Prepared for

DTE Electric Company
One Energy Plaza
Detroit, Michigan 48226

2022 ANNUAL INSPECTION REPORT VERTICAL EXTENSION LANDFILL

MONROE POWER PLANT

Monroe, Michigan

Prepared by

Geosyntec consultants

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CHE8242V

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1. INTRODUCTION

1.1 Overview

This 2022 Annual Inspection Report (AIR) was prepared by Geosyntec Consultants of Michigan, Inc. (Geosyntec) to provide the results of the annual inspection of the coal combustion residuals (CCR) vertical extension landfill (Landfill) at DTE Electric Company's (DTE) Monroe Power Plant disposal facility. The annual inspection has been prepared to comply with the United States Environmental Protection Agency (USEPA) CCR Rule published on April 17, 2015, as amended July 30, 2018 (40 CFR Parts 257 and 261), August 28, 2020 (Part A Rule), and November 12, 2020 (Part B Rule). 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 about one mile southwest of the Monroe Power Plant near Monroe, Michigan, and is bounded on the east by Lake Erie and the Plant discharge canal, on the west by Interstate Highway 75 (I-75), on the south by an agricultural field, and on the north by residential properties and Plum Creek (see Figure 1). It is constructed on top of fly ash that was previously deposited in the Monroe Ash Basin (Ash Basin); the Ash Basin is a separate CCR surface impoundment. The combined Landfill and Ash Basin are considered the "Permitted Area".

Landfill Phase 1 construction began in August 2015. The Michigan Department of Environment, Great Lakes, and Energy (EGLE, formerly Michigan Department of Environmental Quality [MDEQ]), licensed the area for disposal via email communication on October 14, 2015, and CCR was placed in the unit beginning October 16, 2015. CCR disposal continued after October 19, 2015[1] as witnessed during subsequent annual inspections.

1.2 Purpose

The objective of the inspection is to detect indications of instability in time to allow planning, design, and implementation of appropriate mitigation measures. 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."

[1] Based on the CCR Rule, existing landfill is "…landfill that receives CCR both before and after October 19, 2015, or for which construction commenced prior to October 19, 2015 and receives CCR on or after October 19, 2015…".

The inspection must, at a minimum, include:

(i) A review of the 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 an 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 the previous inspection, review of instrumentation monitoring data, and discussions with site personnel about the history of the site and general operations at the Landfill. Observations from the visual inspection, document and instrumentation data review, and discussions are summarized in an inspection report. The inspection report addresses the following under the CCR Rule [40 CFR 257.84(b)(2)]:

(i) Any changes in geometry of the structure since the previous annual inspection;

(ii) The approximate volume of CCR contained in the unit at the time of the inspection;

(iii) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and

(iv) Any other change(s) which may have affected the stability or operation of the CCR unit since the previous annual inspection.

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 – Observations from Annual Inspection: summarizes visual observations recorded during the 2022 inspection of the Landfill.
- Section 5 – Instrumentation Monitoring: provides information about the instrumentation monitoring of the Landfill.
- Section 6 – Current Operations: describes DTE's current operations.

- Section 7 – Evaluation of Observations: based on the inspection results, evaluates if the design, construction, operation, and maintenance of the Landfill are consistent with recognized and generally accepted good engineering standards.

- Section 8 – Conclusions: provides the overall conclusions of the annual inspection and certification of the AIR.

1.4 Terms of Reference

The annual visual inspection was performed on April 6, 2022, by Dr. Clinton Carlson, Ph.D., P.E. of Geosyntec[2], with assistance from DTE staff.

This report was prepared by Dr. Carlson and reviewed by Mr. John Seymour, P. E. of Geosyntec.

[2] Clinton Carlson, Ph.D., P.E., is the qualified professional engineer per the requirements of §257.53 of the CCR Rule. He has eight years of experience with coal ash related projects. His resume is provided in Appendix A.

2. REVIEW OF AVAILABLE INFORMATION

Geosyntec reviewed the following documents for the annual inspection. These documents are summarized in the table below.

Table 1: Available Information Reviewed for Annual Inspection

Title	Prepared by	Date	Content
Run-on/Run-off Control System Plan for CCR Disposal Facility - Monroe Fly Ash Basin Vertical Extension, Existing Landfill	AECOM	October 15, 2021	Describes the run-on and run-off control features for the vertical extension. Documenting how the plan meets the CCR Rule. Provides a five-year update to the original plan submitted in October 2016.
Fugitive Dust Control Plan	DTE	November 9, 2021	Presents fugitive dust control measures. Added operating license information, updated process for the inactive bottom ash impoundment, and further defined activities for assessing and monitoring effectiveness of dust control measures.
Annual Fugitive Dust Report	DTE	November 2021	Annual report of dust control actions, any complaints, and corrective actions taken, if any. Completed pursuant to 40 CFR 257.80(c).
Weekly Inspection Reports	DTE	2021-2022	Qualified person inspections from May 2021 through April 2022.
2021 Annual Inspection Report	Geosyntec	January 2022	Provides the results of the 2021 annual inspection.
Closure Plan	AECOM	April 12, 2019	Documenting how the plan will meet the CCR Rule. Plan remains unchanged.
Post-Closure Plan	AECOM	October 17, 2016	Documenting how the plan will meet the CCR Rule. Plan remains unchanged.

Table 1 (continued)

Title	Prepared by	Date	Content
Groundwater Monitoring System Summary Report	TRC	October 2017	Information on groundwater monitoring system components and details for the Monroe Ash Basin and Vertical Extension Landfill.
Groundwater Statistical Evaluation Plan	TRC	October 2017	Basis for statistical evaluation for groundwater monitoring events for the Monroe Ash Basin and Vertical Extension Landfill.
Annual Groundwater Monitoring Report	TRC	January 31, 2022	Summary of annual groundwater monitoring results for 2021 for the Monroe Ash Basin and Vertical Extension Landfill.
Location Restrictions Demonstration	TRC	September 2018	Provides details of location restrictions demonstration for the Landfill per the CCR Rule.
Instrumentation Monitoring and Maintenance Manual, Rev. D.	Geosyntec	November 2021	Provides details of operations, monitoring, action levels and items for the Landfill

3. FACILITY DESCRIPTION

3.1 Overall Site Description

The facility includes a 79-acre vertical extension landfill (Landfill) and a 331-acre fly ash basin impoundment (Ash Basin) for a permitted area of 410 acres. The permitted area is in Section 16, Township 7 South, Range 9 East, of Monroe Township, Michigan shown in Figure 1. The Landfill is a coal ash landfill, and the Ash Basin is a coal ash surface impoundment under Michigan Part 115, Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994, Operating License No. 9579. The entire Landfill, including the perimeter berms and swales, are located within the interior drainage area of the Ash Basin. Any potential sediments from erosion will be deposited in the Ash Basin. Any potential run-off will be managed under the NPDES permit for the Ash Basin.

The Landfill is designated as a 79-acre "dry" disposal area located on top of an area of the Ash Basin filled with CCR approximately to the originally planned final grade. The site investigation conducted in 2015 identified the fly ash below the Landfill to be approximately 50-feet-thick to an elevation of approximately 563 feet[3]. The water level in the Ash Basin is maintained at or below an elevation of 609 feet.

The Landfill is licensed to receive bottom ash, fly ash, flue gas desulfurization (FGD) scrubber wastewater sludge (solidified with fly ash or bottom ash), synthetic gypsum, inert material, and any other waste allowed by the CCR Rule or obtained through specific regulatory approval. The Permit Modification Report, prepared by Golder & Associates (Golder) dated April 16, 2015, includes regulatory requests for placement of materials within the Landfill.

3.2 Design

The design was provided by Golder in the Permit Modification Report. The components of the Landfill include the following.

- Prepared subgrade consisting of in-situ sluiced fly ash and general fill.
- 30-inch-thick pore pressure relief layer (PRL), comprised of (from top to bottom):
    - 24-inch-thick layer of bottom ash or limestone aggregate;
    - perforated collection pipes encased in a filter fabric ("sock") within the 24-inch-thick bottom ash/limestone aggregate layer;

[3] Elevations in this AIR are reported in the National Geodetic Vertical Datum of 1929 (NGVD29).

  - separation geotextile made of non-woven, needle-punched geotextile; and
  - 6-inch-thick embedment layer.

- Monitoring system consisting of 12 settlement plates, 13 vibrating wire piezometers, and six slope inclinometers.
- Perimeter berm.
- Perimeter collection swale.

3.3 Construction

Phase 1 of the Landfill is the western 11-acre portion shown in Figure 1. Construction of Phase 1 of the Landfill was certified by David List, P.E., of Golder on September 16, 2015; the certification is contained in the Phase 1 Construction Documentation Report. Record drawings of the construction were provided in Appendix B of the 2015 AIR.

Construction for Phase 2 of the Landfill, the remaining 68 acres shown in Figure 1, has been completed and the certification report was sent to EGLE in November 2017. EGLE provided approval on January 24, 2018, for CCR disposal. CCR material began being placed within Phase 2 of the Landfill in 2020.

As of April 2022, the total estimated volume of CCR in the Landfill above the geotextile separation embedment layer was approximately 250,000 cubic yards (cy), based on data provided by DTE.

4. OBSERVATIONS FROM ANNUAL INSPECTION

Inspection results and photographs from the annual visual inspection are provided in Appendix B. The key visual observations from the inspection are summarized below.

1. An asphalt road was constructed on top of the perimeter berm for the Monroe Ash Basin (see Photograph 1). The asphalt road provides a more robust access road for trucks placing CCR within the Landfill. The asphalt road is located on the southwestern, western, and northwestern portions of the Ash Basin perimeter berms and enters the Landfill near approximately Station 60+00 of the Ash Basin perimeter berm.

2. A culvert (see Photograph 31) was constructed at the entrance of the new asphalt road to the Landfill (see Photograph 32). The culvert allows water to flow through perimeter channel R1 to the western side of the Landfill.

3. Perimeter drainage swales have a minimal slope, and standing water was observed in some areas on the eastern and southern sides of the Landfill (see Photographs 7, 10, 12, 16, 17, 18, and 20). Water was contained in the swales and levels were generally below the pore pressure relief pipe outlets at the time of the inspection, so the overall ability of the pore pressure relief pipes to sufficiently drain was not impeded.

4. The culvert at the intersection of the R2 and R4 perimeter swales in the southeast corner of the Landfill drains water from the R3 and R4 perimeter channels (see Photograph 8). Standing water was observed in the swales adjacent to the culvert at the time of the inspection (see Photograph 10).

5. Proper vegetation was present on the perimeter berms of the Landfill with minimal erosion or settlement observed (see Photographs 2, 6, 14, 21, 24, 26, 28, and 36).

6. Many of the pore pressure relief pipes had minimal or no sediment build-up at the outlets. Any observed sediment does not impede the overall ability of the pore pressure relief pipes to sufficiently drain (see Photographs 3, 5, 9, 27, and 34).

7. Heavy vegetation was observed around many of the pore pressure relief pipe outlets along the southern and northwestern sides of the Landfill (see Photographs 11, 13, 15, 17, 18, 19, 22, 29, 33, and 35). In some instances, some vegetation was observed in the pipes (see Photograph 4). However, the vegetation does not impede the sufficient draining of the pore pressure relief pipes.

8. One pore pressure relief pipe along the northwest side of the Landfill was observed to have a very small amount of water flowing out of the outlet (see Photograph 30). This is expected

for pore pressure relief pipes in the area below the active filling area of the Landfill. No water was observed to be flowing out of the remaining pipes.

5. INSTRUMENTATION MONITORING

5.1 Slope Inclinometers

Six slope inclinometers (SIs) are present along the west and south sides of the Landfill perimeter. The SIs were constructed within the existing CCR material in the Monroe Ash Basin. The SIs are designated as FI-1 through FI-4, SI-9, and SI-10, as shown on Figure 2. Readings for the SIs are generally collected twice per month.

5.2 Piezometers

Thirteen piezometers (PZs) are present below the Landfill overliner at the locations shown on Figure 2. PZs have been incorporated into the existing continuous monitoring system established for the Monroe Ash Basin. PZ readings are collected and automatically uploaded to the Cloud system and interpreted as part of the continuous monitoring system for the Monroe Ash Basin. Readings for the PZs are collected and reviewed at least every other week (minimum of twice per month).

PZ-4 went offline in June 2021. Connectivity could not be restored with PZ-4, so it was left in-place and decommissioned at the end of 2021, leaving 12 active piezometers. Maintenance was performed on Data Logger-4 (DL-4) in April 2022 to restore connectivity with the PZs within Phase 1 of the Landfill (i.e., PZ-1, -2, and -3).

5.3 Settlement Plates

Twelve settlement plates (SPs) are present within the footprint of the Landfill and along the northwestern perimeter as shown on Figure 2. The SPs are founded on the surface of the Landfill overliner and generally co-located with the PZs. Readings for the SPs are generally collected twice per month.

6. CURRENT OPERATIONS

6.1 Operations Organization

The Landfill is operated by DTE. The responsible personnel include:

- Michael Dunlap – DTE Energy Supply, Ash Manager, Monroe Site Operations
- Stefanie Ledesma, Elise Ciak, and Gerald Chilson – DTE Environmental Management and Safety (EM&S), Monroe Power Plant

6.2 Operation Activities

Operation details are provided in the Inspection, Monitoring, and Maintenance Manual (IMMM) Rev. D. and Operations Plan Drawings Rev. D. (Geosyntec, 2021). The following operation activities are described in the Operations Plan Drawings.

1. Hours of Operation
2. Site Access and Barriers
3. Traffic Routing
4. Nuisance (e.g., dust, odors, noise) Control
5. Emergency Services
6. Weather Events (includes inclement weather disruptions, snow removal, and dry and windy weather)
7. Reuse of CCR Material
8. Proposed Waste Types
9. Filling Operations
10. Disposal Inventory
11. Personnel and Training
12. Recordkeeping
13. Equipment

14. Intermediate Cover (includes water, bottom ash, soil, chemical sprays, and geotextiles or rolled erosion control products)

15. Perimeter Swale Maintenance

In addition, the following are currently required by the CCR Rule.

- Weekly inspections by a qualified person.
- Dust control in accordance with the Fugitive Dust Control Plan.
- Annual Fugitive Dust Control Report.
- Annual Groundwater Monitoring and Corrective Action Report.

6.3 Run-On/Run-Off Control System Plan for CCR Disposal Facility Observations

It was identified that the intent of the Operations Plan Drawings was being followed at the Landfill. Run-on and run-off for the Landfill is controlled by the perimeter swales, which appeared to be in good working condition at the time of the visual inspection.

7. EVALUATION OF OBSERVATIONS

The design, construction, maintenance, and current operations of the Landfill are consistent with recognized and generally accepted good engineering standards, based on available information. Maintenance of the Landfill berms, swales, and prepared subgrade have been conducted in accordance with the IMMM, Rev. D (Geosyntec, 2021) based on visual observations.

The Annual Fugitive Dust Report from November 2020 through November 2021 was reviewed. It was reported that no citizen complaints for fugitive dust were received during this period, so no corrective actions were necessary. Water trucks have been used to control dust on the roads. In addition, the new asphalt access road should serve to reduce fugitive dust.

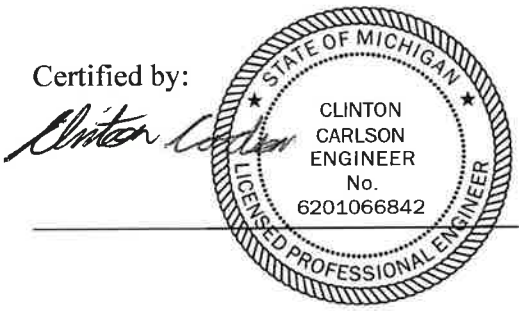
Weekly inspections are completed and documented by qualified personnel. Personnel were initially trained in April 2015, and new inspectors have been trained by DTE personnel as they have been hired. Weekly inspections for the Landfill are conducted concurrently with the inspections for the Ash Basin. DTE reported no deficiencies observed for the Landfill during the weekly inspections. The inspection reports through April 2022 were reviewed by Geosyntec. No indications of structural weaknesses were identified by DTE personnel in the weekly inspections or by Geosyntec during review. The operations instrumentation monitoring data from February 2016 through April 2022 were also reviewed by Geosyntec and did not indicate any structural weaknesses in the trends.

The 2022 annual inspection did not identify any existing structural weaknesses or existing conditions disrupting the operation and safety of the Landfill. Some of the pore pressure relief pipe outlets contained sediments or vegetation or were in areas of heavy vegetation. Standing water was observed in the perimeter swales adjacent to some of the pore pressure relief pipe outlets. Although the sediments, vegetation, and standing water did not appear to affect the operation of the pore pressure relief pipes at the time of the 2022 annual inspection if these conditions are not monitored and worsen, they could potentially disrupt the operation and safety of the Landfill in the future. Therefore, Geosyntec recommends DTE continue to monitor these conditions during routine and annual inspections and maintain the Landfill in accordance with the IMMM.

8. CONCLUSIONS AND CERTIFICATION

The Landfill is operated and maintained with generally accepted good engineering practices. The 2022 annual visual inspection did not identify any structural instabilities that would cause CCR to release into the areas outside the footprint of the Landfill. Geosyntec identified one condition that could develop and potentially disrupt the operation of the Landfill as detailed in Section 7. A recommendation to continue monitoring this condition and performing maintenance in accordance with the IMMM is provided in Section 7.

Certified by:



Date January 9, 2023

Clinton Carlson, Ph.D., P.E.

Michigan License Number 6201066842

Project Engineer

MONROE POWER PLANT
VERTICAL EXTENSION LANDFILL SITE LOCATION

Geosyntec consultants
DETROIT, MICHIGAN

FIGURE 1

PROJECT: CHE8242

JANUARY 2023

PERIMETER CHANNEL R1

PERIMETER CHANNEL R2

PERIMETER CHANNEL R3

PERIMETER CHANNEL R4

PHASE 1

PHASE 2

CULVERT INSTALLED in 2020 TO ALLOW DRAINAGE FROM SOUTHERN CHANNELS INTO DISCHARGE CHANNEL

0.50%

0.50%

SCALE 0 150 300 FEET

RECORD PIEZOMETER LOCATIONS

INSTRUMENT IDENTIFICATION	NORTHING	EASTING	TOP OF PORE RELIEF ELEVATION (ft-msl)
PZ-1S PZ-1D	143,132.58	13,391,553.77	615.22
PZ-2S PZ-2D	142,791.36	13,391,744.99	616.41
PZ-3S PZ-3D	142,601.23	13,391,236.06	614.71
PZ-4	142,399.11	13,392,255.75	615.42
PZ-5	142,891.20	13,392,666.26	614.76
PZ-6	142,317.97	13,393,071.44	616.26
PZ-7	142,712.44	13,393,198.77	614.87
PZ-8	141,845.96	13,393,003.18	613.93
PZ-9	141,949.20	13,393,629.57	615.37
PZ-10	142,364.59	13,393,873.25	615.47

RECORD SLOPE INCLINOMETER LOCATIONS

INSTRUMENT IDENTIFICATION	NORTHING	EASTING	ELEVATION (ft-msl)
FI-1	141,951.23	13,392,399.02	611.90
FI-2	141,360.68	13,392,909.31	612.05
FI-3	141,570.74	13,393,467.74	613.42
FI-4	141,732.21	13,393,991.01	611.64
SI-10_Top of Pipe	142,280.24	13,391,364.86	612.45
SI-9_Top of Pipe	142,989.72	13,391,192.71	611.28

RECORD DATA LOGGER LOCATIONS

DATA LOGGER	NORTHING	EASTING	G.S. ELEV. (ft-msl)
DL1	141,531.70	13,392,823.45	611.68
DL2	141,680.06	13,393,548.90	611.38
DL3	143,022.18	13,393,244.14	613.96
DL4	142,517.07	13,391,015.54	611.82

RECORD LOCATION OF DRAINAGE PIPING

INSTRUMENT IDENTIFICATION	NORTHING	EASTING	ELEVATION (ft-msl)
SP-1	143,263.75	13,391,724.38	613.77
SP-2	142,948.78	13,391,164.48	610.94
SP-3_Top of Plate	143,124.35	13,391,551.76	615.34
SP-3_Top of Pipe	143,124.20	13,391,551.69	620.47
SP-4_Top of Plate	142,779.81	13,391,741.28	616.31
SP-4_Top of Pipe	142,779.97	13,391,741.18	621.48
SP-5_Top of Plate	142,591.55	13,391,231.59	614.76
SP-5_Top of Pipe	142,591.59	13,391,231.69	619.91
SP-6_Top of Plate	142,395.73	13,392,264.52	615.61
SP-6_Top of Pipe	142,395.73	13,392,264.52	620.65
SP-7_Top of Plate	142,887.18	13,392,678.86	615.04
SP-7_Top of Pipe	142,887.18	13,392,678.86	620.06
SP-8_Top of Plate	142,314.67	13,393,070.28	616.49
SP-8_Top of Pipe	142,314.67	13,393,070.28	621.50
SP-9_Top of Plate	142,709.21	13,393,207.63	615.03
SP-9_Top of Pipe	142,709.21	13,393,207.63	620.03
SP-10_Top of Plate	141,843.27	13,393,010.62	614.13
SP-10_Top of Pipe	141,843.27	13,393,010.62	619.16
SP-11_Top of Plate	141,946.56	13,393,636.15	615.51
SP-11_Top of Pipe	141,946.56	13,393,636.15	620.51
SP-12_Top of Plate	142,362.33	13,393,880.27	615.70
SP-12_Top of Pipe	142,362.33	13,393,880.27	620.74

LEGEND

- SI-1 — PHASE 1 SLOPE INCLINOMETER
- PZ-1D / PZ-1S — PHASE 1 VIBRATING WIRE PIEZOMETER (VWP) PAIR (DEEP & SHALLOW)
- SP-1 — PHASE 1 SETTLEMENT PLATE
- PHASE 1 REMOTE (CABLED) DATA LOGGER LOCATION FOR VWP
- DATA LOGGER CABLE
- RECORD LOCATION OF DRAINAGE PIPING
- FI-1 — 2017 SLOPE INCLINOMETER
- 2017 VIBRATING WIRE PIEZOMETER (VWP) PAIR (DEEP & SHALLOW) AND SETTLEMENT PLATE
- DATA TRANSMISSION LOCATION
- CABLING OUTSIDE OVERLINER
- CABLING INSIDE OVERLINER

MONROE POWER PLANT
VERTICAL EXTENSION LANDFILL
LANDFILL LAYOUT

Geosyntec consultants
Geosyntec Consultants of Michigan
DETROIT, MICHIGAN

PROJECT: CHE8242

JANUARY 2023

FIGURE 2

APPENDIX A

Resume of Clinton Carlson, Ph.D., P.E.
(Qualified Professional Engineer)

Clinton P. Carlson, PhD, PE

Qualifications

Dr. Carlson is a geotechnical engineer with eight years of experience on projects related to design and remediation of landfills and coal combustion residual impoundments, dam safety, and geotechnical instrumentation. He is a Project Engineer with Geosyntec and part of the firm's dams and levees practice area. His work has included managerial responsibilities for project budgets and schedules and has primarily supported federal and power clients for both small and large projects. Clinton has managed and supported projects for risk assessments, slope stability analyses, and instrumentation for landfills and dams.

Specialties

Landfill and CCR Design and Remediation
Dam Safety
Geotechnical Instrumentation

Education

PhD, Civil Engineering, University of Michigan, Ann Arbor, MI, 2014
MSE, Civil Engineering, University of Michigan, Ann Arbor, MI, 2010
BSE, Civil & Environmental Engineering, University of Michigan, Ann Arbor, MI, 2009

Licenses/Certifications

Professional Engineer: MI

Relevant Project Experience

Annual Inspections of CCR Units, Confidential Client, Southeast Michigan | Inspections of CCR units are conducted annually as part of the CCR Rule to identify any site conditions that pose a concern to the safe operation and stability of the CCR units. Project manager in charge of financials and engineer in charge of performing annual inspections for three CCR units for a client in Southeast Michigan. Prepared inspection reports to summarize observed conditions at the three CCR units. Interacted with client representatives to discuss necessary actions to address potential concerns. (Mar. 2022–Present)

Monitoring and Maintenance for CCR Units, Confidential Client, Southeast Michigan | Project manager in charge of financials and engineer in charge of overseeing inspections, monitoring, and maintenance of geotechnical instrumentation system of two CCR units for a client in Southeast Michigan. The geotechnical instrumentation system included multiple monitoring wells, settlement plates, vibrating wire piezometers, manual inclinometers, and ShapeArray inclinometers. Instrumentation data were evaluated to identify near real-time concerns for the safe operation and stability of the CCR units. Provided monthly summary reports to the client representatives and met with them to discuss the monitoring data on a bi-monthly basis. Conducted site inspections of observed conditions posing concerns for the safe operation and stability of the CCR units on at the request of the client. (Mar. 2022–Present)

Landfill Stability Evaluation, Confidential Client, Southeast US | Contacted by the client to evaluate an instability at an existing landfill including the implementation of instruments to measure and evaluate progression of instability. Project manager in charge of financials and engineer in charge of developing instrumentation plan and evaluating measurements of instrumentation. Conventional surveying stakes and an automated monitoring total station were implemented to measure progression of instability. Evaluation of measurements was used to inform the client on progression of instability and provide recommendations for implementation of mitigation measures. Weekly summary reports of instrumentation measurements were provided to the client while implementing mitigation measures. Additional support was provided to the client in discussions with the state regulator. The monitoring systems were also utilized to provide additional safety measures during the staged temporary removal of a buttress berm in order to tie-in liner systems for new landfill cells to the existing liner system. Monitoring data are currently summarized in monthly reports and provided to the client. (Aug. 2019–Present)

Landfill Design Projects for Power Company, Confidential Client, Southeast US | Engineer in charge of coordinating and performing the geotechnical analyses for the permitting and closure of multiple sites for a power company. Geotechnical analyses performed for the sites included subsurface investigation and geotechnical material properties interpretation, slope stability analyses (including veneer and liner

stability), settlement calculations for liner and cover systems, and hydrologic evaluations for liner and cover systems. The computer programs Slide and HELP were used to perform the slope stability analyses and hydrologic evaluations, respectively. (June 2015–Present)

Portsmouth Gaseous Diffusion Plant On-Site Waste Disposal Facility, Fluor-BWXT Portsmouth, Piketon, OH | The Department of Energy's Portsmouth On-Site Waste Disposal Facility is being constructed for the disposal of on-site hazardous waste materials. Engineer that aided geotechnical analyses for the design and construction of the facility. Geotechnical analyses performed during the design phase included slope stability analyses (including veneer and liner stability), settlement calculations for liner and cover systems under variable loads, and foundation design for leachate conveyance systems. During construction, performed slope stability analyses for excavation conditions and geo-structural calculations and reinforcement detailing for reinforced concrete valve houses constructed as part of a leachate transmission system and a footing for an interim transfer ramp. The computer program Slide was used to perform the slope stability analyses. (Apr. 2015–Present)

Inspections and Mitigation for CCR Landfill, Confidential Client, Southeast Michigan | Probabilistic slope stability analyses for a CCR landfill in Southeast Michigan identified unsatisfactory conditions for existing slopes that required mitigation measures. Project manager in charge of project financials and schedule and engineer in charge of developing inspection and construction plans to mitigate unsatisfactory conditions. Developed an inspection plan to identify indicators of slope instabilities and allow for safe operation conditions. The inspection plan was carried out by site personnel prior to and during construction and supported by Geosyntec. Developed a construction plan to regrade the slopes and mitigate the unsatisfactory conditions. Performed site inspections and met with client representatives and contractors during construction to verify safe working conditions and satisfactory slope conditions were achieved. (Feb. 2022–May 2022).

Probabilistic Slope Stability Assessment for CCR Landfill, Confidential Client, Southeast Michigan | Previous site inspections identified potentially unstable slopes at a CCR landfill in Southeast Michigan, so probabilistic slope stability analyses were performed to evaluate the reliability of the slope conditions given limited site information. Engineer that aided in review of probabilistic slope stability analyses and slope stability assessment report. Recommendations were developed and provided to the client to address unsatisfactory conditions for existing slopes identified in the probabilistic site response analyses. (Nov. 2021–May 2022).

Review of Slope Stability Analyses and Dewatering Plan, Confidential Client, Southeast Michigan | Contacted by client to review slope stability analyses performed by another consultant for a landfill of concern and provide comments to the client. Project manager in charge of reviewing analyses, project budget and schedule, and meeting with the client. Based on comments and meeting with the client, Geosyntec was asked to review a dewatering plan developed for the landfill and provide comments. Met with client and discussed the dewatering plan developed by the other consultant. (Nov. 2021–Apr. 2022)

Quantitative Risk Assessment for Dam in Southeast US, Confidential Client, Southeast US | The project further refines estimates of risk developed from previous potential failure mode analyses and semi-quantitative risk analyses performed for an embankment dam and its primary and auxiliary spillways located in the Southeastern U.S. Project manager in charge of financials and schedule for the Quantitative Risk Assessment (QRA) of the dam. The main objectives of the QRA are to estimate the risk, in terms of annual failure probabilities and downstream consequences, for seismic, internal erosion, and spillway hydrologic failure modes and the uncertainties associated with the risks. Actively participated in the expert elicitation process to develop risk models and meetings with the client to present the models and results of the QRA. Prepared calculation packages and reports summarizing the methods used in the QRA and the results for the client. Aided in the ground motion selection, internal erosion evaluation, and evaluation of the erodibility of the embankment soils. (May 2018–Apr. 2022)

Field Investigation of Primary Spillway for Dam in Southeast US, Confidential Client, Southeast US | Field engineer for oversight of a visual inspection and investigation of the foundation of the primary spillway slabs and control structure for a dam in the Southeast U.S. Observations from the field investigation were used to inform a QRA performed for the dam and its spillways. The visual inspection

was performed to identify vertical offsets and gaps in the joints between the slabs of the primary spillway. A field investigation consisting of shallow cores through the concrete slabs of the spillway and deep borings into competent rock below the control structure was performed to evaluate the foundation materials of the primary spillway and the presence of voids. (Jan. 2021–May 2021)

Landfill Stability Evaluation, Confidential Client, Southeast US | Contacted by the client to evaluate an instability at an existing landfill including the root cause of the instability. Project manager in charge of financials and engineer in charge of coordinating and performing slope stability analyses. Slope stability analyses were performed to evaluate the root cause of the instability and mitigation measures required to stabilize the landfill. Results of the analyses were used to support the client in discussions with the state regulator and advise the client on a path forward for stabilizing the landfill. A facility-wide stability plan was also developed based on the stability of the landfill for the existing conditions and the final planned conditions. Analyses were also performed for a staged temporary removal of a buttress berm in order to tie-in liner systems for new landfill cells to the existing liner system. Aiding in ongoing annual landfill stability assessments. (Aug. 2019–Dec. 2020)

Onondaga Lake Geotechnical Monitoring, Honeywell, Syracuse, NY | Contaminated sediments were dredged from Onondaga Lake and consolidated within geotextile tubes at an off-site landfill as part of a Superfund project. Geotechnical instrumentation systems were implemented to monitor (i) a sheetpile wall around a portion of the Lake dredged for remediation and (ii) a landfill closure comprised of geotextile tubes filled with sediments dredged from the Lake. Manager in charge of financials and engineer in charge of monitoring the instrumentation data. The monitoring systems included manual and automated inclinometers, settlement cells, vibrating wire piezometers, and surface monitoring points. (Feb. 2015–Oct. 2018)

Stability and Internal Erosion Assessment of Clear Creek Dam and Beaver Creek Dam, Tennessee Valley Authority, Bristol, TN and VA | Static and seismic stability of two earthen embankment dams in the twin cities of Bristol, TN and VA, Clear Creek Dam (BTC) and Beaver Creek Dam (BTB), were assessed along with the internal erosion for potential failure modes identified in the Potential Failure Mode Analyses (PFMA). Engineer in charge of seismic site response analyses and internal erosion evaluations for two earthen embankment dams. Performed seismic response analyses and used the results to perform the liquefaction potential evaluation. The seismic response analysis was performed using the computer program Strata. Internal erosion evaluations were performed for the critical potential failure modes identified by the project team for each dam. (Mar. 2017–Sept. 2017)

Onondaga Lake Capping and SCA Design, Honeywell, Syracuse, NY | Contaminated sediments were dredged from Onondaga Lake and consolidated within geotextile tubes at an off-site landfill as part of a Superfund project. Engineer that aided in slope stability analyses and hydrologic evaluations for: (i) a sheetpile wall around a portion of the lake dredged for remediation and (ii) a landfill closure comprised of geotextile tubes filled with sediments dredged from the lake. Stability analyses for the sheetpile wall included the internal stability (i.e., overturning and bending) of the sheetpile wall adjacent to the dredged lakebed and the global stability of the wall under the loading of an adjacent railroad line. The stability analyses of the landfill closure included the veneer stability of the liner and cover systems and the internal, interface, and global stability of the stacked geotextile tubes. The computer programs ShoringSuite, Slide, and HELP were used to perform the internal stability analyses for the sheetpile wall, global stability analyses of the wall and landfill closure, and the hydrologic evaluations, respectively. (Feb. 2015–May 2016)

APPENDIX B

2022 Annual Inspection Forms and Photos

Monroe Power Plant
Vertical Extension Landfill
2022 Annual Inspection Report

Name of Landfill: Monroe Vertical Extension Landfill
EGLE Landfill ID 397800
Owner: DTE Electric Company
Operator: DTE Electric Company
Site Conditions: Some moist areas from rain

Qualified Professional Engineer: Clinton Carlson, PhD, PE
Date: 4/6/2022 **Time:** 4 pm to 530 pm
Weather: Slight Rain, 50s, Cloudy
Precipitation (past week): 0.1 in.

I. Landfill Condition

1. Describe operations in the landfill: Disposal of bottom ash, FGD sludge
   Other:

2. Are any stormwater swales obstructed? ___ Yes X No
   If 'Yes', describe (type of debris, reason for obstruction, etc.)
   Standing water is observed in some areas (see Photographs 7, 10, 12, 16, 17, 18, and 20);
   however, perimeter swales still drain.

3. Are there indications of erosion on the landfill perimeter berm? ___ Yes X No
   If 'Yes', describe what type and its condition (rill, gully, dimensions, etc.)
   None observed. Proper vegetation is in place (see Photographs 2, 6, 14, 21, 24, 26, 28, and 36).

4. Is run-off from the landfill surface contained by the perimeter ditch or Ash Basin? X Yes ___ No
   If 'No', describe where runoff flow is not contained.
   Perimeter swales were observed to have standing water. Water was contained in the swales and levels
   are below the pore pressure relief pipe outlets.

5. Is run-on prevented from entering the landfill area? X Yes ___ No
   If 'No', describe where runoff flow is not contained.
   Run-on is prevented by perimeter swales and berms.

6. Is the underdrain collection system draining? X Yes ___ No
   Describe flow conditions. Some sediment was observed in the pore pressure relief pipe outlets
   (see Photographs 3, 5, 9, 27, and 34).
   Sediment build-up does not appear to impede flow in the pore pressure relief pipes.
   One pipe was observed to be draining at the time of inspection (see Photograph 30).

7. Is there any unusual settlement causing "birdbaths"? ___ Yes X No
   If 'Yes', describe.

8. Other observations around the landfill (changes since last inspection): X Yes ___ No
   If 'Yes', describe.
   The new asphalt access road (see Photograph 1) and culvert (see Photograph 31 and 32) constructed in 2021
   have been constructed following recognized and generally accepted good engineering practices.

Monroe Power Plant
Vertical Extension Landfill
2022 Annual Inspection Report

Name of Landfill: **Monroe Vertical Extension Landfill** **Qualified Professional Engineer:** Clinton Carlson, PhD, PE
EGLE Landfill ID 397800 **Date:** 4/6/2022 **Time:** 4 pm to 530 pm

II. Repairs, Maintenance, Action Items

1. Has any routine maintenance been conducted since the last inspection? X Yes ___ No
   If 'Yes', describe.
   Regular maintenance has been implemented on the perimeter berms and swales and continuous monitoring system.

2. Have any repairs been made since the last inspection? X Yes ___ No
   If 'Yes', describe.
   Repairs were made to Data Logger-4 for the continuous monitoring system.

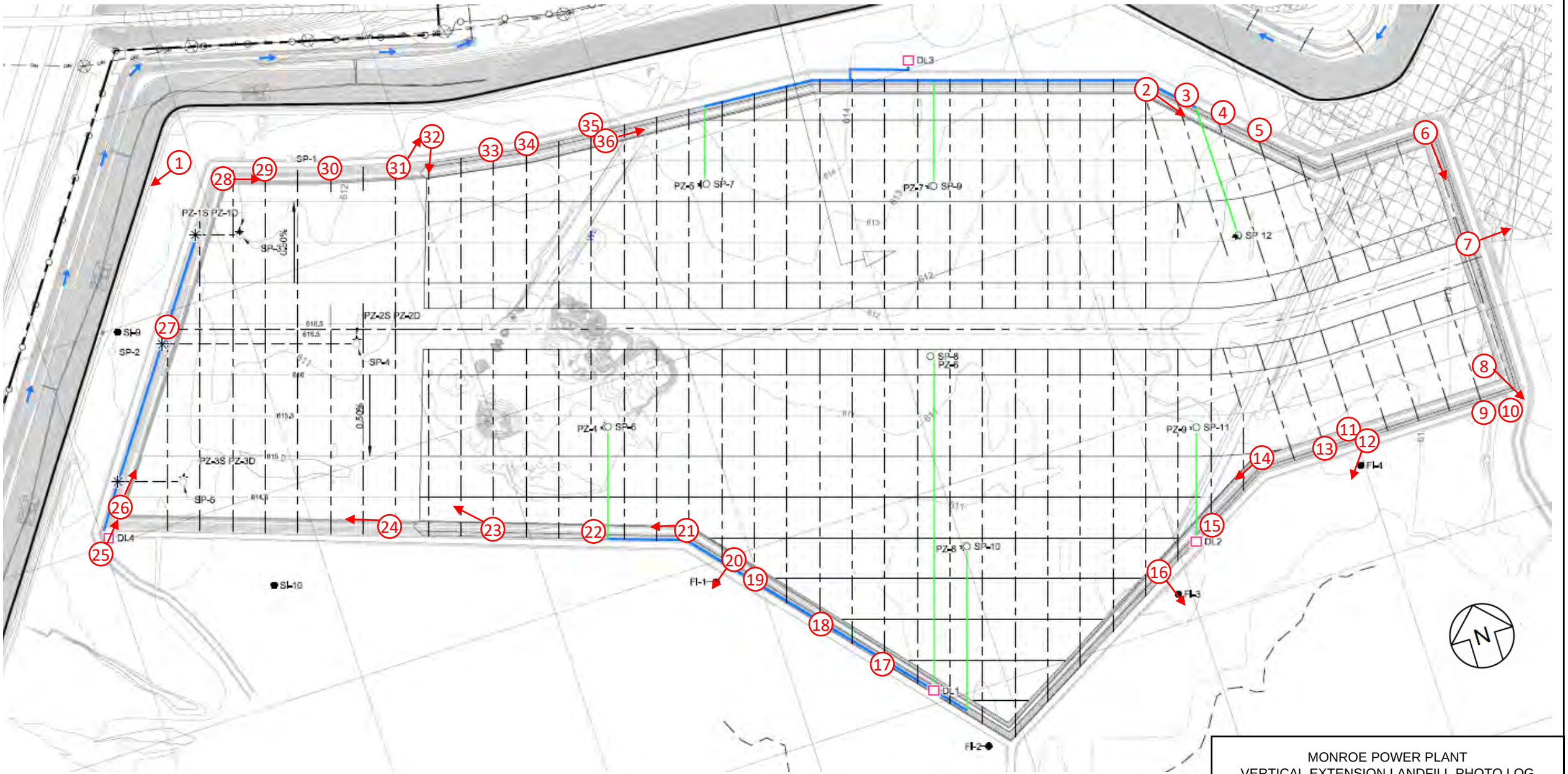
3. Has this inspection identified any need for repair or maintenance? ___ Yes X No
   If 'Yes', describe and state the urgency of maintenance. "Urgent" for maintenance that should be conducted as soon as possible, "Moderate" for maintenance that should be conducted within three months, and "Not Urgent" for maintenance that can be conducted within a year.

4. Are the instrumentation intact and functioning? X Yes ___ No
   If 'No', describe conditions of instrumentatior
   PZ-4 was decommissioned and left in-place.

III. Photography

Photographs can be taken of notable features. List of photographs:

	Location	Direction of Photo	Description
i.	SEE THE ATTACHED PHOTO LOG		
ii.			
iii.			
iv.			
v.			
vi.			
vii.			
viii.			
ix.			
x.			



DIRECTION OF PHOTO

PHOTO NUMBER

MONROE POWER PLANT
VERTICAL EXTENSION LANDFILL PHOTO LOG

Geosyntec consultants
DETROIT, MICHIGAN

PROJECT: CHE8242

JANUARY 2023

FIGURE
B1

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 1 **Date:** 4/6/2022 **Direction:** West **Comments:** New asphalt access road for the Vertical Extension Landfill. Northwest side of Landfill.	
Photograph 2 **Date:** 4/6/2022 **Direction:** Southeast **Comments:** Perimeter berm slopes and crest along northeast side.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 3 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed.	
Photograph 4 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Some vegetation inside the pipe.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 5 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed.	
Photograph 6 **Date:** 4/6/2022 **Direction:** South **Comments:** Perimeter berm slopes and crest along east side.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 7 **Date:** 4/6/2022 **Direction:** East **Comments:** Standing water observed in the perimeter swale.	
Photograph 8 **Date:** 4/6/2022 **Direction:** Southeast **Comments:** Existing culvert in the southeast corner of the Landfill.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 9 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed.	
Photograph 10 **Date:** 4/6/2022 **Direction:** **Comments:** Southeast culvert pipe. Water observed in perimeter swale.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 11 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Area is heavily vegetated.	
Photograph 12 **Date:** 4/6/2022 **Direction:** Southwest **Comments:** Standing water observed in the perimeter swale.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 13 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Area is heavily vegetated.	
Photograph 14 **Date:** 4/6/2022 **Direction:** Southwest **Comments:** Perimeter berm slopes and crest along south side.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 15 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Area is heavily vegetated.	
Photograph 16 **Date:** 4/6/2022 **Direction:** South **Comments:** Standing water observed in the perimeter swale.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 17 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Area is heavily vegetated. Standing water is observed in the perimeter swale.	
Photograph 18 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Area is heavily vegetated. Standing water is observed in the perimeter swale.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 19 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Area is heavily vegetated.	
Photograph 20 **Date:** 4/6/2022 **Direction:** Southwest **Comments:** Standing water observed in the perimeter swale.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 21 **Date:** 4/6/2022 **Direction:** West **Comments:** Perimeter berm slopes and crest along south side.	
Photograph 22 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Area is heavily vegetated.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 23 **Date:** 4/6/2022 **Direction:** Northwest **Comments:** CCR and other material beginning to be placed in Phase 2 of the Landfill.	
Photograph 24 **Date:** 4/6/2022 **Direction:** Northwest **Comments:** Perimeter berm slopes and crest along south side adjacent to Phase 1 of the Landfill.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 25 **Date:** 4/6/2022 **Direction:** Northeast **Comments:** Data Logger-4 for continuous monitoring system. Maintenance was performed in April 2022 to repair the antenna and restore connectivity with a portion of the monitoring system.	
Photograph 26 **Date:** 4/6/2022 **Direction:** Northeast **Comments:** Perimeter berm slopes and crest along west side adjacent to Phase 1 of the Landfill.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 27 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed.	
Photograph 28 **Date:** 4/6/2022 **Direction:** East **Comments:** Perimeter berm slopes and crest along north side adjacent to Phase 1 of the Landfill.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 29 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Area is heavily vegetated.	
Photograph 30 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment. Some flow observed. Pipe is below northeastern portion of Phase 1 Landfill.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 31 **Date:** 4/6/2022 **Direction:** Northeast **Comments:** Culvert constructed for the new asphalt access road to the Landfill.	
Photograph 32 **Date:** 4/6/2022 **Direction:** South **Comments:** Entrance of the new asphalt access road to the Landfill.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 33 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Area is heavily vegetated.	
Photograph 34 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed.	

DTE ELECTRIC COMPANY
Photographic Record

Client: DTE Electric Company | **Project Number:** CHE8242V

Site Name: Monroe Power Plant
Vertical Extension Landfill | **Site Location:** Monroe, MI

Photograph 35 **Date:** 4/6/2022 **Direction:** **Comments:** Pore pressure relief pipe outlet. Minimal sediment and no flow observed. Area is heavily vegetated.	
Photograph 36 **Date:** 4/6/2022 **Direction:** East **Comments:** Perimeter berm slopes and crest along north side.