

DTE Energy®



Prepared for

DTE Electric Company
One Energy Plaza
Detroit, Michigan 48226

2017 ANNUAL INSPECTION REPORT SIBLEY QUARRY LANDFILL

Trenton, Michigan

Prepared by

Geosyntec 
consultants

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

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CHE8312

January 2018

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1. INTRODUCTION

1.1 Overview

This 2017 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 5 October 2017 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 seven 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. As of the year to date, the maximum disposal rate is 10,000 CY/month.

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 18,720,000 CY².

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

² Reported by Mark Nederveld of DTE.

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 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) 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 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 slope (Photographs 2 and 5).
- 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. DTE is also utilizing sprinkler system for dust control in the active filling area where trucks operate (see Photograph 4).
- 5) The quarry bedrock side walls are fractured (see Photograph 14).
- 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 Photograph 13).
- 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 access roads, conveying water to lower elevations (see Photographs 11 and 12). There is a culvert at a low spot underneath the access ramp conveying water to the sump. 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 5) 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 6).
- 11) 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) filling operations near steep slopes and (ii) working/travelling near fractured bedrock side walls. Warning signs were observed at vehicle entrance points to the Landfill, warning personnel of these safety concerns.

A draft Fill Plan was developed to address the safety concerns identified during the inspection. It was submitted in October 2016. It is currently under review by DTE.

5. CONCLUSIONS AND CERTIFICATION

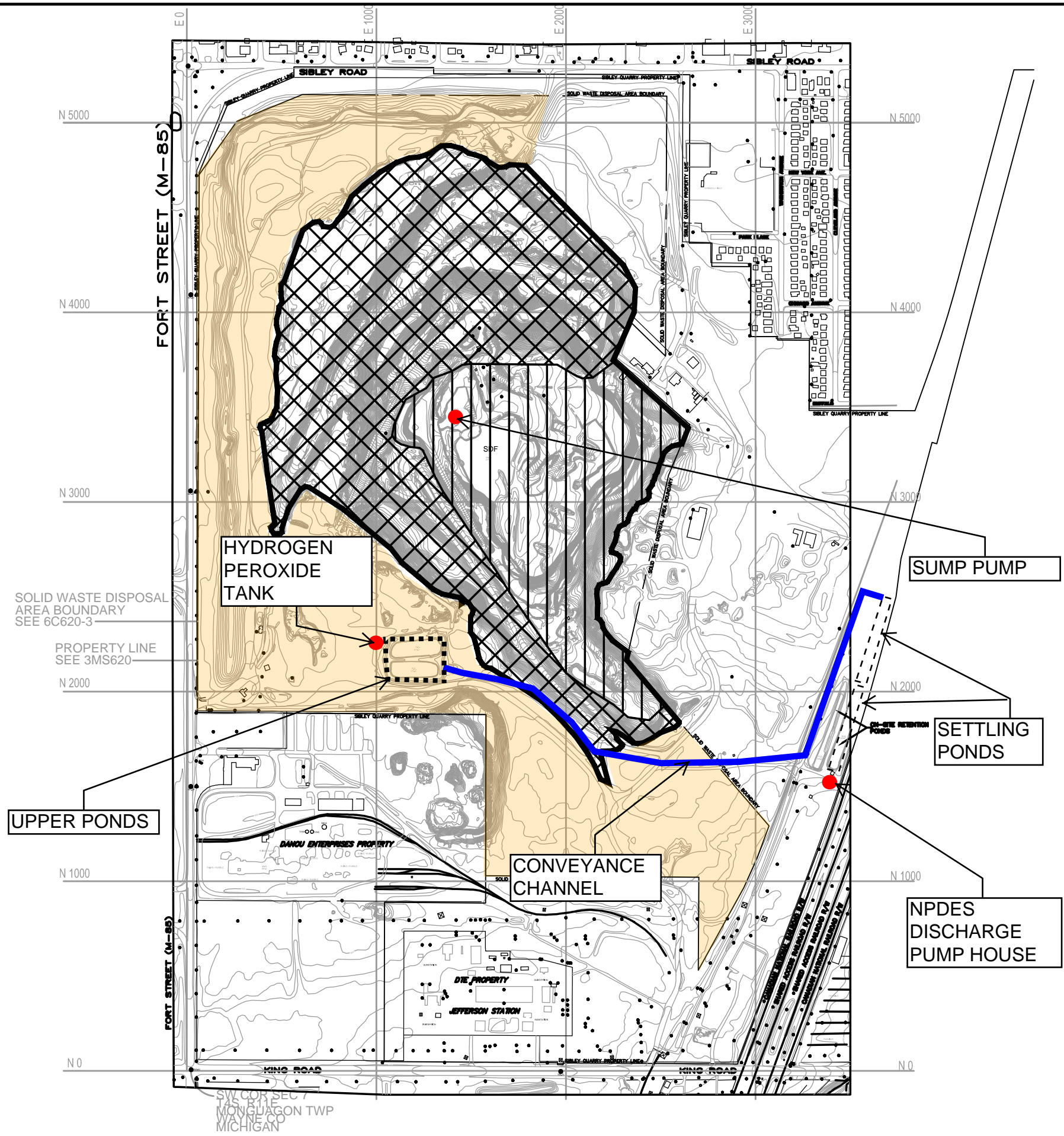
The annual visual inspection did not identify evidence of structural weakness or instability of the containment system (quarry side walls) that would cause CCR to release into the areas outside the footprint of the Landfill.

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 were observed at vehicle entrance points to the Landfill, warning personnel of these safety concerns. DTE is currently preparing an operational fill plan that addresses safety concerns.

Certified by: 
Date 1/3/2018

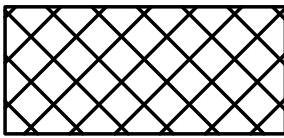





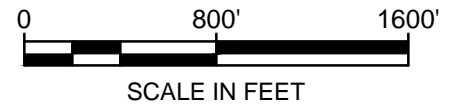
Omer Bozok, P.E. Michigan License Number 6201062700
Project Engineer




- 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	FIGURE 1
PROJECT NO: CHE8312	OCTOBER 2017

APPENDIX A
2017 ANNUAL INSPECTION FORMS AND PHOTOS

**Sibley Quarry - CCR Landfill
2017 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>10/5/2017</u> Time: <u>10 am to 3 pm</u>
Weather: <u>Sunny, 60s</u>	Precipitation (past week): <u>< 0.1 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
2017 Annual Inspection Report**

Name of CCR Landfill: Sibley Quarry Landfill Qualified Professional Engineer: Omer Bozok
Owner: DTE Energy Date: 10/5/2017 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.?)

No erosion was observed. 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
2017 Annual Inspection Report**

Name of CCR Landfill: Sibley Quarry Landfill Qualified Professional Engineer: Omer Bozok
Owner: DTE Energy Date: 10/5/2017 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. _____

Hydrogen peroxide pumps have been replaced.

Main sump pump has been 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
2017 Annual Inspection Report**

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

Owner: DTE Energy **Date:** 10/5/2017 **Time:** 10 am to 3 pm

iii.	<hr/>	<hr/>	<hr/>
iv.	<hr/>	<hr/>	<hr/>
v.	<hr/>	<hr/>	<hr/>
vi.	<hr/>	<hr/>	<hr/>
vii.	<hr/>	<hr/>	<hr/>
viii.	<hr/>	<hr/>	<hr/>
ix.	<hr/>	<hr/>	<hr/>
x.	<hr/>	<hr/>	<hr/>

DTE ELECTRIC COMPANY

Photographic Record

Client: Detroit Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 1

Date: 5 October 2017

Comments: Photograph was taken facing towards active filling area.



Photograph 2

Date: 5 October 2017

Comments: Material piled at the top of active filling area.



DTE ELECTRIC COMPANY

Photographic Record

Client: Detroit Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 3

Date: 5 October 2017

Comments: Active filling area, facing east.



Photograph 4

Date: 5 October 2017

Comments: DTE is utilizing a sprinkler system for dust control in the active filling area where trucks operate.



DTE ELECTRIC COMPANY

Photographic Record

Client: Detroit Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 5

Date: 5 October 2017

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



Photograph 6

Date: 5 October 2017

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



DTE ELECTRIC COMPANY

Photographic Record

Client: Detroit Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 7

Date: 5 October 2017

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



Photograph 8

Date: 5 October 2017

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



DTE ELECTRIC COMPANY

Photographic Record

Client: Detroit Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 9

Date: 5 October 2017

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



Photograph 10

Date: 5 October 2017

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



DTE ELECTRIC COMPANY

Photographic Record

Client: Detroit Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 11

Date: 5 October 2017

Comments: A typical stormwater channel along access roads.



Photograph 12

Date: 5 October 2017.

Comments: A typical stormwater channel along access roads.



DTE ELECTRIC COMPANY

Photographic Record

Client: Detroit Electric Company

Project Number: CHE8312

Site Name: Sibley Quarry Landfill

Site Location: Trenton, MI

Photograph 13

Date: 5 October 2017

Comments: Active seepage was observed on quarry walls.



Photograph 14

Date:

Comments:

APPENDIX B
RESUME OF OMER BOZOK (QUALIFIED
PROFESSIONAL ENGINEER)

ÖMER BOZOK

**geotechnical engineering
coal ash landfill/impoundment engineering
earth retaining systems and foundations
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 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.

He is experienced in design, inspection, instrumentation/monitoring, and operations of coal ash facilities. Mr. Bozok managed design of three large-scale civil projects: (i) project involving mitigation of a 3.5-mile long embankment, encompassing 400-acre ash basin; (ii) project involving closure of a 300-acre ash basin and lowering of a 100-ft tall dam; and (iii) project involving remediation of a 50-acre existing Superfund landfill.

Mr. Bozok 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 at graduate school 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.

Mr. Bozok is a licensed professional engineer in the state of Michigan. He has certification for the 40 Hour HAZWOPER training and HAZMAT Certification for using a nuclear density gauge. Mr. Bozok also completed the 8-Hour HAZWOPER refresher for the year of 2015.

Geotechnical Engineering, Design and Inspections

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. 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, in charge of the civil layout. He performed various slope stability and hydrostatic uplift analyses, and reviewed slope inclinometer and piezometer data obtained during the life of the project.

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.

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, if necessary. 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 a 400-acre ash basin that has 3.5-miles long, 40-ft high embankment. 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, resulting in environmental impact and potential for human life loss. 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. Mr. Bozok, prepared a set of operations plan drawings along with the inspection, monitoring and maintenance manual for a 400-acre fly ash basin facility. 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.

Seep Investigation Study for Fly Ash Basin, DTE Energy, Monroe, Michigan. 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.

Stingy Run Fly Ash Reservoir Closure, American Electric Power, Cheshire, Ohio. The project involves closure of an existing 300-acre fly ash pond and lowering of 100-ft tall dam. 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. In addition to managing civil layout and design efforts, Mr. Bozok performed veneer slope stability analysis to assess the stability of final cover system.

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 and evaluate if the amount of settlements were acceptable.

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.

Engineering Correlations for Geotechnical Parameters for Poned 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.

Settling Pond Fly Ash Removal, City of Escanaba, Escanaba, Michigan. Mr. Bozok prepared a set of drawings and specifications to remove fly ash that was disposed in a settling pond. The settling pond was approximately one acre and utilized by City of Escanaba Generating Station to dispose its coal combustion products.

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.

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.

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.

Guidance Documents for USEPA Coal Combustion Residual Rules, Electric Power Research Institute, Palo Alto, California. Project involved preparing a series of guidance documents for utility companies that manage coal combustion residuals to meet USEPA CCR Rules. Mr. Bozok was a key member of the team and prepared templates for emergency action plans, onsite inspections and training module for inspectors.

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.

Geotechnical Investigation for Wastewater Treatment System Foundation, Zoetis LLC, Chicago Heights, Illinois. Project required an installation of a 62-ft diameter, 26-ft high double wall equalization tank and a one-story building for a proposed wastewater treatment system. Mr. Bozok directed the field investigation, laboratory testing program and a group of staff engineers to provide the client with a cost effective and practical foundation system considering the maximum tolerable settlements provided by the tank manufacturer/installer.

Stabilization of an Existing MSE Wall, Moretrench, West Chester, Pennsylvania. An existing mechanically stabilized earth (MSE) wall that is 400-ft long and 23-ft high was constructed in early 2000s. The wall experienced 3-in of movement over its life time. As a consequence, the owner retained a contractor to stabilize the wall. Mr. Bozok designed the stabilization system for the contractor. The stabilization system comprised 3-ft wide reinforced pilasters constructed over the existing wall at 15 ft spacing and soil nails installed through each pilaster. Mr. Bozok utilized software program Slide 6.0 for the design of soil nails.

Temporary Support of Excavation for DS-P3, Kenny Construction, Chicago, Illinois. Mr. Bozok provided assistance in the design of a temporary support of excavation for construction of Connecting Structure DS-P3 for the 39th Street Conduit Rehabilitation. He reviewed the existing geotechnical report and boring logs, and performed overall stability analyses to evaluate the minimum required embedment depth of the sheet pile (using software program Slide), and to determine the appropriate sheet pile for the expected loads (using software program Shoring Suite).

Temporary Support of Excavation for Ogden Elementary School, Public Building Commission of Chicago, Chicago, Illinois. This project included design of temporary excavation support for the construction of the Ogden Elementary School in downtown Chicago. Mr. Bozok performed seepage analyses using a finite element model to find the appropriate pump required during construction, and performed overall slope stability analyses considering only short term.

Another phase of the project required assessment of potential damage to a water main along the proposed sheet pile alignment due to induced vibrations during sheet pile installation. Mr. Bozok reviewed literature and evaluated the associated risk.

Penn Hills Elementary School Micropile Foundations Design, Moretrench, Pittsburgh, Pennsylvania. Project required bid phase design of approximately 500 micropiles to support foundations of the Penn Hills Elementary School. Mr. Bozok performed the structural design of micropiles, and calculated the required micropile bond lengths and prepared section designs.

Major Oil and Gas Client in Africa, Study to Evaluate the Feasibility of Drilled Shafts as Foundation for a 20-m High MSE Wall. The project involved designing a mechanically stabilized earth wall supported with drilled shafts. Mr. Bozok performed soil-structure interaction analyses using the software program L-PILE to evaluate the response of columns under different loading scenarios.

Major Oil and Gas Client in Africa, Preload Interpretation and Development of Foundation Strategies and Recommendations. Mr. Bozok reviewed and interpreted existing data including laboratory and field test results (including more than 80 CPT logs), and generated numerous figures and tables to use in settlement and stability analyses.

Column Defect Assessment, LNG Facility, Angola. Mr. Bozok conducted a defect assessment of DMM columns used for structural foundation support for a LNG facility in Angola. Mr. Bozok reviewed more than 100 core logs and mapped occurrences of clay inclusions to use in GIS maps. He also performed statistical analyses on unconfined compressive tests results of DMM cores, and calculated the confidence level on target design strength.

Mr. Bozok also ran L-PILE analyses to evaluate the loads that will be generated on columns due to shrinking and swelling forces (driven by thermal activities) of the LNG tank's concrete base.

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.

Muskingum River Landfill Design, American Electric Power, Waterford, Ohio. Mr. Bozok prepared the conceptual base and cover grade for a future FGD waste landfill.

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[®] 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.

MIG/DeWane Landfill, BFI North America, Belvidere, Illinois. Mr. Bozok directed CQA activities for an existing approximately 50-acre Superfund landfill for three construction seasons. Construction included: (i) leachate and gas collection system consisting of approximately 4,000-ft long leachate and gas collection system trench, underground and above ground storage tanks; (ii) augmentation of the existing clay fill cover; and (iii) implementation of stormwater management system.

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[®] 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.

MIG/DeWane Landfill, BFI North America, Belvidere, Illinois. Mr. Bozok participated in the development and subsequently sampling of 24 groundwater monitoring wells and performed landfill gas monitoring.

Edgewater Library Field Investigation and Caisson Construction, PBC Chicago, Chicago, Illinois. Mr. Bozok provided oversight for the field investigation activities which consisted of soil borings, in-situ infiltration testing, vane shear and pressuremeter tests for the design of caissons. During construction, Mr. Bozok documented the construction of 20 caissons that are 60-ft deep and 24-in diameter. Mr. Bozok communicated with the client's onsite personnel for the orderly execution of the work.

Ping Tom Park Field House Foundation Design, PBC Chicago, Chicago, Illinois. Mr. Bozok provided oversight for field investigation activities including soil borings and vane shear tests.

Plate Load Test on Slurried Fly Ash, Electric Power Research Institute, Central City, Kentucky. 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.

Motor Control Center Foundation Construction Oversight, Racine, Wisconsin. Mr. Bozok documented installation of 16 helical piles used as the foundation of a one story building. Helical piles were approximately 25-ft long and had squared shafts with three helices up to maximum 12-in in diameter.

PROFESSIONAL EXPERIENCE

Geosyntec Consultants, Inc., 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
- Sabatini, P.J., Bozok, O., Andonyadis, P., Yafrate, N. (2014) “Engineering Correlations for Geotechnical Parameters for Poned Fly Ash”, Document #3002001151, July 2014