring plan approved by the MDEQ. The surface water that falls within the landfill waste areas and within the perimeter ditch system is collected by the ditch system and flows, for the most part by gravity, to the SDB, as shown in **Figure 2**. Exception to this is the perimeter ditch located at the northwest corner of the property where the ditch water is collected and pumped to a portion of the ditch on the north side which gravity drains to the SDB. The perimeter slurry wall installed along the property line and outside of the ditch and basin system supplements and supports surface water collection as well as contains and directs any near-surface groundwater to the perimeter ditch.

Monitoring of the ditch water collection is accomplished through ditch visual inspection and maintenance, review of water elevations from a series of twelve (12) ditch staff gauges (SG) with their locations shown on **Figure 2**, and implementation of monitoring plans which have been approved by the MDEQ. Reporting of the monitoring is summarized in quarterly tables prepared by TRC. Review of the ditch water levels for the staff gauges show that the water gradient flows to the SDB, with its water elevation monitored with SG-13. A discussion of details of the 2017 review is provided in report Section 7.3 on ditch maintenance.

The perimeter ditch also collects near-surface groundwater that is imported along the east side of the property where near-surface sand is located above the subsurface thick layer of clay. The slurry wall, with top elevation higher than the groundwater elevation, in that area acts as a barrier and supports collection by the perimeter ditch.

### 5.2 Groundwater Elevations and Offsite Capture System Monitoring

Monitoring well and piezometer locations are shown on **Figure 2** and monitoring water depths and elevations summarized in tables prepared by TRC. Groundwater elevations and flow directions indicates that the site-wide slurry wall and perimeter ditch network continue to perform as designed to prevent shallow groundwater beneath the RRLF site from migrating off-site. DTEs visual weekly inspections and quarterly monitoring logs were available and reviewed.

### 5.3 RRLF CCR Monitoring Wells

During the 2017 annual inspection locations of seven (7) groundwater monitoring wells were observed. Two of the 7 wells with their protective bollards are shown in Photographs 49 and 55. All 7 of the well locations were shown in the 2016 AIR. They were all stick-up wells except for MW 16-05, a flush mount well, which was located within an alternate construction entrance for the landfill located on the south side of the property near Puttygut Road.

## 6. OPERATION ACTIVITIES

Operations are defined in Section 4 of the Landfill Development Plan. The following operation control measures are described in the plan:

1. Hours of Operation
2. Waste Types
3. Traffic Routing
4. Lines and Grades
5. Nuisance Control (includes Fugitive Dust Control)
6. Police and Fire Protection
7. Access Control
8. Inclement Weather Operations
9. Drainage and Erosion Control
10. Record Keeping
11. Personnel and Equipment
12. Ash Filling Procedures
13. Leachate Management
14. Environmental Monitoring

Engineering design and construction related to the Landfill design, waste type and volumes, subbase grades, site phasing, final cover, surface water management, construction observation and documentation, and final closure and long-term care are included in the Landfill Development Plan. The Plan was written by DTE/TRC in November 2013, and contained the Landfill Operating License valid at that time. The current Landfill Operating License issued by MDEQ is dated 26 June 2014 prior to the effective date of the CCR Rule (19 October 2015).

In addition, the following plans and inspections are specifically currently required by the CCR Rule:

- Weekly inspections by a qualified person,
- Dust control in accordance with a Fugitive Dust Control Plan,
- Preparation and Implementation of a Run-on/Run-off Control System Plan,
- Preparation of the Closure Plan for the Existing CCR Unit, and
- Preparation of the Post-Closure Plan for the Existing CCR Unit.

These plans were available for inspection during this or previous visits and are included in the project document file. The new Annual Fugitive Dust Control Report and 2017 weekly and quarterly inspection reports were reviewed.

#### 6.1 Observations

It was identified that the overall intent of the Operations Plan was being followed. Documentation that the Operations Plan was being followed in a method "...to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards" in accordance with the CCR Rule was for the most part verified.

Operating control measure Items 1 through 9, 10,11&12 (DTE records and contractor work sheet and JHA documents), 13 and 14 from above were verified during the annual inspection or with documents submitted and reviewed after the inspection. Those items appear to be compliant with the Landfill Development Plan. There is a full-time DTE guard shack or building near the entrance of the Landfill and the landfill is surrounded by security fencing and locked gates.

## 7. EVALUATION

### 7.1 Design

The Landfill design was completed by TRC and is well documented in the references listed in the 26 June 2014 Landfill Solid Waste Disposal Area Operating License, and the Landfill Development Plan, dated November 2013. The design appears consistent with recognized and generally accepted good engineering standards, based on available information.

### 7.2 Construction

Construction of final cover Phase Work Areas is being well documented in area closure documentation reports by NTH. Construction certification or documentation reports or portions of those reports were viewed during the 2015 and 2016 annual inspection for Work Areas C, D1, D2, F1 and F2 and they were signed by a professional engineer licensed in Michigan. During this 2017 inspection final cover capping, or more specifically Area F3 Final Closure, was in progress. The Closure bid cover drawing, dated March 17, 2017, indicating a sheet index of 8 drawings was viewed. DTE indicated they expected the capping to be completed by the end of 2017. Clay for the capping was observed being excavated as part of subgrade excavation within Area G2.

The west slope of Area F2 that lines-up against Area G2 Phase I has been excavated as discussed in report Section 4 subsection discussing Active Area G2 Phase I and Continued Clay Borrow Development.

### 7.3 Maintenance

Maintenance of final cover vegetation and erosion control has been identified by the DTE qualified person as an ongoing activity based on results of weekly inspections. Quarterly Comprehensive Inspection Logs lists specific comments on the status, schedule and results of maintenance activities. These activities reviewed included, pump operation and maintenance, closure cover construction, ditch repairs and vegetation clearing, and slope vegetation maintenance. Many of the activities mentioned are necessary to maintain operation and consistent flow direction of water collected by the perimeter ditch. Tables summarizing staff gauge water elevations recorded during the first and second quarter 2017 monitoring program were reviewed. Results of the first quarter summary, dated April 2017, indicated a problem with the flow at the NW corner, while the second quarter summary, dated July 2017, did not. This suggested that the problem with the NW pump lift station (pumps and controls) likely started in early summer that resulted in DTE using a contractor pump temporarily until the NW system could be evaluated and new pumps and controls ordered and installed. New pumps were scheduled to be installed by the end of October, per discussion with DTE. Photographs 62 and 64 show and comment on the status of the pump maintenance activity.

Control of vegetation growth in the site ditches has been identified by DTE as a significant maintenance activity. DTE has instituted a 3-year rotation ditch maintenance program where 1/3 of the perimeter ditch alignment is cleared of excessive vegetation. DTE's weekly and quarterly inspections report on the status of this activity. Photographs 8, 19, 20, 22, 23, 25-27, 32, 33, 35, 36, 53, and 65 show various conditions and stages of vegetation growth, and ditch clearing maintenance.

## 7.4 **Operations**

### 7.4.1 **Operations Plan**

The Landfill Development Plan serves as DTE's main operations plan for the landfill. The plan has been discussed in previous AIR's, and has again been reviewed as part of this annual inspection. The plan has not been revised. The landfill ash fill contractor, Headwaters, has made improvements in following the plan CCR placement and compaction procedures. This has been discussed in AIR Section 4 on final cover construction observations.

During the inspection Headwaters onsite personal provided their Standardized Work Sheet and JHA 2017 documents, and contractor's worker training of specific equipment for a new employee added to the site work force. Each were signed or acknowledge by the employee.

Records by DTE, such as the daily shift report for the NPDES Pond (SDB), Landfill Weekly and Quarterly Inspection Logs were provided as part of the annual inspection information. These inspection logs are consistent with recognized and generally accepted good engineering standards.

### 7.4.2 **Fugitive Dust Control**

A Fugitive Dust Control Plan was provided by DTE in 2015. Fugitive Dust Control is also discussed in the Landfill Development Plan. An Annual Fugitive Dust Report, dated December 7, 2016, was provided for review. The report summarized CCR fugitive dust control actions, listed citizen complaints, if any, and provided discussion of any corrective actions taken for the period October 2015 to December 7, 2016. There were no citizen complaints and no corrective actions reported. During the site inspection there were no observed dust clouds or active dust control activities. Rainfall had occurred the previous day and night that may have helped keep ground and road dust under control. Basin water is used for dust control and signs limiting the use of the water in areas near the construction entrances have been posted by DTE. One of the signs is shown in Photograph 43. Comments on status of signage was also noted on DTE's August Quarterly Comprehensive Inspection Log. Dust control operations at the site are considered consistent with recognized and generally accepted good engineering standards.

### **7.4.3 Run-on and Run-off Control**

Run-on and run-off control is maintained by final cover temporary or permanent berms, the perimeter ditch system, the offsite pumping systems and the stormwater detention pond pump and discharge system. The Landfill Development Plan and the Run-on and Run-off Control System Plan have not been updated since they were issued in 2013 and 2016, respectively. As reported the 2016 AIR, the Run-on and Run-off Control System Plan appears to be consistent with recognized and generally accepted good engineering standards in accordance with the requirements of 40 CFR 257.81(c).

### **7.4.4 Inspections**

Weekly and quarterly inspections have been ongoing and documented by qualified persons. Inspections reviewed have been discussed and are consistent with recognized and generally accepted good engineering standards, based on available information. A 2017 annual inspection form has been prepared by the qualified professional engineer and is provided in **Appendix B**.

### **7.4.5 Annual Visual Inspection**

This annual visual inspection did not identify any evidence of structural weakness or instability. The perimeter ditch, perimeter slurry wall, offsite capture system pumping and collection and pumping of water in the SDB appeared to be working as designed and in accordance with recognized and generally accepted good engineering standards. Some maintenance needs to be scheduled for removal of some identified small woody vegetation and erosion repair of riprap gully in the downchute located on the west side, both shown in the photographs. Ditch maintenance clearing of vegetation was in progress and more is scheduled next year.

## 8. CONCLUSIONS AND CERTIFICATION

The annual visual inspection did not identify any evidence of structural weakness or instability.

Based on the annual inspection results and review of the available data, the Landfill was designed, constructed, operated and maintained in accordance with generally accepted good engineering standards.

Certified by:

*Daniel G. Bodine* Date *03 Jun 2018*

Daniel G. Bodine, P.E. - Michigan P.E. No. 6201051139  
Senior Consultant



**Plot Data**

Design File = J:\DTE\St Clair Co\212568\0000\212568.0000.01.plt  
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 Plot File = J:\DTE\St Clair Co\212568\0000\212568.0000.01.prf  
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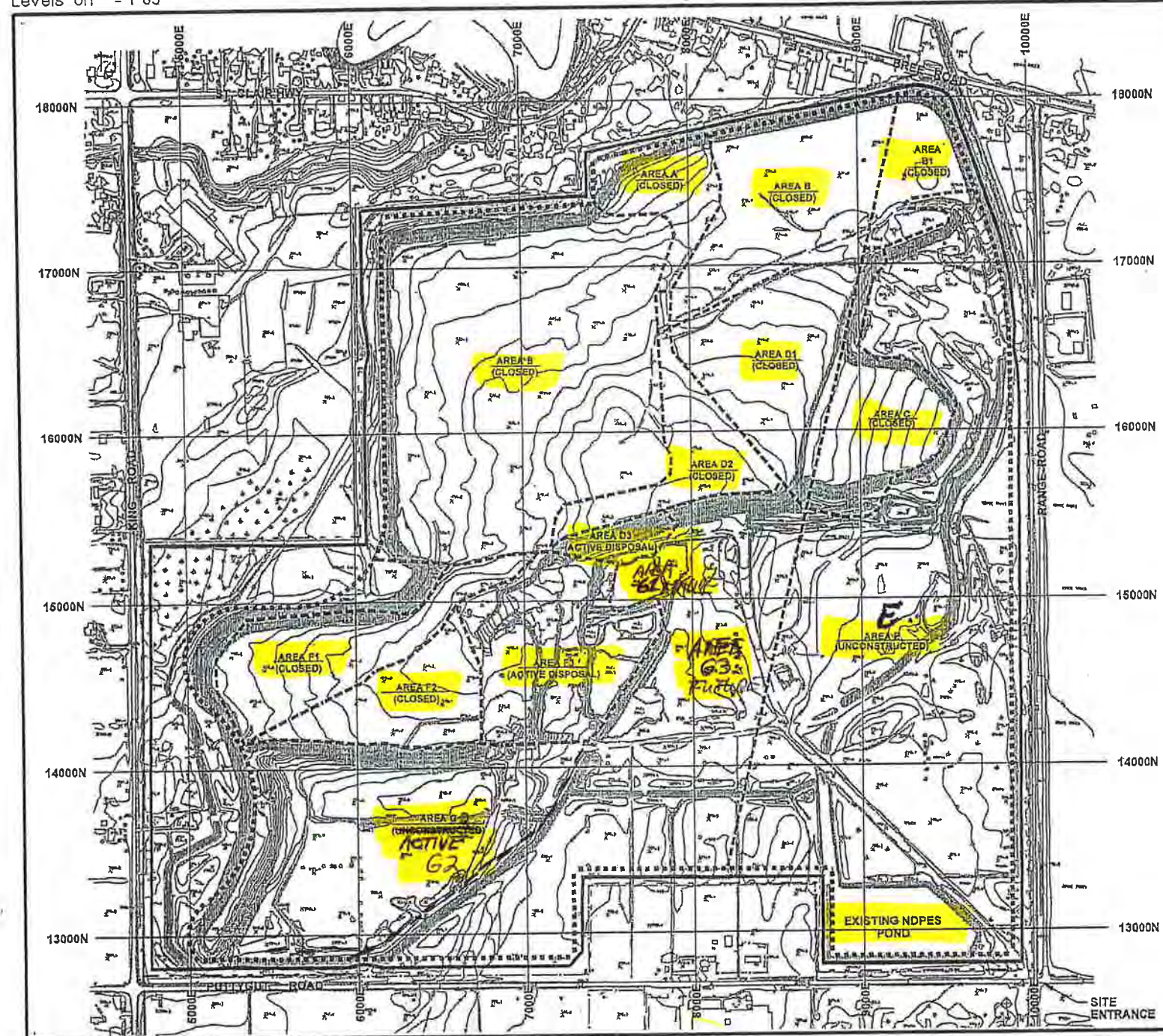
**Reference Files**

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 Ref. File 3 = J:\DTE\St Clair Co\212568\0000\REF\212568.0000.01.dgn  
 Ref. File 4 = J:\DTE\St Clair Co\212568\0000\REF\212568.0000.01.dgn

**Logical Names**

**Levels**

(1) 45-50,53-56,58,59,61,63  
 (2) 7-10,18,29,30  
 (3)  
 (4) 1-63



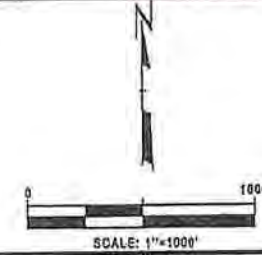
**LEGEND**

- PROPERTY BOUNDARY
- ..... DESIGN LIMITS OF ASH FILL
- DISPOSAL AREA BOUNDARY
- SLURRY CUTOFF WALL
- AREA A DISPOSAL AREA A

**NOTES**

1. BASE MAP DEVELOPED FROM AERIAL SURVEY PERFORMED BY KUCERA INTERNATIONAL, INC., WILLOUGHBY, OHIO. DATE FLOWN: 4/27/2013.
2. GRID SYSTEM IS ON-SITE GRID - BELLE RIVER PLANT/RANGE ROAD PROPERTY SYSTEM.

SITE PHASING LEGEND				
Area	Status	Size (Acres)	Material Under Waste	Comments
A	Closed	7	Clay	Certified Closed, May 17, 2002
B	Closed	102	Clay	Certified Closed prior to September 2, 1999
B1	Closed	9	Sand	Certified Closed prior to September 2, 1999
C	Closed	16	Sand	Certification Report Approved by MDEQ, August 25, 2009
D1	Closed (Interim cover on southern sidestaps)	21	Clay	Certification Report Approved by MDEQ, August 25, 2009
D2	Closed	10	Clay	Certification Report Approved by MDEQ, August 25, 2009
D3	Active Disposal	3	Clay	Can be authorized to receive fill once a remediation plan is implemented
E	Unconstructed	147	Sand	Certification Report Approved by MDEQ January 4, 2010
F1	Closed	17	Clay	Certification report approved by MDEQ February 28, 2013
F2	Closed	12	Clay	
F3	Active Disposal	22	Clay	
G	Unconstructed	110	Clay	Future

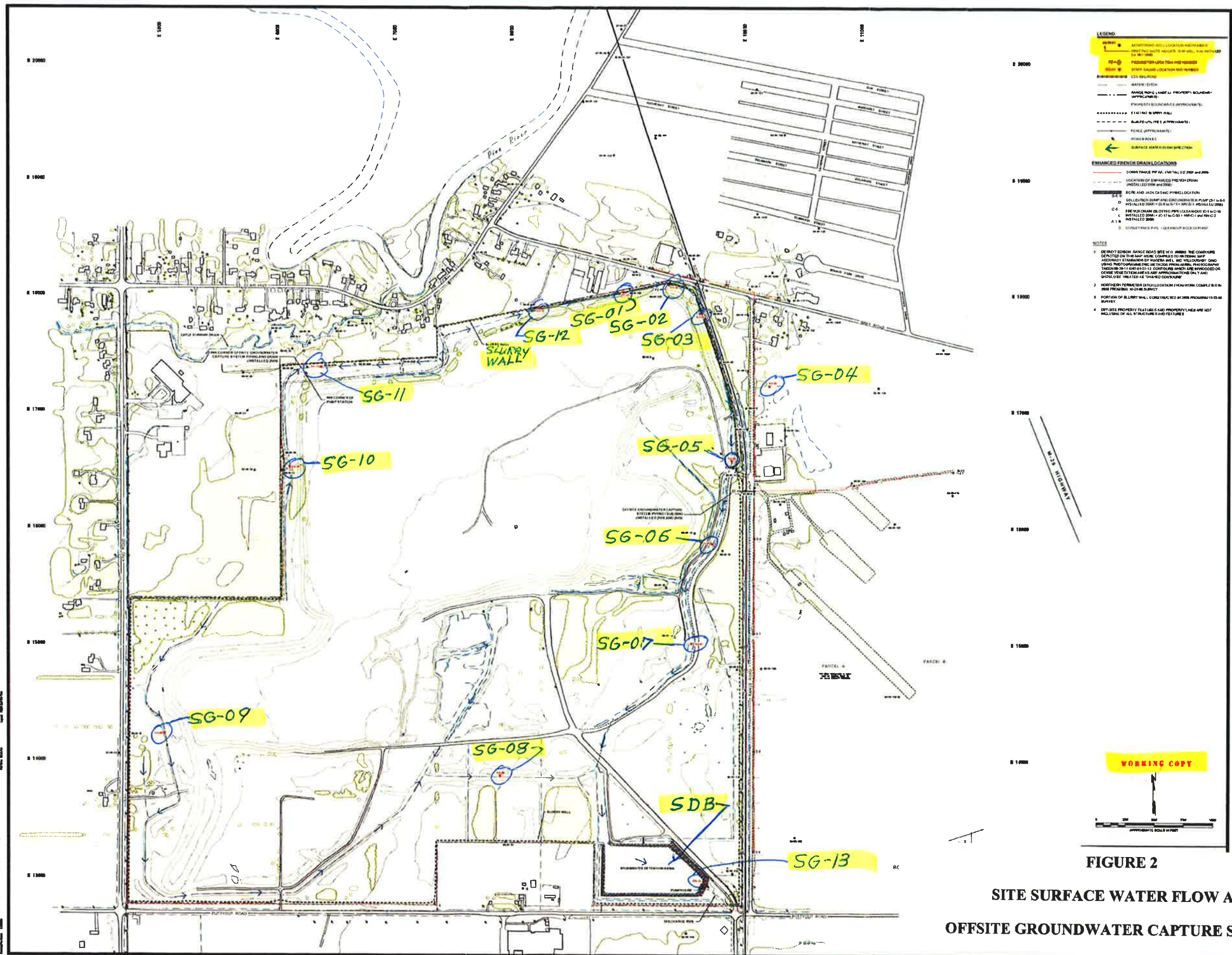


**FIGURE 1**  
**LANFILL WORK AREA PHASING PLAN**

DRAWN BY:	Istormer
APPROVED BY:	V. BUENING
PROJECT NO.	212568.0000
FILE NO.	212568.0000.01.plt
DATE:	MARCH 2014

**FIGURE 1**

ATTACHMENT A



## **APPENDIX A**

### **Resume of the Qualified Professional Engineer**

**DANIEL G. BODINE, P.E**

**geotechnical and civil engineering  
geo-environmental engineering  
project management  
litigation support  
resident engineering  
construction management**

## **EDUCATION**

M.S., Geotechnical Engineering, Rutgers University, 1973

B.S., Civil Engineering, Rutgers University, 1970

Continuing Education Seminars

## **PROFESSIONAL REGISTRATION**

Illinois, P.E. Number 0062-047218

Ohio, P.E. Number E-61363

Nebraska, P.E. Number E-9478

Michigan, P.E. Number 6201051139

Indiana, P.E. Number 920347

South Carolina, P.E. Number 15628

West Virginia, P.E. Number 14279

Colorado, P.E. Number 47434

## **CAREER SUMMARY**

Mr. Bodine has over 45 years of experience in all aspects of civil and environmental engineering. He has worked 13 years for a large AE firm in the civil, geotechnical and site development departments on fossil and nuclear power plant facilities and the remainder time with two major geotechnical and environmental consultants. He has supervised and coordinated fossil and nuclear power plant geotechnical site investigations, foundation design, construction and post construction activities. He has also performed geotechnical design and construction monitoring work for recent projects for private, industrial, oil and chemical industry, and municipal and government clients. These projects involve design and construction for deep foundations including all types of piles and caissons, several types of barrier walls, site dewatering, insitu solidification and stabilization, runoff collection and treatment basins and landfill liners and caps. He has worked on dam projects such as the Ludington Pump Storage Project, Center Hill Dam Foundation Remediation, AEP Amos Fly Ash Dam, CCR Ash Disposal Dike and Dam Inspections, and numerous other dam safety inspections for the power industry. He has worked with attorneys related to litigation/arbitration and expert witness support related to geotechnical engineering and construction claims. Specialties include barrier wall design and construction, insitu solidification/stabilization, deep foundation design and landfill design & construction including design/build and bid package preparation.

Mr. Bodine's experience on various projects has included the following:

**Barrier Wall Technical Report**, Confidential National Research Institute. Completed report summarizing approximately 10 types of barrier walls 60-ft deep based on comparisons of their design, constructability, and installation details. Provided construction and QC/QA cost.

**Casper Wyoming Barrier Wall**, Wyoming DEQ, Casper, WY. Working for the department as a slurry wall specialist providing design document review and comment and attended site review meetings. Design was complete, but the site redevelopment has expanded and barrier wall construction has been put off until 2017 or 2018 because of site wide re-development plans for a hotel convention center. Site was location of former refinery and review and comments were well received by lead oil company.

**Boeing Design/Build Slurry Wall & Landfill Cap Expansion**, Remedial Construction Services, Wichita, KS. Geosyntec lead technical engineer supervising the preparation of design and construction plans and specifications including technical reports and documents submitted to the KDEH. Served as the technical task manager for the construction QC/QA work including preparation of the construction completion report, completed in August 2010. The slurry wall and landfill cap extension, located adjacent to the Arkansas River, surrounded a closed landfill and was constructed without opening the closed landfill clay cover. Monitoring well drawdown on the down-gradient side along the river was noted by owner to drop almost immediately after completion of construction. This has been verified 1 year later, except during periods of river flooding that raise water levels outside of the wall containment.

**US Forestry Holden Mine Barrier Wall**, U.S. Forestry, Chelan, WA. Working through USF Consultant, Hart Crowser, provided specialist consulting review for design and construction of deep 70-100 ft slag & Portland cement bentonite slurry wall located along river and tailings piles at a closed copper mine in the middle of a national forest. Work included review for agency of mix design and compatibility testing, construction procedures and quality control test results. Mr. Bodine provided onsite observation and review for US Forestry and their consultant. Field work was completed in 2015.

**Wood River Refinery Sludge Basin Closure**, Shell Oil Products, USA, Wood River, IL. As PM and EOR completed an oil refinery engineering design, bid document preparation and construction engineering involving in-situ solidification and capping of over 300,000 cubic yards of oily sludge for an in place RCRA closure of a 20-acre oil refinery sludge disposal basin located in Wood River, Il for Shell Oil Company. This project is unique in that there is approximately 550,000 cubic yards of sludge in the basin and that the design, permitting and construction was successfully completed saving millions of dollars over alternative closures. Design involved detailed geotechnical settlement analyses of the soils and sludge. Closure construction was

completed and certification report issued to the client and IEPA. Mr. Bodine supervised the CQA monitoring and prepared and sealed the CQA certification report.

***Steel Facility Landfill Cap & Tar Pond Solidification***, Confidential Owner, NW IN,. Working for contractor provided CQA project management, site work and construction certification of an approximate 60-acre landfill containing two large tar ponds. Geosyntec performed onsite CQA observation, testing, documentation and preparation of the construction completion report including onsite testing of tar solidification /stabilization activities. Project substantially completed in 2014 with Construction Completion Report issued in early 2015. Report for the landfill closure was approved by agency without comment.

***BP-Amoco Refinery Sludge Basin Closure***, Amoco Corp., Whiting, IN. As EOR and lead engineer supervised design and prepared and evaluated construction bid documents for in-place closure of an oil refinery sludge disposal basin. Design included providing demolition of structural and mechanical equipment, slurry and grout cutoff wall containment, insitu solidification of the sludge, design of wells and pump control systems for surface water collection and as back-up for water level control beneath the solidified sludge. The design included a thicken RCRA type cap with HDPE and soil covers. Also managed CQA and resident engineer construction oversight for the project, including setup and operation of on-site project meetings and laboratory testing operations. The design and oversight included structural (concrete, steel and asphalt), electrical and mechanical work (wiring, piping, pumps, motors, and controls in accordance with refinery standards) as well as geotechnical and environmental work. Closure of this project under jurisdiction of U.S. EPA Region 5 and IDEM was completed in July 1992 on schedule for Amoco Oil located in Whiting, Indiana. Test program and certification reports for these agencies were prepared under the direct supervision of Mr. Bodine. The thicken RCRA cap was designed, permitted and constructed to accommodate future structures on top of the landfill closure, prior to the widely-used Brownfield concept. Twenty-two years later new structures have now been constructed and the new foundation settlement design remains consistent with the original design.

***Bofors Nobel Superfund Site***, PSDs, Muskegon, MI. Geosyntec PM and EOR responsible for design and management of barrier wall and chemical sludge lagoon cap for the Bofors-Nobel superfund project located near Muskegon, Mi. Work included field and laboratory investigation work plan, 30%, 95% and 100% design, construction bid package preparation and construction and CQA documentation and performance of barrier wall onsite. Barrier wall construction was Phase 1 of the work and is 100% complete. The wall consists of a soil-bentonite (SB) slurry wall approximately 75 to 125 ft deep and 2000 ft long. Closure cap design and construction of 10 chemical sludge lagoons (portion of Phase 2 work) was completed in 2007. Mr. Bodine was the lead

geotechnical engineer for the Phase 2 work, on the Parsons team. Other consulting team members provided team project management, conducted groundwater monitoring and treatment, designed and monitored construction of the treatment and diffuser wetlands, and phytoenhancement of the lagoon cover and surrounding area. Geosyntec assisted these team activities and provided geotechnical portions of the work.

***US Forestry Holden Mine Barrier Wall***, U.S. Forestry, Chelan, WA. Working through USF Consultant, Hart Crowser, provided specialist consulting review for design and construction of deep 70-100 ft slag & Portland cement bentonite slurry wall located along river and tailings piles at a closed copper mine in the middle of a national forest. Work included review for agency of mix design and compatibility testing, construction procedures and quality control test results. Mr. Bodine provided onsite observation and review for US Forestry and their consultant. Field work was completed in 2015.

***Design & Construction of Permeable Reactive Barrier (PRB) Slurry Wall***, Quantum Murray, LLC, Ontario, Canada. Worked as the contractor's slurry wall specialist and prepared contractor plans and technical memorandums for bench scale testing and mix design and construction quality control testing and monitoring procedures for a slurry wall that included design sheet pile control structures for the reactive material. This was for a funnel & gate PRB wall within soils and ground water impacted with radiation. Provided recommendations for onsite construction procedures and QC training of personnel performing slurry and soil-bentonite backfill mixing and testing. Project is completed, performing exceptionally well and is confidential.

***Colorado Soil-Bentonite Slurry Wall Construction***, Tri-Districts, Ft. Collins, CO. Responsible Project Manager and Lead Engineer for bid document preparation and construction of a 5400 ft long slurry wall around former sand, gravel and cobble pit. Project completed in September 2013 with both contractor construction and engineering oversight completed on schedule and under budget. A 90-day leakage test was performed by an independent consultant and exceeded all requirements by the state.

***Gavin Power Plant Residual Waste Landfill Expansion***, AEP, Cheshire, OH. Part of the project design team preparing a permit to install (PTI) package for the lateral and vertical expansion of a 58,000 cubic yards waste landfill. Performed design reviews of plans, drawings and specifications, including leachate treatment ponds and assisted in major field investigation program that had to be performed thru-out the winter months and during the holiday period. The PTI has been approved and owner waiting for formal permit to be issued in early 2014. A separate construction package for Stage 1 & Stage 2 construction of the landfill expansion has also been prepared and issued to the owner for bid and initial construction beginning in late 2014.

***Ash Reservoir Dam Modification***, AEP, Cheshire, OH. As part of the design and permitting for the closure and capping of a large ash reservoir the 100 ft high dam is

being modified by reducing the dam height and providing a new discharge structure for safe discharge of the 100-year and PMF storm flows. Mr. Bodine is the Engineer of Record for the dam modification.

**Cardinal FAR 1**, AEP, Brilliant, OH. As EOR responsible for Geosyntec design and major permit document preparation for a 127 acre 18 million cubic yards FGD gypsum landfill at a power plant facility in the State of Ohio. Major portion of new landfill is to be constructed over an existing closed fly ash disposal area. Design and permit documents included detailed geotechnical settlement and stability analyses. Agency has completed review and permit was issued in April 2007. Construction of Cell 1 has been completed and a minor permit modification to construct Cell 3 before Cell 2 was prepared with agency approval in 2008. Preparation of Cell 3 construction drawings was completed in 2010 and cell construction followed in 2011.

**Chicago Public Building Commission (PBC)**, Chicago IL. Provided review of construction documents and prepared report on lessons learned for a new school project that involved construction dewatering, excavation and earth retention that resulted in schedule delay and some foundation redesign. Consulted on means and methods for turning around dewatering and excavation problems. With other Geosyntec team members worked on several other PBC projects related to dewatering, earth retention design and permitting, including one high profile downtown Chicago project. Other PBC projects (library & athletic field house) included preparing and reviewing foundation designs for the architect/engineer and performing foundation inspections.

**CSX Talleyrand**, CSX, Jacksonville, FL. Served as senior reviewer and in-house barrier wall consultant for design and construction of a Florida landfill slurry wall approximate 43 feet in depth. Designed and summarized the slurry wall compatibility and mix design testing program and trained others on the design and onsite for the slurry wall quality control/quality assurance testing and inspection. Site is unique because of high groundwater adjacent to a river, adjacent to a major city sewer line, and included a large portion of excavation within peat soils. Wall was completed in summer of 2011 and landfill cap late in 2011.

**CSX Richmond**, CSX, Richmond, VA. Serving as senior reviewer and in-house consultant on slurry design and permitting for 40 ft deep soil-bentonite wall at a former wood treating facility in Richmond, Virginia. Project design and review by the US EPA and VA DEQ is final. The slurry wall construction was started and completed in 2014.

**Former Camilla Wood Preserving Site**, Black & Veatch, Camilla, GA. Providing barrier wall consulting and in-house recommendations for design team on slurry wall compatibility testing and response to US EPA questions. Conventional soil-bentonite wall was selected and wall construction completed in 2013.



***O'Hare Airport Stormwater Flood Control Reservoir***, AOR, City of Chicago, IL. Provided technical review of existing reservoir design by others during construction to assist in solving design/construction problem involving slope seepage and erosion. Geosyntec provided recommendations for design changes and repairs, as well as additional monitoring to prevent slope erosion and reduce uplift pressures to acceptable factors of safety.

***O'Hare Airport Stormwater Damage Mitigation Measures***, CARE, Chicago Department of Aviation, Chicago, IL. Technical lead providing investigation, evaluation and corrective measure design of stormwater related seepage damage to an underground training area located adjacent to an existing airport utility tunnel. Designed concrete retaining wall repairs and preventative measures to collect and transfer excessive groundwater during and immediately after stormwater events from causing future similar problems.

***Rt 44 Barrier Wall***, Tauton, MA. Served as in-house consultant for an 800-foot long, 50-foot deep slurry wall installed to contain contaminants present in the saturated portion of the soil. Barrier wall was part of an overall drum removal and thermal desorption project. Provided onsite monitoring and training of others for the slurry wall quality control/quality assurance testing and inspection. Wall was completed in 2010.

***McColl Superfund Site***, CA. Served as in-house consultant and mentor for the field monitoring and site engineering of the slurry wall construction phase. Provided daily contact as needed for the two soil-bentonite slurry walls that transverse sloping topography and were tied into the final cover system.

***Home Depot Site Redevelopment***, Burbank, CA. Geosyntec provided concept and detail design, construction, operation, maintenance and monitoring of site remediation of a dual-phase extraction (DPE) and soil vapor extraction (SVE) systems at a redevelopment site. Part of the design included a 2,600 ft long, 55 ft deep soil-bentonite slurry wall. Mr. Bodine consulted on the design and led the construction quality assurance monitoring and testing of the barrier wall.

***138<sup>th</sup> Street Landfill***. Land And Lakes, Dalton, IL. Performed full time Resident Engineering and Construction Management for landfill client on an IEPA remedial action project located on the southeast side of Chicago. Project involved earthwork, slurry wall and leachate collection and transfer systems installation. Duties included review of project submittals, contractor invoices, CQA activities, preparation of progress reports, design modifications approved by the designer and preparation of the Construction Completion Report. Construction project was brought-in under budget.

***Historical Slurry Wall Design & CQA***. Provided full-time construction quality assurance activities for landfills and cooling lakes with slurry and grout cutoff walls, including preparing summary CQA reports. Cutoffs have performed exceptionally well,

some for over 40 years. Slurry wall experience includes shallow and deep Soil Bentonite and Cement Bentonite walls, specification preparation, and full time CQA/CQC activities for approximately 1.5 million square feet of wall. Recent projects involved environmental remediation and closure at landfill and disposal projects where construction dewatering, containment and site closure were involved. Another involved slurry wall design and specifications for groundwater and flood control for a 4-lane state highway project with railroad and river overpass crossings. Total slurry wall experience involves walls totaling over 25 miles long. Completed local Midwest projects with deep walls (>50 ft and <130 ft) include Schaefer Power Station in Indiana and Braidwood Nuclear Power Station in Illinois and the Bofors Nobel project mentioned above. Projects with medium depth cutoff walls (>30 ft and <50 ft) include Collins Power Station in Illinois and Amoco Oil (now BP) Refinery in Indiana. The Amoco walls (4 total) involved cement bentonite, jet grout and chemical grout barriers. Specification and CQA monitoring review for soil bentonite walls was also performed for the McColl Superfund project and a Home Depot project in California. Two of the recent slurry walls have been design/build projects where Mr. Bodine, in addition to design and project management activities, supervised the QC/QA work and certified the construction. The Amoco project is discussed in a paper listed at the end of this resume. Copy provided upon request.

***Groundwater Remediation System CM and CQA***, Shell, Kankakee, IL. Provided design and construction bid document and specification review for a bedrock groundwater interceptor trench and surface water collection basin and controls. Performed CM and CQA activities at the site and prepared a project construction certification report. Reviewed all contractor draft invoices and assisted client negotiating settlement of work claims and revised contract when project changed from non-union to union labor and operator work. Project was successfully completed and performing as intended.

***Naval Training Center and Power Plant Site***, TN & Associates, Newport, RI. Mr. Bodine has prepared designs, plans, specifications, and monitored installation and testing for numerous pile and drilled shaft construction projects. Most current pile installation and load test monitoring occurred in 2006 at Newport Naval Training Facility in Newport Rhode Island. Selected, monitored and evaluated dynamic pile testing and static load test at site of Fuel Oil Tank No. 2.

***DOE Fernald Onsite Disposal Facility***, Flour, Fernald, OH. Performed duties as responsible onsite Resident Engineer for construction of the leachate conveyance system and two onsite disposal facility (OSDF) cells at DOE's Fernald Environmental Management Project, located near Cincinnati, Ohio. Systems included structural, geotechnical, mechanical, electrical and environmental equipment. Duties included review of contractor submittals, preparation, review and approval of design modifications, preparation of reports, interaction with client and contractor construction

management, engineering and quality assurance personnel and project's CQC staff. Cell 1 began accepting impacted material in 1997. During 1998 Mr. Bodine performed the duties of Geosyntec's onsite Managing Engineer and Certifying Engineer during which time filling of Cell 1 with low level impacted materials and construction of Cell 2 was completed. All 8 Cells of the OSDF were completed by end of 2006 ahead of schedule.

***Willow Ranch Landfill Retaining Wall***, Land And Lakes, Romeoville, IL. Provided Construction Management assistance and Construction Quality Assurance monitoring and Engineering Certification of the installation of a geogrid tieback concrete retaining wall located at a closed landfill site. The wall consists of 700 lineal feet of panels with 3 and 4 stepped levels, constructed at a 7 percent alignment grade. One hundred and seven (107) concrete panels twenty-foot long were formed, constructed and installed on site. Construction submittals, schedules and testing for concrete and soils was provided.

***Elgin Illinois Landfill Closure***, BFI, Elgin, IL. Managed CQA monitoring and provided CQA certification of Closure of Elgin Landfill Superfund Site located in Kane County, Illinois. Closure design by US Army Corps of Engineers (US ACE) involved a soil and geosynthetic cap. Project fieldwork completed end of Nov. 2001 and the remedial construction completion report (RCCR) prepared in Dec. 2001. The US EPA and Corps without comment approved the RCCR. For the same landfill closure Mr. Bodine prepared the Operation and Maintenance Plan that involved normal landfill maintenance, long term groundwater monitoring and operation of the landfill gas management system.

***City of Janesville Wisconsin Landfill***, Provided management of project consisting of the review and evaluation of a poorly performing landfill gas system, and the design of a new dual well gas/leachate collection system. Services included field measurements, preparation of landfill permit modification and construction bid documents with contract requirements, specifications and drawings. Project began in May 2002 with construction of the new dual well collection system completed in December 2002.

***Permits***. Responsible for preparation and certification of NPDES permits, Construction permits, Joint permits, Dam safety permits, stormwater permits and plans, local permits and other agency documents for flood control projects, wastewater treatment facilities, landfills and various site remediation projects. Selected completed projects include the Meacham Grove Dam and Reservoir Flood Control Project in DuPage County Illinois and permitting activities for BASF, Amoco Chemical and Exxon Chemical.

***Detroit Edison Power Company Ash Basin Evaluation & Design Modifications***, Monroe, MI. Performed dike inspection of large ash basin to assist in evaluation of a large number of shallow slope failures. Project work included prepared construction plans and specifications for repair and reconstruction of slopes and related drainage

facilities. Provided quality construction expertise for the 2009, 2010 and 2011 construction phases, all now completed. Mr. Bodine consults on designs as needed with team members on other site projects for DTE.

***Detroit Edison Power Company Ash Basin Drainage Ditch Evaluation & Design.*** Managed and performed design of a large drainage ditch which is part of the Range Road Landfill existing ash basin that involved culvert alternatives including a large diameter structural pipe arch. Project completed in 2010.

***DTE Energy Range Road Landfill Annual Inspections,*** St. Clair, MI. Conducted field inspection and office file review under the CCR Rule 40 CFR 257.84(b)(1) for the Range Road 418-acre landfill. The annual inspections and reports were for years 2015 and 2016.

***American Electric Power Dam Inspections.*** Providing multi-year (1999-2001) independent annual dam safety inspections and reporting of dike and dam structures at 18 facilities for American Electric Power in the states of Indiana, Ohio, Kentucky, West Virginia and Virginia. Dams range from small dike containment structures to large high hazard classification dams. Internal inspections and repair recommendations for discharge pipes were also provided at 3 AEP facilities. Reports for the utility and state agencies were prepared for all facilities. Prior to this project Mr. Bodine performed dike and dam inspections of ash disposal and power plant lake facilities in the states of Illinois, Wisconsin, Indiana, Ohio, Kentucky, Colorado and Texas.

***CCR Location Restriction and Groundwater Monitoring Network Reports.*** AEP, Ohio. Provided CCR facility evaluation and report preparation for Location Restriction Evaluation at two separate AEP plants. Assisted the Groundwater Monitoring Network report preparation and review for the same two plants.

***Indianapolis Power & Light Ash Pond Dike Inspections,*** Indiana. Provided ash pond facility inspection in 2008 for three coal fired power plant sites. Prepared inspection report findings and recommendations for maintenance and recommendations for critical dike re-evaluations.

***Sylvan Lake Dam Evaluation,*** RCCD, Rome City, In. Performed dam and spillway inspections and report for 2004 through 2016 at Rome City, Indiana. In 2004 Geosyntec prepared a special dam evaluation report reviewing a critical Dam safety report prepared by U.S. Army Corps of Engineers. In 2007 consulted with dam owner during periods of very heavy rainfall concerning opening of emergency flood gate, however, it was not necessary to open the gate. Attended and took part in the Emergency Action Plan table-top-exercise in 2007, 2011 and 2016. Prepared the project O&M Manual and provided owner training and annual inspection activities since 2004. Remain as Rome City's on-call engineer with respect to dam safety and inspection.

***Boston Tunnel Construction Claim***, CAT, Boston MA. Provided expert witness support for major geotechnical construction claim. Work consisted of technical assessment of contractor claims for extra compensation for excavation of Central Artery Tunnel. Mr. Bodine was a key member of the assessment team that resulted in full rejection of the \$25 million claim against the CA/T project.

***Scottsville Landfill Construction Claim***, Scottsville, MI. Provided technical assessment of construction claim for new landfill construction in the State of Michigan. Assessment resulted in nearly full rejection of contractor claim for 2 to 4 million of extra compensation for earthwork construction and schedule extension.

***Unloading Dock Construction Claim, Honduras***. Performed independent review of geotechnical foundation investigation and design for pile foundation for arbitration hearings concerning significant design-build cost extras for a large docking facility located in Central America.

***Power Plant Circulating Water Pipe Evaluations***, NW IN. Provided confidential evaluation of two large 14-ft diameter CMP pipe collapses for an AE designer and assisted field sampling and evaluation of two other power plant CMPs for long term integrity condition evaluations.

***Foundation Site Investigation and Geotechnical Design***. During the 1970's and 1980's coordinated site investigation and geotechnical foundation design of power plant and waste disposal structures for several fossil units between 500 MW to 750 MW in size located in the Midwest and South. Foundation and pond design included shallow and deep foundations (piles, caissons and drilled shafts) and water and waste holding ponds and dikes. The deep foundations were subject to a large range of loading conditions and conducting several large-scale load tests where necessary. One major project located along the Mississippi River in Louisiana is discussed in a paper listed at the end of this resume. Projects specific to Illinois and Indiana included those at several plants designed by Sargent & Lundy during the period.

***Safety Analysis Report Preparation***. Supervised and prepared geotechnical foundation design criteria and geotechnical and groundwater sections of safety analysis reports (SARs) for nuclear power plants located in Illinois, Indiana, and South Korea.

***Cooling Lake and Dam Inspections***. Conducted cooling lake and dam inspection and monitoring activities for lakes up to 3000 acres in size and over 25 miles of embankment dikes or dams. Prepared reports for submittal to client and appropriate state and federal agencies. The largest of these projects (Braidwood Nuclear Power Station Cooling Lake) involved dike construction and cutoffs constructed over and through extensive coal strip-mine spoils and over underground coal mines. Site monitoring included settlement monitoring of pre-load and dike fills over strip-mine

spoils up to 120 ft thick, slope indicator movements, piezometer measurements and sampling for seepage and water quality evaluations.

*SWMU's at Argonne National Lab*, Illinois. Performed Visual Site Inspections and Structural Integrity Assessments for a large number of Solid Waste Management Units (SWMUs) at DOE's Argonne National Laboratory-East as part of a corrective action program under RCRA. Performed duties as the Certifying Professional Engineer.

## **PROFESSIONAL EXPERIENCE**

Geosyntec Consultants, Chicago/Oak Brook, IL, June 1996-Present

Woodward-Clyde Consultants, Chicago, IL, March 1989-June 1996

Sargent & Lundy Engineers, Chicago, IL, 1976-1989

Woodward-Clyde Consultants, Clifton, NJ, 1970-1972, Chicago IL, 1973-1976

## **PROFESSIONAL AFFILIATIONS**

American Society of Civil Engineers - Life Member - Geo-Institute

Illinois Society of Professional Engineers (ISPE)

Deep Foundation Institute (DFI)

ACEC: American Council of Engineering Companies

Society of American Military Engineers

Three Rivers Manufacturing Association (Industry Association)

## **REPRESENTATIVE PUBLICATIONS**

“Implementation of a Permeable Reactive Barrier for Treatment of Groundwater Impacted by Strontium-90”, Andrzej Przepiora, Dan Bodine, Peter Dollar and Jim Coughlin, *The 19<sup>th</sup> Pacific Basin Nuclear Conference (PBNC 2014)*, August 24-28, 2014, Vancouver, Canada.

“Analysis and Verification of Louisiana Pile Foundation Design Based on Pressuremeter Results”, D.G. Bodine and R. R. Davidson, in *The Pressuremeter and Its Marine Applications*: American Society for Testing and Materials, 1986.

“Effects of Clay Swelling on Permeability Calculations Obtained From Sealed Double Ring Infiltrometer Tests”, C. B. Avci, D. G. Bodine and E. Guler, in *The First International Congress on Environmental Geotechnics*, Edmonton, Canada; July 10-15, 1994.

“RCRA Closure of Refinery Sludge Basin Using In-situ Solidification and Containment”, D. G. Bodine and F. M. Trevino, in *The Proceedings of The Fourth Great Lakes Geotechnical/Geoenvironmental Conference: In-Situ Remediation of*

*Contaminated Sites*, Krishna R. Reddy, Editor, University of Illinois at Chicago; May 17, 1996. Containment was by cement bentonite slurry wall and cement bentonite jet grout wall on the shore of Lake Michigan.

“Design and Permitting of a FGD Landfill Over and Existing Ash Reservoir” (2009), D. G. Bodine, B. F. Tanyu, P. J. Sabatini, M. A. Ajlouni and D. E. Limes, Geotechnical Special Publication No. 187, Contemporary Topics in Ground Modification, Problem Soils, and Geo-Support, pp. 496-503.

“Case Study: Stability of Two Horizontal to One Vertical Embankment” (2011), Tanyu, B. F., Neal, W., Seymour, J. P., Bodine, D. G, Bozok, O., Paper presented at the ASCE Geo-Frontiers March, 2011, Dallas, Texas.

## **APPENDIX B**

**Range Road Landfill Annual Inspection Log**

**Range Road Landfill Annual Inspection Photographs**



# Detroit Edison Company Range Road Ash Disposal Facility Annual Inspection Log

Inspector: Dan Bodine, P.E., Geosyntec  
 DTE: Dave Huxhold, Jason Roggenback  
 Provided Documents; Jason Accompanied Field  
Inspection  
 Date: 02 October 2017, 8-3 pm

Weather: Clear, No Rain; Temperature 44°-72 F, Light  
Wind

Previous P.E. Annual Inspection Date: 20 & 21 Oct. 2016

Item	Condition			Related Photo # (s)	Notes and Comments (LDP=Landfill Development Plan)
	Good	Adequate	CA Req.		
<b>General Site</b>					
1. Site Access Restricted / Attendant On-duty	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Visitor Sign in	Gates locked, except active ash haul road entrance near Guard.
2. Security Fence / Gates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DTE noted	Good, some recent repaired cut openings N & NW side.
3. Signs and Markers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	43	Signs/markers were present. MW labeling not sufficient.
4. Access Roads	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	34,37,43,51,55	Most very good. New roads constructed this year.
5. Traffic Flow	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	13	Haul Trucks appeared moving in safe manor
6. AST Inspection	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	None provided	Observed, and containment provided with fire extinguisher.
7. Universal Waste (properly labelled, container condition, less than one (1) year from accumulation start date)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None provided	Reported on only CCR waste material hauled to landfill. Sources noted in documents. License is Updated.
<b>Waste and Nuisance Control</b>					
8. Ash Hauling Contractor On-site Safety/Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None provided	Training documents provided for new equipment site worker.
9. Ash Hauling Contractor Equipment Condition/Adequacy	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	10,11,13,31,33,53,62,	Ash hauling equipment appeared adequate, maintenance vegetation removal equipment under repair.
10. Ash Hauling Contractor Filling Active Area to Appropriate Grade	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	13	Observed Filling Area G2 Phase I. Improved filling procedures.
11. Waste Condition (i.e. - waste from approved source, no recyclables, no MSW, no liquids, no hazardous wastes, etc.)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	None Provided	Sources noted in LDP and Waste Filling Sequence Memo. Operating License was Updated to Remove Cargill Salt Co. CCR
12. Noise Level	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Covered in LDP. No contractor noise heard during perimeter ditch inspection and most closed cover areas.
13. Dust Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Dust Control Plan and Annual Report available. No complaints and no action needed.
14. Adequacy of Interim Cover	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10,11,15,16,37 & 39	Closed or final cover area slopes joining active areas appeared stable. Minor erosion observed on temporary slope shown in Photos 15 & 16.

# Detroit Edison Company Range Road Ash Disposal Facility Annual Inspection Log

Final Cover					
15. Landfill Side Slope Condition (i.e.-no seeps, no cracking, no settling, no burrows, adequate vegetation)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	10,37,39,41,61,67,69,70,71,72	No erosion noted except downchute. Trees on N, NE, NW sides approved to stay. Other woody vegetation noted in unconstructed area to be removed when developed. Brush noted in Photo 61.
16. Final Cover Top Condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	74,75,76,77,78,79,80,81 & 82	Top and slope final cover areas were well vegetated. Some small woody vegetation previously noted was removed. No observed settlement or stability conditions. Flat design requiring swales.
Leachate and Surface Water Control					
17. Stormwater Detention Pond Water Quality (unnatural films, foams, oils, etc.) and pump operating condition (panel, meter etc)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1, 2 & 6	Quality appeared Good. Pump Run & Light Conditions Checked (DTE person). All appeared operating normally.
18. Stormwater Detention Pond Side Slope Condition (erosion, riprap, vegetation) and any other operating observations not in	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1 & 2	Appeared stable and adequately vegetated & slope protected. WL also monitored with staff gauge, SG-13. Flow meter working.
19. NW Corner Lift Station Surface Water Ditch Level & Pump	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	62 & 64	Pump & controls replacement in-progress. CA In-progress. Temporary contractor pump placed onsite.
20. NW Corner Lift Station Operating Condition	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	62 & 64	Temporary contractor pump operates manually as needed. New pumps to be installed by end of October.
21. NE Off-site French Drain Operating Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	44	Pump flow condition not checked. DTE indicated no problems.
22. NW Off-site French Drain Operating Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Offsite, not Inspected; Covered in TRC reports.
23. NE/NW Off-site French Drain Outfall Water Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Not part of this CCR inspection. Covered in other reports.
24. Perimeter Slurry Wall Marker Condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	28,43,51	Slurry wall below Grade and Surrounds Entire Landfill at/near Property Line. Barrier to Any Below Grade GW Flow. Markers Show Alignment. Many markers removed for road installation, Photo 51.
25. Perimeter Ditch System (Flow & Staff Gauge Monitoring)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	46,48,50,52,54,56,57,58,66,68	Some flow observed. Staff gauge elevations in tables provided. Reviewed and confirmed gradient flow in system.
26. Perimeter Ditch System (Slope & Bottom Conditions)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Perimeter ditch located around entire active and closed landfill areas. Runon and runoff controlled. Flow appears to be maintained. DTE Indicates that non-woody vegetation has been approved to remain as long as flow maintained. However, a rotating 3-year vegetation maintenance program is in effect.

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**DTE Range Road Landfill Annual Inspection 2 October 2017**



1. Storm Water Detention Basin (SWDB), South and West Sides. Slopes are Protected with Stone. No Visible Slope Erosion Vegetation Cut on Slopes.



2. SWDB, North and East Sides. Slopes are Protected with Stone Within Water Level Range. No Visible Slope Erosion. Vegetation Cut on Slopes.



3. Pump House Pumps. Water from Basin is Pumped Back to Power Plant. DTE Plant Inspects Daily and Records Pump Observations and Flow.



4. Pump Control Panel. Each Pump was Run Checked. Pump #3 Running. Pumps Cycle Each Run Unless Higher Pond Level Needs More Pumps On.

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5. View of SWDB Pump Flow Meter. No Pumps On at Time of Photo, Therefore No Flow Rate Other Than "0" Shown. Total Flow Pumped is Given



6. Basin Intake Screens. No Significant Blockage Noted. DTE Routinely Inspects and Cleans Grate Area.



7. View of North/South Drainage Canal Leading to SWDB from Perimeter Ditch System.



8. View of Vegetation in Portion of Internal Drainage Ditch.

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9. Northeast Off-Site Groundwater Capture System Building. Capture System Building Controls Inside were not Inspected Due to Wrong Key Available.



10. Looking NW at Cover Placement on 4H to 1V Interim Slope of Area F3. Waste Placement & Compaction to Construct Slope is from Bottom Up.



11. Looking North at Interim Slope of Area F3. Slope Reported to be 4H to 1V or Flatter.



12. View of Active Clay Borrow Area from Top of G2 Fill Area.

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13. View Active Waste Placement Area G2 (North Side). At Top Center are Stockpiles of Dry Waste Waiting to be Spread and Compaction.



14. Looking Southwest from Waste Area at Portion of Clay Subgrade Where Historical Artifact was Found and Roped Off for Further Investigation.



15. Looking NNE at Large Cemented Portions of Waste Removed During Removal of Interim Clay Slope on West Side of F2 Adjacent to G2 Placement.



16. Closeup View of Cemented Chunks of Waste. Some Soil Mixed In. Chunks are Planned to be Broken-Up and Placed & Compacted.

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17. Looking West at West Outside Slope of Unconstructed Areas of G2. Stake is One of Group of Survey Stakes Placed to Mark the Perimeter Limits of Waste.



18. Looking North at West Side of Unconstructed G2 Area. Some Woody Vegetation Present. In F Areas Slope were Cleared of Small Trees in 2016.



19. Looking West at Portion of Perimeter Ditch Located in the SW Quadrant of the Landfill Property. Heavy Vegetation in Bottom of Ditch.



20. Close-up of Typical Vegetation Along Perimeter Ditch Located in SW Quadrant of Property.

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21. Perimeter Ditch View of Water Level at Bottom of Typical Heavy Vegetation Where Ditch Cleaning Has Not Occurred.



22. Looking West Along Perimeter Ditch Modified in 2010 at Right and on Alignment of Markers for Property Perimeter Installed Slurry Wall.



23. Looking East Along Inside Slope of Perimeter Ditch Where Drainage Pipe Enters and Slope Protected by Riprap. Slope Protection Appeared Satisfactory.



24. Close-up of Survey Stake Indicating a Boundary of Area G2 Along the Perimeter Ditch West Side of Landfill.



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25. View of Perimeter Ditch Slopes West Side Ditch. Heavy Vegetation Bottom of Ditch. Survey Stakes Like that Shown in Photo 24 Present Middle of Slope.



26. View Looking West at Modified Perimeter Ditch. G2 Survey Stakes Right Side Slope. White Markers Along Top of Slope at Road for Safety.



27. View of Perimeter Ditch at the SW End of Area G2. A G2 Development Survey Stake, One with Red Flags Shown, is Located at Middle of Ditch Slope.



28. Looking North Along Property Fence Line. White Marker is Alignment of Perimeter Slurry Wall.

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29. View of Drainage Discharge Pipe Shown in Photo 30 and Heavy Vegetation Within Perimeter Ditch.



30. Close-up View of Drainage Pipe Discharging into Perimeter Ditch. Some Small Stone Riprap Protecting Slope. Protection Appeared Satisfactory.



31. Culvert Flare Draining Surface Water to Perimeter Ditch from a G2 Borrow Development Area.



32. Internal Drainage Ditch. Vegetation Not as Heavy as Portions of the Perimeter Ditch.

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33. Internal Landfill Drainage Ditch on South Side and Capping on Top of Area F3.



34. Reconstructed Roadway Along Perimeter Ditch on East Side.



35. Internal Drainage Ditch Filled with Vegetation.



36. Internal Drainage Ditch Filled with Vegetation.

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37. Roadway to Top of Active Area G1, Renamed Area F3/D3. Vegetative Slope of Closed Area C at Top of Photo is Well Vegetated and Appeared Stable.



38. View of West Side of Internal Water Collection Pond Near Area F3/D3.



39. View of Slope of Closed Area C. Slope Well Vegetated and Appearing Very Stable.



40. View of East Side of Internal Water Collection Pond.

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41. DTE Representative Inspection Slope Vegetation.



42. Discharge from Concrete Culvert into Internal Ditch. No Significant Erosion Observed.



43. View of Signage on Watering Restriction at Areas of Gate Entrances and Exits.



44. Offsite Groundwater Capture System Building. Controls Inside were not Observed as Door Remained Locked. No Issues Reported in DTE Reports.

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45. Piezometer PZ-96-W-15 Left Side of DTE Rep Checking Ditch Water Level.



46. Perimeter Ditch Staff Gauge SG-06. White Small Stake in Center of Photo in Bottom of Ditch.



47. Perimeter Ditch Culvert Beneath Road Crossing Has Been Cleared of Vegetation Around Entrance.



48. Perimeter Ditch Staff Gauge SG-05. Water Observed Flowing.

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49. Typical View of One of Six Stick-up Monitoring Wells Around Perimeter of Landfill. Well is MW-16-02. One More Well is a Flush Type (MW-16-05).



50. DTE Engineer Checking Perimeter Ditch for Observance of Water Level on East Side of Landfill.



51. Perimeter Road Along East Side Maintained. Perimeter Ditch Along Left Side and Slurry Wall Alignment Beneath Road in this Photo.



52. Perimeter Ditch Monitoring Staff Gauge SG-03. No visible Flow.

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53. Ditch Maintenance and Vegetation Removal In progress. Equipment Shown Currently Under Repair or Maintenance.



54. Perimeter Ditch Monitoring Staff Gauge SG-02. Gauge Numbering Not Visible. No Visible Flow.



55. View of Roadway and Monitoring Well MW-16-03. Access and Well Protection in Place.



56. Perimeter Ditch Monitoring Staff Gauge SG-02 and Piezometer PZ-01R. No Visible Flow Noted.



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57. Perimeter Ditch Monitoring Staff Gauge SG-01. No Visible Flow Noted.



58. Perimeter Ditch Monitoring Staff Gauge SG-06. Video of Visible Flow in Ditch on File.



59. View of Monitoring Well MW-16-06. Access Clear and Well Protected.



60. Sump Collecting Pumped NW Groundwater that then Drains by Pipe to Perimeter Ditch on Other Side of Truck.

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61. Brush and Small Woody Vegetation Growing on North Slope of Closed Area B of Landfill.



62. Pumps in Sump at NW Groundwater Capture System are Being Replaced. Contractor Temporary Pump Used to Remove Water from Sump.



63. Collection Ditch Temporary Berms to Dam-up Water Flow.



64. Sump at NW Groundwater Capture System with Old Pumps Partially Removed. New Pumps to be Installed in October 2017, per DTE.

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65. Area of Recent Vegetation Removal Along Perimeter East Side. Removal Equipment Observed, but Undergoing Repair or Maintenance.



66. View of Perimeter Ditch Staff Gauge SG-10. Vegetation Heavy, but Review of Recorded Elevations Show Ditch is Still Flowing as Designed.



67. Looking at Slope Downchute From Intersection of Closed Areas F1 and F2. Some Runoff Erosion in Riprapped Area. Downchute Drains to Perimeter Ditch.



68. View of Perimeter Ditch Staff Gauge SG-09 and Stoned Slope. Gauge Not Numbered or No Longer Readable, as was Most Gauges.

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69. Close-up of Slope Downchute From Intersection of Closed Areas F1 and F2. Some Runoff Erosion in Riprapped Area. Same as Photo 67.



70. Looking North at Vegetated Slope of Closed Area F2.



71. Looking East at Vegetated Slope of Closed Area F2.



72. Looking at a Closed Area Landfill Slope.

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73. Looking SE at Repaired Slope of Perimeter Ditch Along West Side.



74. View of Typical Top of Closed Landfill Areas.



75. View Looking East of Typical Top of Closed Landfill Areas.



76. View Looking North of Typical Top of Closed Landfill Areas.

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77. View of Typical Top of Closed Landfill Areas. Small Drainage Berm on Cover Shown to Contain and Direct Surface Flow.



78. View of Typical Top of Closed Landfill Areas. Small Drainage Berm on Cover Shown to Contain and Direct Surface Flow.



79. Another View of Typical Top of Closed Landfill Areas. Some Previous Small Woody Vegetation had been Removed.



80. Another View of Typical Top of Closed Landfill Areas.

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81. Another View of Typical Top of Closed Landfill Areas.

82. Another View of Typical Top of Closed Landfill Areas.

Two Videos of Flow Occurring in Perimeter Ditch were Taken as Part of Documentation of Ditch Operation and Flow to the Stormwater Detention Basin. Copies of the Videos are Maintained in Project Files.

83.