

**DTE Energy®**



*Prepared for*

**DTE Energy**  
One Energy Plaza  
Detroit, Michigan 48226

# **2015 ANNUAL INSPECTION REPORT SIBLEY QUARRY LANDFILL**

**Trenton, Michigan**

*Prepared by*

**Geosyntec**   
consultants

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

134 North La Salle Street, Suite 300  
Chicago, Illinois 60602

CHE8212

January 2016

15 January 2016

*Via email*

Mr. Joseph Garavaglia  
DTE Energy  
One Energy Plaza  
Detroit, Michigan 48226

**Subject: 2015 Annual Inspection Report  
Sibley Quarry Landfill Annual Inspection**

Dear Mr. Garavaglia:

Geosyntec Consultants (Geosyntec) is pleased to provide you with the attached final Annual Inspection Report file as a pdf. It is to be placed in the operating record and on the publicly accessible internet website on January 18, 2016 in accordance with 40 CFR 257. Please call if you have any questions.

Sincerely,



Omer Bozok, P.E.  
Engineer

Copies to: William Neal, P.E. - DTE Energy  
John Seymour, P.E. - Geosyntec

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Figure 1 Approximate extent of waste at Sibley Quarry Landfill

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## 1. INTRODUCTION

### 1.1 Overview

This 2015 Annual Inspection Report (AIR) was prepared by Geosyntec Consultants (Geosyntec) for DTE Energy'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 has been mined to a depth of over 300 feet below ground surface ("bgs") in some areas. The site is currently permitted 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 by Mr. Omer Bozok, P.E. of Geosyntec<sup>1</sup>, with assistance from DTE Staff.

This report was prepared by Mr. Omer Bozok. The peer review and senior review was completed by Mr. John Seymour, P.E. of Geosyntec.

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<sup>1</sup> Omer Bozok, P.E. is the qualified professional engineers per the requirements of §257.53 of the CCR Rule. He has six 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 has received CCR (mainly fly ash with some bottom ash) from various DTE power plants. Currently, the Landfill receives fly ash and some bottom ash<sup>2</sup> from the Trenton Power Plant (the main source), River Rouge Power Plant, and receives flue gas desulfurization material from the Monroe Power Plant. In addition, DTE reported that inert materials from various sites are disposed and used as CCR cover. On average, 60 to 70 tons of CCR (10 to 15 truckloads) is received daily.

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 18,560,000 CY<sup>3</sup>.

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

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<sup>2</sup> Fly ash and bottom ash will be referred to as “CCR” in the remaining of the report.

<sup>3</sup> Reported by Mark Nederveld of DTE.

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 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.

Currently, some of the plans required by the CCR Rule have not been prepared and are not required to be prepared until specified times in the future. These plans and deadlines are summarized below.

- Surface Water Run-on and Run-off Control Plan (per 257.81) – due October 17, 2016.
- Groundwater Monitoring Plan (per 257.90-98) – due October 17, 2017.
- Closure Plan (per 257.102) – due October 17, 2017.
- Post-closure Plan (per 257.104) – due October 17, 2017.

### 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) CCR is disposed in the Landfill by end-dumping and spreading. Trucks haul CCR to the active filling area using the access roads built with CCR (see Photograph 5) and crushed limestone. Based on discussions with the site personnel, access roads are constructed over portions of previous filling operations to access the active fill area. Trucks dump CCR at the top of CCR slope near the crest. Then, front-end loader or dozer pushes CCR onto the slope (see Photographs 1 and 2). CCR slopes are as high as ~180 ft with grades as steep as 1.25 horizontal to 1 vertical (1.25H:1V).
- 3) There were no indications of slope instability on the CCR slopes at the time of inspection.
- 4) 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.
- 5) The quarry bedrock side walls are fractured.
- 6) Portions of the exposed quarry side walls appeared to be damp or have active groundwater flow from a seam or bedrock layer interface (see Photographs 10, 11, 15 and 16).
- 7) 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 eastern access ramp, conveying water to lower elevations. There is a culvert at a low spot underneath the access ramp conveying water to the sump (see Photographs 12 and 13). 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, approximately 300 feet bgs.
- 8) Based on topographic information, the Landfill does not appear to have direct run-on from the adjacent areas.
- 9) Erosion gullies on the CCR slopes (see Photograph 8) were observed. These gullies do not have to be maintained due to the incised nature of the Landfill.



- 10) 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 21).
- 11) No fugitive dust complaints were observed in the Landfill Operating Record.

#### **4. EVALUATION OF OBSERVATIONS**

Failure of Landfill (quarry) side walls (containment system) and consequential release of CCR into the areas outside the footprint of the Landfill is not possible because the Landfill is operated within a quarry.

Two safety concerns for site personnel were observed and should be addressed through site operating procedures. The two concerns were: (i) filling operations near steep slopes and (ii) working near fractured bedrock side walls.

DTE is in the process of preparing an operational fill plan for the Landfill in 2016, which will address the observed safety concerns.

## 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. It is Geosyntec's understanding that DTE will prepare an operational fill plan to address safety concerns.

Certified by:

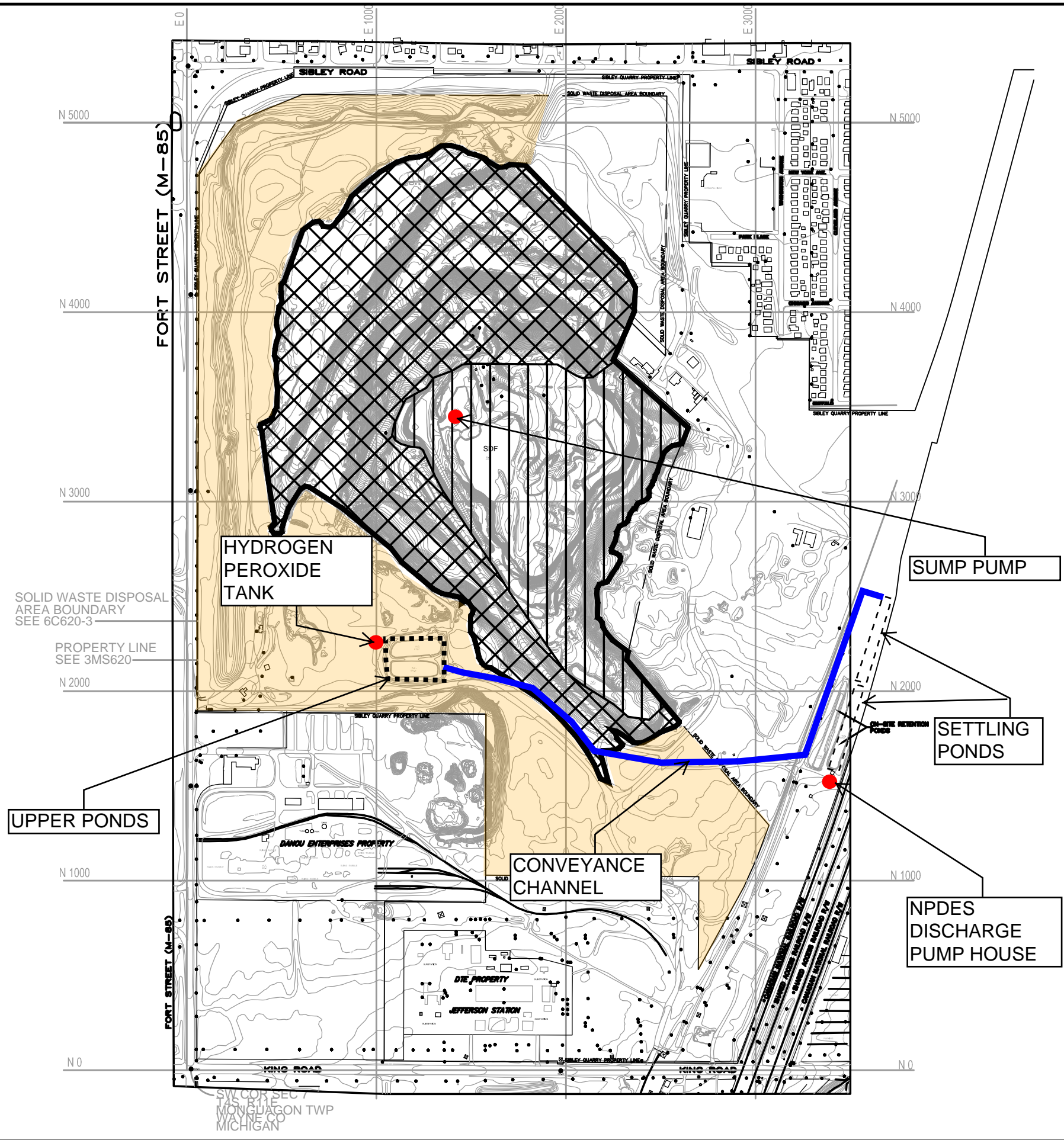
  
Date 1/13/16

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

  
Date 1/13/2016

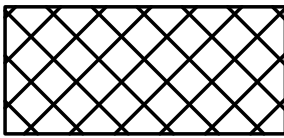



John Seymour, P.E. Michigan License Number 620103356  
Senior Principal

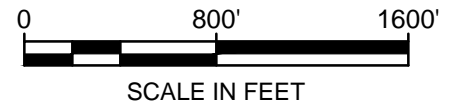





- NOTES:
1. TOPOGRAPHIC INFORMATION GENERATED FROM AERIAL PHOTOGRAPHY DATED 27 APRIL 2013 BY KUCERA INTERNATIONAL, INC., WILLOUGHBY, OH.
  2. APPROXIMATE BOUNDARY OF ACTIVE LANDFILLING OBTAINED FROM DTE DRAWING NO. 6SE 06200-021, DATED 31 OCTOBER 2013.
  3. APPROXIMATE NO WASTE BOUNDARY OBTAINED FROM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

APPENDIX A  
2015 ANNUAL INSPECTION FORMS AND PHOTOS

**Sibley Quarry - CCR Landfill  
2015 Annual Inspection Report**

**Name of CCR Landfill:** Sibley Quarry Landfill      **Qualified Engineer:** Omer Bozok  
**Owner:** DTE Energy      **Date:** 12/15/2015      **Time:** \_\_\_\_\_  
**Weather:** Cloudy, 50s      **Precipitation (past week):** < 0.1 in.  
**Site Conditions:** Dry

**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 (Greater than 6-in.) | <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 south east 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  
groundwater flow. See Photographs 10 and 11
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  
2015 Annual Inspection Report**

Name of CCR Landfill: Sibley Quarry Landfill Qualified Engineer: Omer Bozok  
Owner: DTE Energy Date: 12/15/2015 Time: \_\_\_\_\_

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.?)

No erosion was observed.

**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. Measurements were not taken for safety reasons.

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.): \_\_\_\_\_

No previous inspection has occurred.

**Sibley Quarry - CCR Landfill  
2015 Annual Inspection Report**

Name of CCR Landfill: Sibley Quarry Landfill Qualified Engineer: Omer Bozok  
Owner: DTE Energy Date: 12/15/2015 Time: \_\_\_\_\_

**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. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Have any repairs been made since the last inspection?  Yes  No  
If 'Yes', describe. \_\_\_\_\_  
There has been no previous inspection. No changes were reported by DTE over 2014.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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 and may cause serious injury or loss of life. 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 may cause serious injury or loss of life.  
\_\_\_\_\_

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  
2015 Annual Inspection Report**

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

**Owner:** DTE Energy **Date:** 12/15/2015 **Time:** \_\_\_\_\_

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

DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 1

Date: 15 December 2015

Comments: Front-end loader is at the top of CCR slope pushing recently brought CCR down the slope (facing east).



Photograph 2

Date: 15 December 2015

Comments: CCR slope at the far east end of the quarry.



DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 3

Date: 15 December  
2015

Comments: Quarry  
side walls in the  
general area where  
front-end loader is  
operating (facing east).



Photograph 4

Date: 15 December  
2015

Comments: Piles of  
CCR recently brought  
to the site (facing  
west).



DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 5

Date: 15 December  
2015

Comments: General  
view of the active  
filling area (facing  
west).



Photograph 6

Date: 15 December  
2015

Comments: CCR  
from ash basin  
cleaning placed at the  
upper tier of the  
landfill (facing west).



DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 7

Date: 15 December  
2015

Comments: Active  
filling area from the  
bottom of the quarry  
(facing northeast).



Photograph 8

Date: 15 December  
2015

Comments: Gully  
erosion on the active  
filling area (facing  
northeast).



DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 9

Date: 15 December 2015

Comments: View from the quarry, facing south. Areas on the side walls that appear to be darker are damp or there is active groundwater seepage.



Photograph 10

Date: 15 December 2015

Comments: Side walls along the access ramp. Groundwater was observed to be seeping from sections of the side wall; some parts were observed to be damp.



DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 11

Date: 15 December  
2015

Comments: Side walls along the access ramp. Groundwater was observed to be seeping from sections of the side wall; some parts were observed to be damp.



Photograph 12

Date: 15 December  
2015

Comments:  
Groundwater seepage from southeast sidewall is conveyed under the quarry access road via below grade culverts.



DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

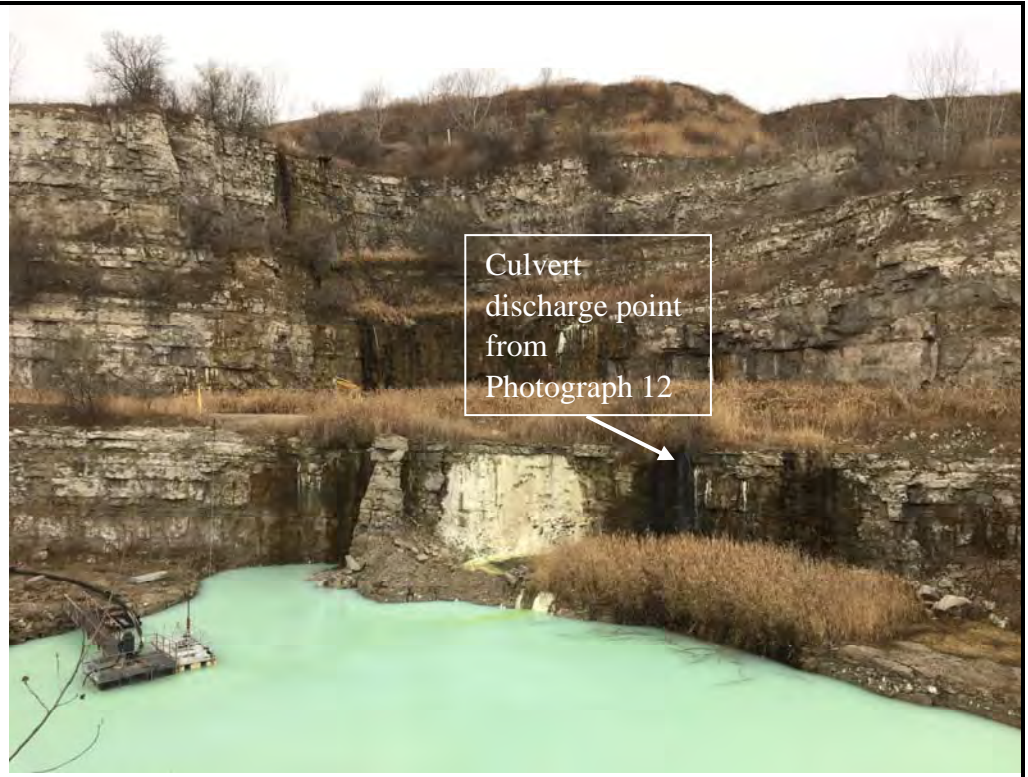
Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 13

Date: 15 December 2015

Comments: View of the sump and pump (facing north).



Photograph 14

Date: 15 December 2015

Comments: Water from the sump is pumped to upper ponds with two 8-in diameter pipes.





DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 15

Date: 15 December  
2015

Comments: View of  
the side walls (facing  
south). Areas on the  
side walls that appear  
to be darker are damp  
or there is active  
seepage.



Photograph 16

Date: 15 December  
2015

Comments: The  
arrow points out the  
part of the side wall  
that appears to be  
damp (facing east).



DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 17

Date: 15 December 2015

Comments: Upper ponds where the water from quarry sump is treated with hydrogen peroxide (facing east).



Photograph 18

Date: 15 December 2015

Comments: Hydrogen peroxide tank (facing north).



DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 19

Date: 15 December  
2015

Comments: Water  
from the upper ponds  
discharge into the  
conveyance channel  
through a culvert.



Photograph 20

Date: 15 December  
2015

Comments:  
Conveyance channel  
(facing west).



DTE ENERGY  
Photographic Record

Client: Detroit Edison

Project Number:

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 21

Date: 15 December  
2015

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



Photograph 22

Date: 15 December  
2015

Comments: View from  
the downstream end of  
Settling Pond #3 near  
the NPDES discharge  
pump house.



**APPENDIX B**  
**RESUME OF OMER BOZOK (QUALIFIED**  
**PROFESSIONAL ENGINEER)**

**ÖMER BOZOK**

**geotechnical engineering  
ash basin and landfill design  
construction quality assurance**

## **EDUCATION**

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

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

## **CAREER SUMMARY**

As an engineer for Geosyntec Consultants, Mr. Bozok is responsible for reviewing engineering data, writing technical reports, generating/reviewing drawings, performing geotechnical analyses and design, and managing construction quality assurance (CQA) activities.

Mr. Bozok has performed various geotechnical analyses including bearing capacity analyses, design of support systems for temporary/permanent excavations, slope stability analyses for reinforced/unreinforced embankments, soil-structure interaction analysis to evaluate the loads imposed on piles, prepared civil layouts, performed CQA activities, and managed CQA personnel.

Mr. Bozok's research focused on the response of micropiles based on large scale physical tests. He evaluated the effect of micropile spacing, batter angle and capping beam on slope stabilization.

### **Geotechnical Engineering and Design**

#### ***Geotechnical Engineering for Fly Ash Basin, DTE Energy, Monroe Michigan.***

*Ash Basin Embankment Mitigation.* The project involved design and mitigation of an existing fly ash basin embankment that is 3.5-miles long and 40-ft high. 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). Mr. Bozok served as the project manager for the 2013 construction and performed various slope stability and hydrostatic uplift analyses, and reviewed slope inclinometer and piezometer data obtained during the life of the project.. Mr. Bozok was in charge of the civil layout for the 2011 design.

*Probabilistic Slope Stability Analysis.* Mr. Bozok performed probabilistic slope stability analysis to assess the global stability of an existing embankment that is 3.5-miles long

and 40-ft high. The purpose of this study was to evaluate the global stability of an existing embankment and recommend mitigation measures, if necessary. Mr. Bozok performed transient groundwater analyses and probabilistic reliability analyses (using software program Slide 6.0) to evaluate the probability of failure of the existing embankment.

*Seep Investigation Study.* Mr. Bozok prepared a seep investigation report for the Monroe Ash Basin embankment. The purpose of the study was to find the origin of water observed in slope indicator casings and standing water along the toe of the embankment and to recommend a mitigation approach. Mr. Bozok reviewed and evaluated the field data (including water level readings from the casings, pore pressure data from piezometers and precipitation data) and groundwater and fly ash chemical analysis results.

*Gavin Plant Residual Waste Landfill (RWL) Expansion, American Electric Power, Cheshire, Ohio.* The project requires lateral and vertical expansion of the existing Gavin RWL. Mr. Bozok performed settlement analyses for the sections of the landfill that will be expanded vertically. The goal of the analyses was to evaluate the strains that will be imposed on the existing clay liner.

Mr. Bozok performed slope stability analyses capturing the anticipated worst case scenarios that would develop during expansion of the landfill and in the long-term. Analyses took into account of the shear strength gain of the subgrade soils due to consolidation under the construction loads.

Mr. Bozok prepared the “Geotextile Calculation Package” and the “Leachate and Stormwater Collection and Transmission Pipe Calculation Package”.

*Use of Instrumented Test Fill to Assess Static Liquefaction of Impounded Fly Ash for Cardinal Landfill, American Electric Power, Brilliant, Ohio.* Mr. Bozok assessed the potential for a fly ash subgrade to undergo static liquefaction using results from an instrumented test fill. Mr. Bozok performed time-rate settlement analyses for a flue gas desulfurization (FGD) waste landfill to be constructed over an existing fly ash pond. He evaluated the coefficient of consolidation of ash by interpreting CPTu dissipation tests, and compared it against the values in the literature. Mr. Bozok used the software program SAF-TR to model the effect of ramp loading on excess pore pressure and compared it to results from a full scale test.

*Stingy Run Fly Ash Reservoir Closure, American Electric Power, Cheshire, Ohio.* Project involves closure of an existing 300-acre fly ash pond. Mr. Bozok performed veneer slope stability analysis to assess the stability of final cover system. In addition,

Mr. Bozok performed analyses to select appropriate geonet for the given cover system hydraulic properties.

***MIG/DeWane Superfund Site Remedial Design, Republic Services, Belvidere, Illinois.***

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. Mr. Bozok was the lead design engineer for the final design.

***Acme Wall Movement Monitoring, Eastern Region Supervalu, Lancaster County, Pennsylvania.*** Mr. Bozok's role on this project is to monitor the deflections of a mechanically stabilized earth wall, inform the client about the condition of the wall, and provide recommendations if needed.

**Construction Quality Assurance (CQA)**

***Ash Basin Embankment Remediation, DTE Energy, Monroe, Michigan.*** Mr. Bozok performed onsite CQA activities for the mitigation of a 40-ft high, 7,000-ft long embankment in 2010 and 2011. In general, mitigation involved: (i) flattening the embankment slopes from approximately 2 Horizontal to 1 Vertical (2H:1V) to 2.5H:1V; (ii) constructing a mid-slope stormwater drainage system utilizing Smartditch<sup>®</sup> HDPE sections; and (iii) constructing/remediating facility roads. During the project, Mr. Bozok inspected construction activities, performed field conformance tests on a daily basis and communicated directly with the contractor and the client's onsite representative for the orderly execution of the work. Testing involved performing nuclear density/moisture tests on clay fill lifts and surface course aggregate and laboratory testing. Upon completion of the construction seasons, Mr. Bozok prepared the construction completion reports.

In 2012 and 2013, Mr. Bozok managed onsite CQA personnel on a day to day basis, reviewed submittals, daily reports, test results, CQA survey results, the contractor's submittals, responded to the contractor's and the owner's requests in a timely manner for the orderly execution of the work. He also wrote the construction completion reports.

In its final year of construction in 2013, the project won DTE's "Best Large Project Award" under their Major Enterprise Project group. The multi-year project was completed under budget, within schedule and with no safety incidents.



***Settling Pond Fly Ash Removal, City of Escanaba, Escanaba, Michigan.*** Project included removal of fly ash from a settling pond and adjacent areas that required excavation and re-grading. Settling pond was utilized by City of Escanaba Generating Station to dispose its coal combustion residuals. Mr. Bozok designed the cleanout, assisted with contractor bids and selection, managed onsite CQA personnel on a day to day basis, reviewed daily reports, the contractor's submittals, responded to the contractor's and the owner's requests in a timely manner for the orderly execution of the work. He also wrote the construction completion report.

### **Field Experience**

***Ash Basin Embankment Mitigation, DTE Energy, Monroe, Michigan.*** Mr. Bozok performed quality control assurance for the mitigation of a 40-ft high, 7,000-ft long embankment in 2010 and 2011. In general, mitigation involved: (i) flattening the embankment slopes from approximately 2 Horizontal to 1 Vertical (2H:1V) to 2.5H:1V; (ii) constructing a mid-slope stormwater drainage system utilizing Smartditch<sup>®</sup> HDPE sections; and (iii) constructing/remediating facility roads. During the project, Mr. Bozok inspected construction activities, performed field conformance tests on a daily basis and communicated directly with the contractor and the client's onsite representative for the orderly execution of the work. Testing involved performing nuclear density/moisture tests on clay fill lifts and surface course aggregate. Upon completion of the construction seasons, Mr. Bozok prepared the construction completion reports.

***Plate Load Test on Slurried Fly Ash, Electric Power Research Institute, Central City, KY.*** Mr. Bozok documented construction and testing of a plate load test on slurried fly ash at a power plant ash disposal basin. The test was performed by applying load on a stiffened 5-ft by 5-ft test plate. The load was resisted by four micropiles drilled into bedrock. In addition, Mr. Bozok provided oversight for the field investigation that included CPTu testing, shear wave testing and soil borings.

### **PROFESSIONAL EXPERIENCE**

Geosyntec Consultants, Chicago, Illinois, 2009 - present

University of Missouri, Graduate Research/Teaching Assistant, 2007 - 2009

## **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
- 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.
- Seymour, J.S., Bozok, O., Hughes, A., Bodine, B. (2015) “Conditions of Coal Ash Embankments” World of Coal Ash Conference 2015, Nashville, TN