

DTE Energy®



Prepared for

DTE Electric Company
One Energy Plaza
Detroit, Michigan 48226

2018 ANNUAL INSPECTION REPORT SIBLEY QUARRY LANDFILL

Trenton, Michigan

Prepared by

Geosyntec 
consultants

engineers | [scientists](#) | [innovators](#)

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CHE8312

January 2019

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1. INTRODUCTION

1.1 Overview

This 2018 Annual Inspection Report (AIR) was prepared by Geosyntec Consultants (Geosyntec) for DTE Electric Company's (DTE's) Sibley Quarry Landfill ("Landfill"). The inspection was performed to comply with United States Environmental Protection Agency (USEPA) Coal Combustion Residual (CCR) Rule (CCR Rule) published on April 17, 2015 (40 CFR Parts 257 and 261). Under the CCR Rule, Sibley Quarry is an "existing landfill" and must be inspected by a qualified professional engineer on a periodic basis, not to exceed one year.

The site is located in Trenton, Michigan. The site is an inactive limestone quarry that was operated since the mid-nineteenth century and mined to a depth of over 300 feet below ground surface ("bgs") in some areas. The site is currently licensed as an existing Type III low hazard waste landfill under the provisions of Michigan Part 115, Solid Waste Management, of the Natural Resource and Environmental Protection Act (NREPA), 1994 Public Act ("PA") 451.

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 (40CFR 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 previous inspection and discussions with site personnel about the history of the site and general operations at the Landfill.

1.3 Report Organization

The remainder of this report is organized as follows:

- Section 2 - The Site History and Current Operations: provides information on the history of the site and DTE's current operations.
- Section 3 - Inspection Results: summarizes visual observations recorded during inspections of the Landfill.
- Section 4 - Evaluation: evaluates the results of the inspection to assess if the design, construction, operation, and maintenance of the CCR unit are consistent with recognized and generally accepted good engineering standards.
- Section 5 - Conclusions: provides the overall conclusions of the annual inspection.

1.4 Terms of Reference

The annual visual inspection was performed on 23 April 2018 by Mr. Omer Bozok, P.E. of Geosyntec¹, with assistance from DTE Staff.

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

¹ Omer Bozok, P.E. is the qualified professional engineers per the requirements of §257.53 of the CCR Rule. He has nine years of practicing experience with coal ash related projects. His resume is provided in Appendix B.

2. THE SITE HISTORY AND CURRENT OPERATIONS

The site was originally operated as a limestone quarry since the 1800s. The site was acquired by DTE in 1951 and has been operated as a landfill since acquisition. Over the life of the Landfill, it received CCR (mainly fly ash with some bottom ash) from various DTE power plants. The Landfill is licensed to receive coal ash, sewage sludge incinerator ash, waste gypsum, kiln dust, and inert material. The approximate disposal rate is 7,000 CY/month based on latest data.

There are no construction or design documents available for the original quarry. Based on review of current and historical maps, and correspondences with DTE personnel, limestone and dolomite was mined from the site to a depth of approximately 300 feet bgs, with multiple setbacks.

The Site is approximately 207 acres, of which approximately:

- (i) 92 acres is currently licensed as an active landfill area;
- (ii) 90 acres have received final cover approved by Michigan Department of Environmental Quality (MDEQ); and
- (iii) the remaining 25 acres is not used for disposal.

The operations at the site consist of three main activities:

- (i) placement of CCR;
- (ii) continuous pumping of groundwater and stormwater; and
- (iii) treatment of pumped water before discharging into the Detroit River through a National Pollutant Discharge Elimination System (NPDES) permit.

CCR is disposed by end-dumping and spreading. The area of active landfilling that is occupied by CCRs is approximately 64 acres as shown in Figure 1. The amount of CCR disposed in the Landfill is currently estimated to be approximately 18,150,000 CY.

Groundwater is continuously pumped from the lowest point of the quarry to maintain a consistent water level below the CCR. Therefore, the steady state groundwater level is maintained below the lower most area of the quarry. The pumping rate is approximately 1.5 million gallons per day (MGD) based on discussions with site personnel. Groundwater is pumped into two ponds located at the top of the quarry (referred to as “upper ponds”). Water from the upper ponds discharges into a conveyance channel. The conveyance channel is approximately one-half mile long and conveys water to settling ponds. A pump house at the southern end of the settling ponds pumps

the water to the Detroit River. The water is discharged to the Detroit River consistent with NPDES permit requirements.

Water samples are collected weekly from the pump house and analytical results are compared to the limits provided in the NPDES permit.

Dust at the site is controlled in accordance with the site specific Fugitive Dust Plan. Per the plan: (i) vehicular speed is limited to a maximum 15 mph; (ii) paved surfaces are frequently swept with wet broom equipment; and (iii) unpaved roads are wetted during landfill operations, as necessary. Unpaved roads are also treated with an acrylic cement emulsion two times per year. In addition, soil is placed onto CCR upon disposal (more information is provided in Section 3). DTE reported that there have been no citizen complaints for fugitive dust.

3. OBSERVATIONS FROM THE ANNUAL INSPECTION

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

- 1) The Landfill was originally operated as a limestone quarry, with mining of limestone and dolomite to a depth of approximately 300 bgs.
- 2) There were no disposal activities on the day of inspection. Based on discussions with the site personnel, CCR is disposed in the Landfill by end-dumping and spreading, which is consistent with the activities observed in the previous years. Trucks haul CCR to the active filling area using the access roads built with CCR and crushed limestone. Trucks dump CCR at the top of CCR slope near the crest. Then, a front-end loader or dozer pushes CCR onto the slope. There are several CCR slopes in the active disposal area. They are separated with two main setbacks (Photographs 1 and 5). The slopes are as high as approximately 180 ft with grades as steep as 1.25 horizontal to 1 vertical (1.25H:1V). Based on the current operations, CCR is placed from the top of most upper and lower slopes (Photographs 2 and 3 show active filling areas).
- 3) There is a safety zone observed along the highwall on the first bench.
- 4) There were no indications of slope instability on the CCR slopes at the time of inspection.
- 5) For fugitive dust control purposes for CCR, DTE stated that inert material is placed in the same manner as described in Item 2 upon CCR disposal. DTE is also utilizing sprinkler system for dust control in the active filling area where trucks operate (see Photograph 4).
- 6) The quarry bedrock side walls are fractured (see Photographs 13 and 14).
- 7) Portions of the exposed quarry side walls appeared to be damp or have active groundwater flow from a seam or bedrock layer interface (see Photograph 14).
- 8) Groundwater and stormwater that occurs within the quarry drains by gravity to the sump at the bottom of the quarry. Drainage channels were observed along the access roads, conveying water to lower elevations to sump at the bottom of the quarry (see Photograph 11). Based on discussions with the site personnel, the pump operating at the sump discharges approximately 1.5 MGD to keep the sump elevation at approximately 300 feet above mean sea level, which is coincidentally, approximately 300 feet bgs.
- 9) DTE is currently in the process of installing two new pumps to replace the existing single pump. Site personnel reported that the new pumps will have the same daily discharge rate.

- 10) Based on topographic information, the Landfill does not appear to have direct run-on from the adjacent areas.
- 11) Erosion gullies on the CCR slopes (see Photograph 5) were observed. These gullies do not have to be maintained due to the incised nature of the Landfill.
- 12) The Quarry sump, sump pump, upper ponds, conveyance channel and settling ponds appeared to be in good condition. Water discharging from the conveyance channel to Settling Pond #4 appeared to be clear (see Photograph 6).
- 13) No fugitive dust complaints were observed in the Landfill Operating Record.

4. EVALUATION OF OBSERVATIONS

The Landfill is operated within a quarry, below ground surface; and therefore, the side walls of the quarry provide the containment system for the Landfill. If the side walls were to fail, there would be no consequential release of CCR into areas beyond the footprint of the Landfill because the Landfill is below ground surface and failure would be contained within the quarry.

Two safety concerns for site personnel were observed and should be addressed through site operating procedures. The two concerns were: (i) safety and stability during filling operations near steep slopes, and (ii) working/travelling near fractured bedrock side walls that are subject to rockfall. Warning signs for “steep slopes” and “falling rock” were observed along vehicle routes. Also, a safety zone was observed along the highwall on the first bench, where active filling operations are conducted.

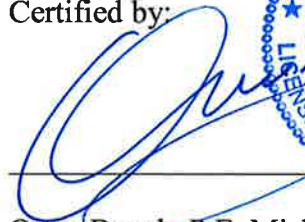
A draft Fill Plan was developed to address the safety issues. DTE is currently in the process of assessing the life time of the landfill and when it can be closed; once the long-term plan for the landfill is finalized, the draft fill plan will be revised and implemented.

5. CONCLUSIONS AND CERTIFICATION

The annual visual inspection did not identify evidence of structural weakness or instability of the containment system (quarry side walls) that would cause CCR to release into the areas outside the footprint of the Landfill.

There are no design and construction documents available for review as it is contained in a quarry. In general, the site is operated and maintained with recognized and generally accepted good engineering practices; safety concerns exist associated with filling operations near steep slopes and potential rock falls along traffic routes. Warning signs for “steep slopes” and “falling rock” were observed along vehicle routes. Also, a safety zone is observed along the highwall on the first bench, where active filling operations are conducted. DTE is in the process of finalizing the long-term operational plans for the landfill, then the draft operational fill plan will be revised to address safety concerns.

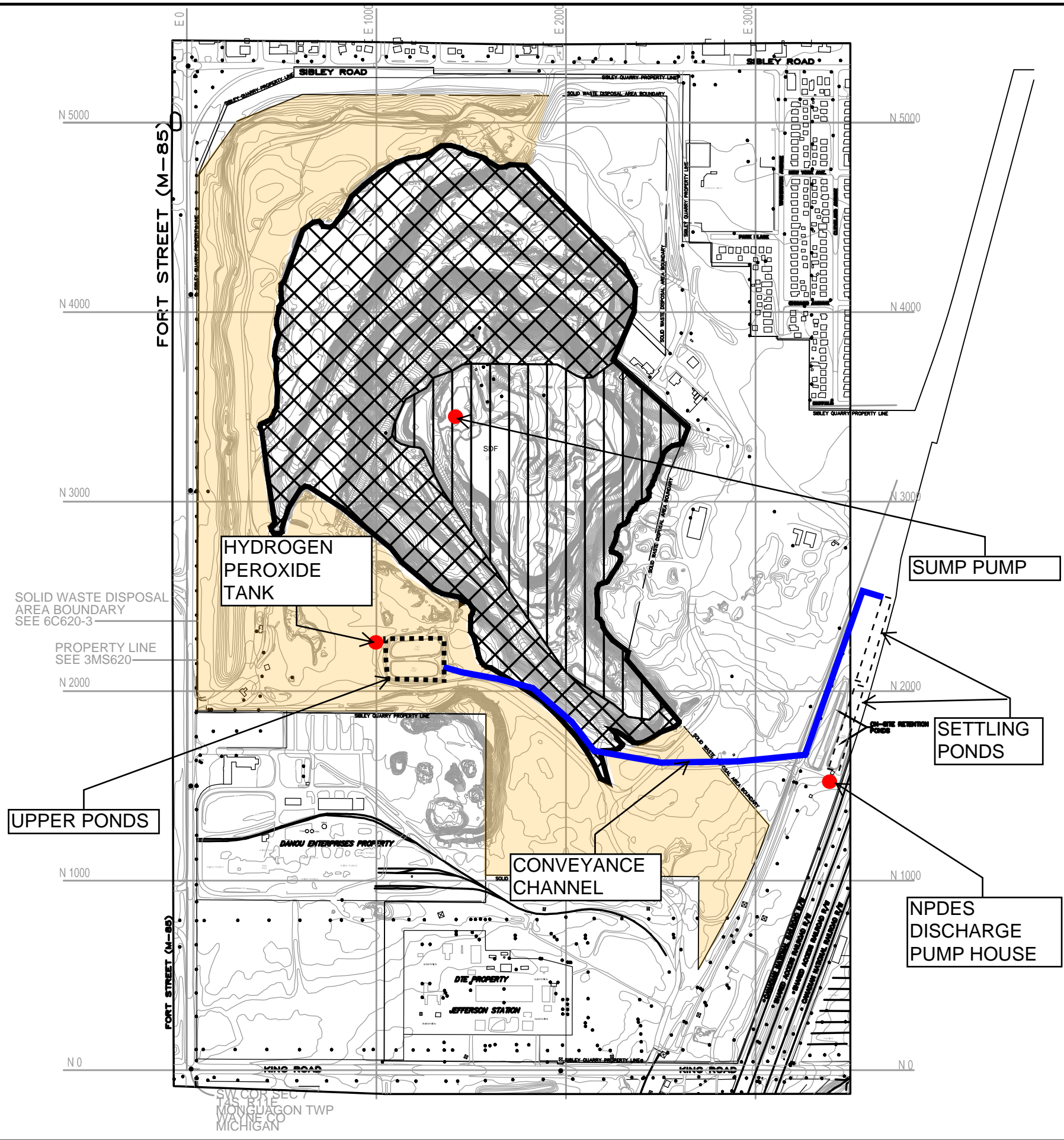
Certified by:



Date

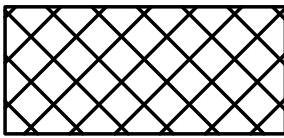



1/9/2019

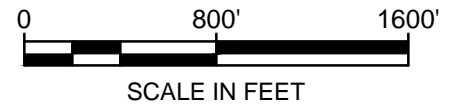
Omer Bozok, P.E. Michigan License Number 6201062700
Project Engineer




- NOTES:
1. TOPOGRAPHIC INFORMATION GENERATED FROM AERIAL PHOTOGRAPHY DATED 27 APRIL 2013 BY KUCERA INTERNATIONAL, INC., WILLOUGHBY, OH.
 2. APPROXIMATE BOUNDARY OF ACTIVE LANDFILLING OBTAINED FROM DTE DRAWING NO. 6SE 06200-021, DATED 31 OCTOBER 2013.
 3. APPROXIMATE NO WASTE BOUNDARY OBTAINED FROM CORRESPONDENCES WITH DTE ON 18 FEBRUARY 2015.

LEGEND

-  APPROXIMATE AREA OF WASTE REQUIRING FINAL COVER (64.2 AC)
-  APPROXIMATE AREA OF NO WASTE
-  APPROXIMATE BOUNDARY OF PERMITTED ACTIVE LANDFILLING AREA
-  APPROXIMATE LANDFILL AREA THAT RECEIVED CLAY COVER



APPROXIMATE EXTENT OF WASTE AT SIBLEY QUARRY LANDFILL	
 Geosyntec consultants CHICAGO, ILLINOIS	
PROJECT NO: CHE8312	JUNE 2018
FIGURE 1	

APPENDIX A

2018 ANNUAL INSPECTION FORMS AND PHOTOS

**Sibley Quarry - CCR Landfill
2018 Annual Inspection Report**

Name of CCR Landfill: <u>Sibley Quarry Landfill</u>	Qualified Professional Engineer: <u>Omer Bozok</u>
Owner: <u>DTE Energy</u>	Date: <u>23/4/2018</u> Time: <u>10 am to 3 pm</u>
Weather: <u>Sunny, 60s</u>	Precipitation (past week): <u>~1 in.</u>
Site Conditions: <u>Dry</u>	

I. Landfill Perimeter, Side Walls and Access Ramps

1. How would you describe the vegetation at the? (Check all that apply)
- | | |
|--|--|
| <input type="checkbox"/> Recently Mowed | Other (describe): _____ |
| <input checked="" type="checkbox"/> Overgrown | <u>Most of the area outside of the active filling area has a good cover of grass</u> |
| <input checked="" type="checkbox"/> Good Cover | <u>and trees. Area along the southeast corner of the quarry perimeter has sparse</u> |
| <input checked="" type="checkbox"/> Sparse | <u>vegetation.</u> |
| <input type="checkbox"/> Paved | |
| <input type="checkbox"/> Gravel | |
2. Are there any areas of hydrophilic (lush, water-loving) vegetation? Yes No
If 'Yes', describe (size, location, severity, etc.) _____
Multiple areas within the landfill, where water tends to flow through, or stand has established phragmites. This
vegetation is not on CCR slopes, but along drainage channels and on high wall setbacks.
3. Are there any trees or other undesired vegetation? Yes No
If 'Yes', describe (type of vegetation, size, location, etc.) _____
Most of the eastern and southern sides have
trees in various sizes. There are some trees observed on CCR cover on the northern, western and southern sides.
4. Is there an access ramp in the landfill? Yes No
If 'Yes', describe (good condition, numerous cracks, newly paved, stone uniformly distributed, etc.) _____
The access ramps are in good condition.
5. Are there any depressions, ruts, or holes on the access ramp or road? Yes No
If 'Yes', describe (size, location, etc.) _____
6. Are there any fractures on side walls? Yes No
If 'Yes', describe (length and width, location and direction of cracking, slough, or distress, etc.) _____
There are bedrock fractures on the quarry sidewalls.
7. Are there wet areas that indicate seepage through the side walls? Yes No
If 'Yes', describe (size, location, etc.) _____
Multiple areas on the quarry sidewalls show damp conditions or
natural groundwater seepage.
8. Other observations, changes since last inspection: _____

II. Stormwater Conveyance Structures

1. Describe what types of stormwater conveyance structures there are at the site (e.g. drop inlets, downchutes, benches, ponds, outlet structures, etc.).
- Stormwater within the footprint of the site gravity drains to the sump at the bottom of quarry. Channels were
observed along the access ramps, conveying stormwater/groundwater to lower elevations. There is a culvert at a low
spot underneath the access ramp conveying stormwater/groundwater to the sump.

**Sibley Quarry - CCR Landfill
2018 Annual Inspection Report**

Name of CCR Landfill: Sibley Quarry Landfill Qualified Professional Engineer: Omer Bozok
Owner: DTE Energy Date: 23/4/2018 Time: 10 am to 3 pm

2. Describe the condition of stormwater structures mentioned above. (Are they in working condition? Is there any erosion in or around the structures, signs of leakage or movement, etc.?)

All are in working order.

III. Landfill Conditions

1. Describe operations in the landfill (disposal, reclamation, general operational activities):
CCR from various DTE power plants are disposed in the landfill by end dumping and spreading method.

2. Are any stormwater controls obstructed? Yes No
If 'Yes', describe (type of debris, reason for obstruction, etc.) _____

3. Are there indications of erosion on the landfill slopes? Yes No
If 'Yes', describe what type and its condition (rill, gully, dimensions, etc.) _____
Gully erosion was observed on the active face of the CCR disposal area. There are no outer slopes because the CCR is contained within the quarry.

4. Is the leachate collection system functioning (describe discharge color, quantity)?
The upper ponds act as a leachate collection system since the CCR contact water may drain into the quarry sump, which is pumped to the upper ponds along with groundwater for treatment.

5. How is the leachate stored? Comment on the condition of the structure.
See the explanation for Item 4 above. The sump and the pump appeared to be in good condition.

6. Other observations around the landfill (changes since last inspection, etc.):
None

**Sibley Quarry - CCR Landfill
2018 Annual Inspection Report**

Name of CCR Landfill: Sibley Quarry Landfill Qualified Professional Engineer: Omer Bozok
Owner: DTE Energy Date: 23/4/2018 Time: 10 am to 3 pm

IV. Leachate Pond Spillways

1. What types of spillways does the leachate pond have (concrete, earth, riprap, etc.)?

Principal Spillway: _____ Emergency Spillway: _____

Other: There is no spillway.

V. Repairs, Maintenance, Action Items

1. Has any routine maintenance been conducted since the last inspection? Yes No

If 'Yes', describe. _____

Main sump pump is in the process of being replaced.

2. Have any repairs been made since the last inspection? Yes No

If 'Yes', describe. _____

3. Are there any areas of potential concern? Yes No

If 'Yes', describe. _____

There are two main concerns. One concern is that rock pieces may fall from the side walls during daily operations is a serious situation. The other concern is that the CCR slopes are relatively steep, 1.25 horizontal to 1 vertical (1.25H:1V) and as much as 180-ft high for a single CCR slope. Failure of CCR slopes is a serious situation.

4. Has this inspection identified any need for repair or maintenance? Yes 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 in a year. _____

VI. Photographs

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

	Location	Direction of Photo	Description
i.	<u>SEE THE ATTACHED PHOTO LOG.</u>	_____	_____
ii.	_____	_____	_____

**Sibley Quarry - CCR Landfill
2018 Annual Inspection Report**

Name of CCR Landfill: Sibley Quarry Landfill **Qualified Professional Engineer:** Omer Bozok

Owner: DTE Energy **Date:** 23/4/2018 **Time:** 10 am to 3 pm

iii.	_____	_____	_____
iv.	_____	_____	_____
v.	_____	_____	_____
vi.	_____	_____	_____
vii.	_____	_____	_____
viii.	_____	_____	_____
ix.	_____	_____	_____
x.	_____	_____	_____

DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 1

Date: 23 April 2018

Comments: Sibley Quarry Landfill.
Facing south.



Top of CCR slope on first bench where active filling operations is taking place

Photograph 2

Date: 23 April 2018

Comments: Active filling area. Facing east.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 3

Date: 23 April 2018

Comments: Active filling area, facing east.



Photograph 4

Date: 23 April 2018

Comments: DTE is utilizing a sprinkler for dust control on the top bench of active filling area when trucks are operating.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 5

Date: 23 April 2018

Comments: View of the active filling area, facing northwest.



Photograph 6

Date: 23 April 2018

Comments: Culvert connecting conveyance channel to Settling Pond #4 (facing south). Discharge water appeared to be clear.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 7

Date: 23 April 2018

Comments: View of Settling Pond #3 from the pump house where the aerators are located.



Photograph 8

Date: 23 April 2018

Comments: Water from the quarry is transferred to upper ponds.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 9

Date: 23 April 2018

Comments: View of upper ponds. Water is discharged into the conveyance channel through a culvert. Facing east.



Photograph 10

Date: 23 April 2018

Comments: Upstream end of the conveyance channel. Facing east.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 11

Date: 23 April 2018

Comments: DTE is in the process of replacing existing single pump to double pumps.



Photograph 12

Date: 23 April 2018

Comments: "Danger" signs are located along the haul roads.



DTE ELECTRIC COMPANY

Photographic Record

Client: DTE Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 13

Date: 23 April 2018

Comments: "Caution" signs for falling rock are located along highwalls.



Photograph 14

Date: 23 April 2018

Comments: Active groundwater inflow was observed on quarry walls.



APPENDIX B

**RESUME OF OMER BOZOK, P.E. (QUALIFIED
PROFESSIONAL ENGINEER)**

ÖMER BOZOK, P.E.¹

EDUCATION

M.S., Geotechnical Engineering, University of Missouri, Columbia, Columbia, Missouri, 2009

B.S., Geological Engineering, Hacettepe University, Ankara, Turkey, 2007

CAREER SUMMARY

Mr. Bozok is a project engineer and has been with Geosyntec for eight years. He is responsible for managing large-scale civil projects, reviewing engineering data, writing technical reports, generating/reviewing drawings, performing geotechnical analyses and design, and managing construction quality assurance (CQA) activities.

Civil Design and Engineering

Embankment Mitigation for Fly Ash Basin, DTE Energy, Monroe, Michigan. The project involved design and mitigation of an existing fly ash basin embankment that is 3.5-miles long and 40-ft high. Mr. Bozok served as the project manager. Mainly, mitigation measures included flattening of the existing slopes from 2 horizontal to 1 vertical (2H:1V) slopes to 2.5H:1V with a mid-slope stormwater conveyance channel. The project was completed in five construction seasons (2009 through 2013).

The project won DTE's "Best Large Project Award" under their Major Enterprise Project group. The five-year project was completed under budget, within schedule and with no safety incidents.

Stingy Run Fly Ash Reservoir Closure, American Electric Power, Cheshire, Ohio. The project involved closure of an existing 300-acre fly ash pond and lowering of 100-ft tall dam. Mr. Bozok served as the project manager. The project requires approximately 4 million CY of earthwork. The scale of the project, nature of loose ash, lowering of the dam, nearby highwalls, wetlands and streams make it a challenging design project and involves collaboration between different disciplines.

Wood River West Ash Complex Closure, Vistra Energy, East Alton, Illinois. Mr. Bozok is the project manager and the lead civil design engineer for the project that involves closure of an existing 50-acre fly ash pond, detailed dewatering design and relocation of plant discharge pipes. The project requires approximately one million CY of earthwork. The availability of limited on-site materials, nature of loose ash, and extent of groundwater makes it a challenging project.

MIG/DeWane Superfund Site Remedial Design, Republic Services, Belvidere, Illinois. Mr. Bozok was the lead design engineer for closure of a Superfund site, and managed CQA activities during construction. The project involved preparing remedial design construction drawings for an existing approximately 50-acre Superfund site to upgrade an interim cap that had been installed in 1990s. Design included: (i) construction of leachate and gas collection system consisting of approximately 4,000-ft long leachate and gas collection system trench, and underground and above ground storage tanks; (ii) augmentation of the existing clay fill cover by compacting additional clay fill; and (iii) implementation of stormwater management system.

¹ Licensed in Michigan and Ohio, currently working on reciprocity for Illinois.

Escanaba Ash Pond Fly Ash Removal, City of Escanaba, Escanaba, Michigan. The project involved closure of an existing one-acre ash pond by removal. Mr. Bozok served as the project manager and oversaw quality assurance activities for the construction.

Review of Safety Factor Assessments for Various Sites, Dynegy, various locations. Mr. Bozok was a key member of a team, which reviewed safety factor assessments for various high risk sites that were prepared by another consulting firm. The documents were prepared to meet the requirements of USEPA CCR rules and required diligent review before made available to the public.

Use of Instrumented Test Fill to Assess Static Liquefaction of Impounded Fly Ash for Cardinal Landfill, American Electric Power, Brilliant, Ohio. Mr. Bozok provided geotechnical services for a research project on static liquefaction of impounded fly ash.

Engineering Correlations for Geotechnical Parameters for Pounded Fly Ash, EPRI, Palo Alto, California. The project involved performing a field plate load test at an ash basin site and preparing a report summarizing findings of the study. Mr. Bozok was one of the principal investigators and managed the field investigation activities and the plate load testing.

Annual Inspection of Ash Impoundments and Landfills, DTE Energy, various locations. Mr. Bozok inspected Sibley Quarry Landfill and Monroe Ash Basin and prepared annual inspection reports per the requirements of USEPA CCR rules.

Documentation for USEPA CCR Rules, DTE Energy, Monroe, Michigan. Mr. Bozok assisted client with meeting the documentation requirements of USEPA CCR rules. The rule requires various documentation regarding the history of construction, operations and design of various structures. He directed hydraulic capacity and safety factor assessments.

Probabilistic Slope Stability Analysis for Fly Ash Basin, DTE Energy, Monroe, Michigan. The client was considering mitigating a portion of a 3.5-miles long and 40-ft high the embankment to improve slope stability safety factor. Mr. Bozok performed probabilistic slope stability analysis to assess the global stability and recommend mitigation measures. Mr. Bozok provided the client with a probability of failure information for the embankment and the client decided that mitigation was not necessary. This provided the client with approximately 5-million-dollar savings.

Emergency Action Plan for Fly Ash Basin, DTE Energy, Monroe, Michigan. Mr. Bozok prepared an Emergency Action Plan (EAP) for the Monroe Ash Basin. The Ash Basin is critically bounded on the east by Lake Erie, on the west by Interstate Highway 75 (I-75), on the north by Plum Creek, and on the south by an agricultural field. Mr. Bozok evaluated four failure scenarios at critical locations around the perimeter embankment and developed the EAP based on Federal Emergency Management Agency Guidelines for Dam Safety.

Potential Failure Mode Analysis for Fly Ash Basin, DTE Energy, Monroe, Michigan. Mr. Bozok worked with the client to identify potential failure modes for a 400-acre ash basin that could cause ash release. Mr. Bozok facilitated meetings with client's staff including personnel from operations, maintenance, engineering and environmental group, to rank and categorize potential failure modes. Upon, identifying medium and high risk failure modes, Mr. Bozok worked with the client to design and implement mitigation measures to lower risk levels.

Operations Plan for Fly Ash Basin, DTE Energy, Monroe, Michigan. Project involved installation of a continuous monitoring and alarm system for the ash basin embankment inclinometers. Mr. Bozok directed a group of field staff and instrumentation engineers to implement the program. The operations

plan provides guidelines on how to safely operate the fly ash basin, structures, provides communication procedures, and provides action criteria for surface and subsurface instrumentation.

PUBLICATIONS

- Bozok, O., Sabatini, P.J., Amaya, P. (2013) “Use of Instrumented Test Fill to Assess Static Liquefaction of Impounded Fly Ash” World of Coal Ash Conference 2013, Lexington, KY
- Bozok, O., Tanyu, B.F., Sabatini, P.J., Seymour, J.S. (2015) “Reliability Analysis of an Existing Ash Basin Embankment” World of Coal Ash Conference 2015, Nashville, TN
- Seymour, J.S., Bozok, O., Hughes, A., Bodine, B. (2015) “Conditions of Coal Ash Embankments” World of Coal Ash Conference 2015, Nashville, TN
- Sabatini, P.J., Bozok, O., Andonyadis, P., Yafrate, N. (2014) “Engineering Correlations for Geotechnical Parameters for Poned Fly Ash”, EPRI Document #3002001151, July 2014
- Tanyu, B.F., Neal, W., Seymour, J.P., Bodine, D., Bozok, O. (2011) “Case Study: Stability of Two Horizontal to One Vertical Embankment” ASCE, *Geo-Frontiers Conference*, March, Dallas, Texas.