



Closure Plan

J.H. CAMPBELL GENERATING FACILITY

POND A CLOSURE PLAN

West Olive, Michigan

Pursuant to 40 CFR 257.102

Submitted To: Consumers Energy Company
1945 W. Parnall Road
Jackson, Michigan 49201

Submitted By: Golder Associates Inc.
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Lansing, Michigan 48906

October 2016

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CERTIFICATION

Professional Engineer Certification Statement [40 CFR 257.102(b)(4)]

I hereby certify that, having reviewed the attached documentation and being familiar with the provisions of Title 40 of the Code of Federal Regulations Section 257.102 (40 CFR Part 257.102), I attest that this Closure Plan is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR Part 257.102.

Golder Associates Inc.

Signature

October 14, 2016

Date of Report Certification

Jeffrey R. Piaskowski, PE

Name

6201061033

Professional Engineer Certification Number



10/14/16



Table of Contents

CERTIFICATION..... C-1
Professional Engineer Certification Statement [40 CFR 257.102(b)(4)]..... C-1

1.0 INTRODUCTION..... 1

2.0 NARRATIVE DESCRIPTION [40 CFR 257.102(b)(1)(i,iii-v)]..... 2

2.1 Pond A CCR Quantity [40 CFR 257.102(b)(1)(iv-v)]..... 2

2.2 Closure Construction Sequence 2

2.2.1 Drainage and Stabilization of CCR Surface Impoundments Prior to Closure [40 CFR 257.102(b)(1)(i) and 40 CFR 257.102(d)(2)]..... 2

2.2.1.1 CCR Stabilization 2

2.2.2 Final Cover System [40 CFR 257.102(b)(1)(iii) and 40 CFR 257.102(d)(3)]..... 3

2.2.2.1 Final Cover Design and Performance 3

2.2.2.2 Final Cover Construction..... 4

3.0 SCHEDULE [40 CFR 257.102(b)(1)(vi)] 5

3.1 Introduction..... 5

3.2 Closure Construction..... 5

3.3 Closure Deadline Extension [40 CFR 257.102(f)(2)] 7

4.0 REFERENCES..... 8

List of Tables

Table 3.2.1 Closure Schedule Production Estimate
Table 3.2.2 Conceptual Final Cover Construction Schedule Milestones

List of Figures

Figure 1 Site Location Map
Figure 2 General Site Plan
Figure 3 Conceptual Closure Plan
Figure 3.1 Final Cover System



1.0 INTRODUCTION

On April 17, 2015, the United States Environmental Protection Agency (EPA) issued the Coal Combustion Residual (CCR) Resource Conservation and Recovery Act (RCRA) Rule (40 CFR 257 Subpart D) (“CCR RCRA Rule”) to regulate the beneficial use and disposal of CCR materials generated at coal-fired electrical power generating complexes. In accordance with the CCR RCRA Rule, any CCR surface impoundment or CCR landfill that was actively receiving CCRs on the effective date of the CCR RCRA Rule (October 19, 2015) was deemed to be an “Existing CCR Unit” on that date and subject to self-implementing compliance standards and schedules. Consumers Energy Company (CEC) identified three existing CCR surface impoundments at the J.H. Campbell Generating Facility (JH Campbell):

- Bottom Ash Ponds 1-2
- Bottom Ash Pond 3
- Pond A

JH Campbell is located in West Olive, Michigan as presented on Figure 1 – Site Location Map. The location of Pond A is presented on Figure 2 – General Site Plan.

This written closure plan is being generated pursuant to 40 CFR 257.102(a), and describes the steps necessary to close the JH Campbell Pond A CCR unit consistent with recognized and generally accepted good engineering practices.



2.0 NARRATIVE DESCRIPTION [40 CFR 257.102(b)(1)(i,iii-v)]

Pond A at JH Campbell will be closed with CCR in place and capped with a final cover system over the CCR surface impoundment area. Prior to construction of the final cover, Pond A will be dewatered by actively pumping the pond's contents downstream through the permitted National Pollutant Discharge Elimination System (NPDES) outfall in a manner that maintains permitted effluent limits. Upon reaching an equilibrium groundwater elevation, active pumping will cease; and the influent and effluent pipes will be permanently capped to prevent subsequent filling of the pond. Once dewatered, Pond A will be regraded and/or backfilled to two feet below design grades provided on Figure 3 – Conceptual Closure Plan. Design grades will be reached with construction of a two-foot-thick final cover system designed with a minimum 2.5 percent slope to meet performance standard requirements per 40 CFR 257.102(d)(3)(ii). Details of the closure construction are provided in the following sections.

2.1 Pond A CCR Quantity [40 CFR 257.102(b)(1)(iv-v)]

Golder Associates Inc. (Golder) performed an investigation of the CCR in Pond A in May 2016. Through visual observation, the investigation sampling determined that the CCR in Pond A extended to depths that ranged from three to eight feet below mudline, which correlated to elevations of 600.7 to 602.2 (NGVD29). The largest total surface area of Pond A requiring final cover is approximately 10.1 acres as identified on Figure 2 – General Site Plan. The maximum inventory of CCR estimated in Pond A was approximately 36,000 cubic yards (cy). No CCR was observed in the surrounding dikes.

2.2 Closure Construction Sequence

2.2.1 Drainage and Stabilization of CCR Surface Impoundments Prior to Closure [40 CFR 257.102(b)(1)(i) and 40 CFR 257.102(d)(2)]

Pond A will be dewatered by actively pumping ponded water through the permitted NPDES outfall in a manner that maintains permitted effluent limits. Once dewatered, the influent and effluent pipe will be permanently capped to prevent subsequent filling of the pond. Golder's May 2016 investigation indicated that poorly graded, fine to medium sand underlies Pond A, which is expected to readily allow any stormwater received in the pond to infiltrate with limited storage.

2.2.1.1 CCR Stabilization

Once dewatered, the CCR within Pond A will be evaluated to determine whether the CCR materials have sufficient strength properties to accommodate and support the proposed closure grades. If the existing CCR materials do not have the strength to accommodate earthwork equipment and/or fill material required to meet the closure grades, then the CCR material will be stabilized as required prior to closure construction. Once filling begins, Golder anticipates some elastic settlement of the CCR will occur, but most of the settlement will occur immediately during closure construction (due to the granular nature of the CCR and fill materials); thus, limiting long term subsidence. Clay is present beneath Pond A at a depth of



approximately 50 feet below ground surface (bgs) (elevation 569.5 feet NGVD29). The clay is not expected to be a concern, because the surcharge from the nominal fill heights should not create sufficient stress to consolidate and create post-closure settlement concerns or areas of ponded water while utilizing 2.5 percent design slopes.

2.2.2 Final Cover System [40 CFR 257.102(b)(1)(iii) and 40 CFR 257.102(d)(3)]

2.2.2.1 Final Cover Design and Performance

The final cover system will be two-feet thick and consist of a 40 mil linear low-density polyethylene (LLDPE) textured geomembrane (infiltration layer) overlain with an 8 ounce per square yard nonwoven geotextile (cushion). The cushion will be overlain with an 18-inch-thick layer of fine to medium grained, well sorted sand (protective cover). The protective cover will be overlain with a six-inch-thick erosion layer. The erosion layer consists of topsoil, seed, fertilizer, and mulch in accordance with Michigan Department of Transportation (MDOT) Standard Specification 816 – Turf Establishment. A typical detail of the final cover system is provided below in Figure 3.1 – Final Cover System.

Together, the final cover system is designed to:

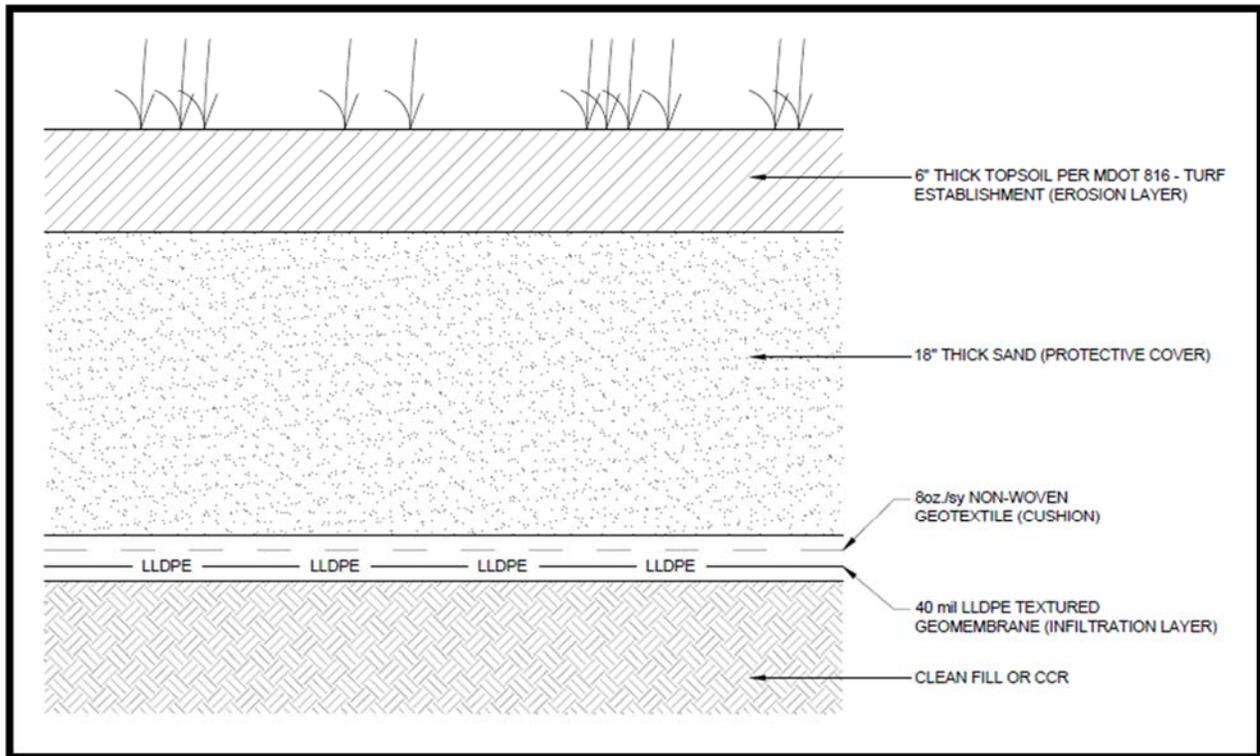
- Provide a final cover permeability less than 1.0×10^{-5} centimeter per second (cm/sec)
- Control contaminated runoff
- Minimize the need for maintenance
- Control, minimize, or eliminate post-closure infiltration of liquids
- Minimize releases of CCR and leachate into ground and surface waters or the atmosphere
- Prevent the sloughing or movement of the liner

The system is designed with a minimum 2.5 percent slope to:

- Prevent/limit the future impoundment of water, sediment, and slurry
- Minimize erosion
- Prevent/control the release of waste
- Limit the effects of settlement/subsidence



Figure 3.1 - Final Cover System



2.2.2.2 Final Cover Construction

Pond A will be filled to planned grade with readily available certified clean fill material. The certified clean fill material will be placed in 12-inch-thick loose lifts compacted to at least 95 percent of the maximum dry density achieved by the Standard Proctor (ASTM D698). The certified clean fill material will be placed approximately two feet below the grades presented on Figure 3 – Conceptual Closure Plan, which allows the final cover system described in Section 2.2.2.1 to meet the grades as shown. Once the fill has been placed to its design grades, the final cover system will be constructed and tested to confirm it meets the requirements of the designed final cover.



3.0 SCHEDULE [40 CFR 257.102(b)(1)(vi)]

3.1 Introduction

CEC will initiate closure by providing notification pursuant to 40 CFR 257.102(e) by October 1, 2018. In accordance with 40 CFR 257.102(f)(1)(ii), closure activities are expected to be completed within five years of the notification of intent to initiate closure (by October 2023).

3.2 Closure Construction

On average, it is anticipated that 5,000 cy of earthwork (cut/fill/place/compact) can be completed each day. This yields 36 working days or eight weeks. Once the grading is complete, the 40 mil LLDPE geomembrane will be installed. One liner crew can place approximately 45,000 square feet per day and; therefore, it is expected that it will take 13 working days or approximately three weeks to complete the geosynthetics installation.

Once the geosynthetics are installed, the protective cover can be placed over the nonwoven geotextile cushion. The protective cover will require placement of approximately 31,000 cy. Assuming a placement rate of 5,000 cy per day yields seven working days or approximately two weeks. The erosion layer will overlay the protective cover. Approximately 10,000 cy of erosion layer is required. Assuming a placement rate of 5,000 cy per day yields two working days.

The erosion layer will require seed, fertilizer, and mulch and should be planted by mid-August so the seed can be established and cut before winter. With proper equipment, the closed area can be seeded, fertilized, and mulched in two days. A breakdown of the schedule is provided below in Table 3.2.1 – Closure Schedule Production Estimate.

**Table 3.2.1 – Closure Schedule Production Estimate**

Closure Component	Quantity	Units	Construction Rate	Rate Units	Required Time in Days
Grading cut/fill	180,000	cubic yards	5,000	cubic yards per day	36
40-mil LLDPE geomembrane (infiltration layer)	560,000	square feet	45,000	square feet per day	13
18-inch-thick sand layer (protective cover)	31,000	cubic yards	5,000	cubic yards per day	7
6-inch-thick topsoil (erosion layer)	10,000	cubic yards	5,000	cubic yards per day	2
Seed, fertilizer, mulch (erosion layer)	560,000	square feet	300,000	square feet per day	2
Workdays Required =					60

It is anticipated that closure construction will begin on or before May 1, 2023 in order to comply with the closure schedule. Conservatively assuming a start to finish construction schedule, the final cover construction will take approximately 12 weeks. Using these assumptions results in completion of the final cover construction on August 11, 2023, which complies with the October 1, 2023 closure deadline. Table 3.2.2 – Conceptual Final Cover Construction Schedule Milestones contains a list of milestone dates that were developed as part of the closure construction schedule to demonstrate that closure will be completed within the self-implementing closure schedule per 40 CFR 257.102(f)(1)(ii).

**Table 3.2.2 – Conceptual Final Cover Construction Schedule Milestones**

Closure Component	Start Date	End Date
Monitor groundwater	January 1, 2016	October 1, 2023
Notification of closure	NA	October 1, 2018
Grading layer fill	May 1, 2023	June 23, 2023
40-mil LLDPE geomembrane (infiltration layer)	June 26, 2023	July 14, 2023
18-inch-thick sand layer (protective cover)	July 17, 2023	July 28, 2023
6-inch-thick topsoil (erosion layer)	July 31, 2023	August 4, 2023
Seed, fertilizer, mulch (erosion layer)	August 7, 2023	August 11, 2023
Closure activities complete	NA	October 1, 2023
Certified closure report	NA	December 31, 2023
Post-closure care period	January 1, 2024	December 31, 2053

3.3 Closure Deadline Extension [40 CFR 257.102(f)(2)]

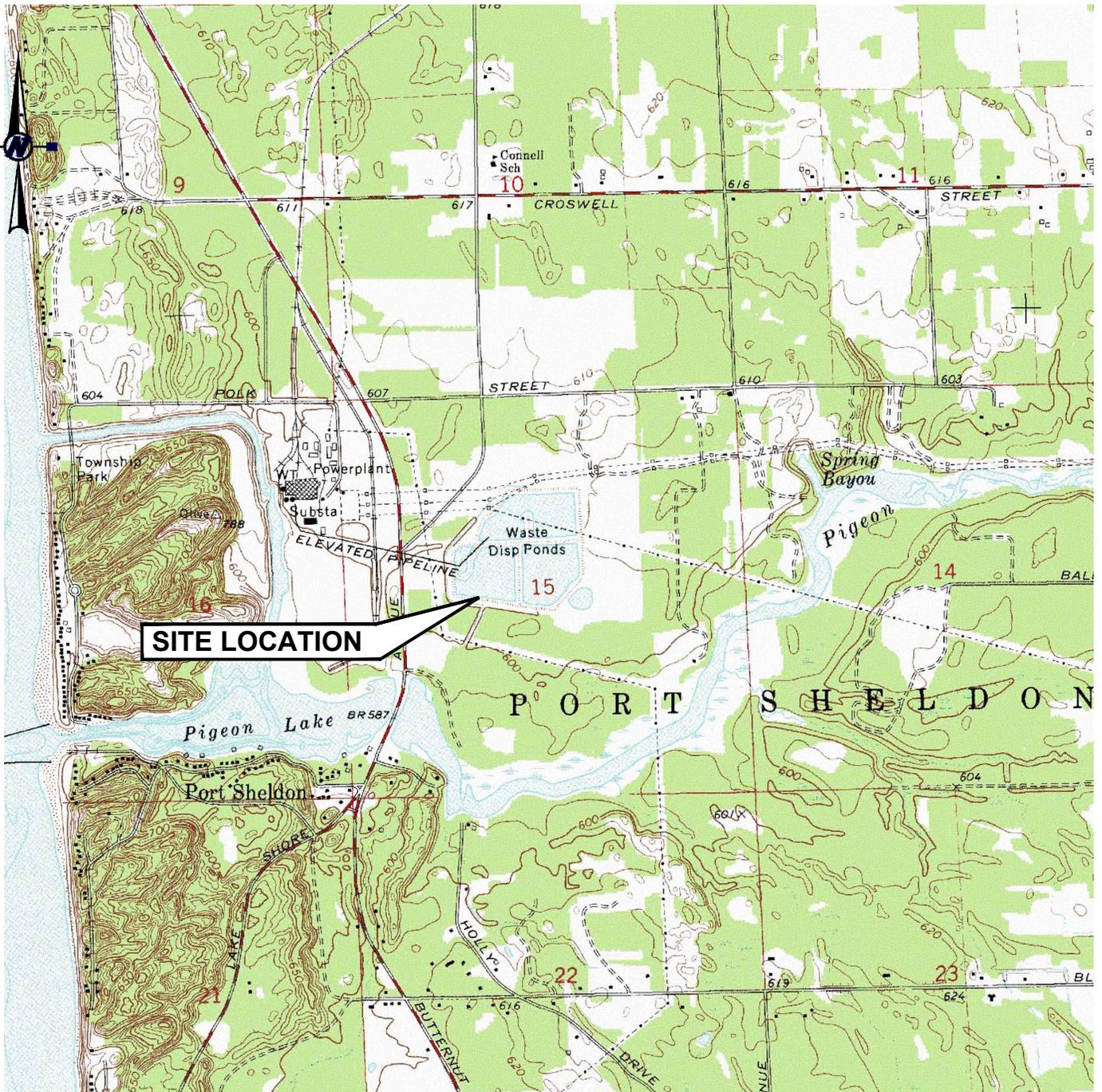
As previously indicated in Section 3.1, closure of existing CCR surface impoundments must be completed within five years of initiating closure in accordance with 40 CFR 257.102(f)(1)(ii). A deadline extension can be obtained as outlined in 40 CFR 257.102(f)(2) if completion of closure is not feasible within five years (e.g., shortened construction season, significant weather delays during construction, time required for dewatering CCR, delays due to state or local permitting or approval, etc.). An extension must include a narrative description that demonstrates closure is not feasible in the required timeframe in accordance with 40 CFR 257.102(f)(2)(i, iii). The closure deadline for Pond A may be extended up to two years per 40 CFR 257.102(f)(2)(ii)(A).



4.0 REFERENCES

“Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments.” Title 40 – Protection of the Environment Part 257 – Criteria for Classification of Solid Waste Disposal Facilities and Practices Subpart D – Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments.

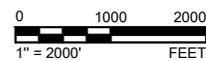
FIGURES



MICHIGAN COUNTIES
NOT TO SCALE

REFERENCE(S)

1. BASE MAP TAKEN FROM 7.5 MINUTE U.S.G.S. QUADRANGLES OF PORT SHELDON MICHIGAN, DOWNLOADED FROM MICHIGAN DNR WEBSITE JUNE 2016.



CLIENT
CONSUMERS ENERGY COMPANY
17000 CROSWELL ST.
WEST OLIVE, MI 49460

PROJECT
J.H. CAMPBELL GENERATING FACILITY POND
A CLOSURE PLAN

CONSULTANT	YYYY-MM-DD	2016-06-06
	DESIGNED	BAL
	PREPARED	ARM
	REVIEWED	DJS
	APPROVED	MAB



TITLE
SITE LOCATION MAP

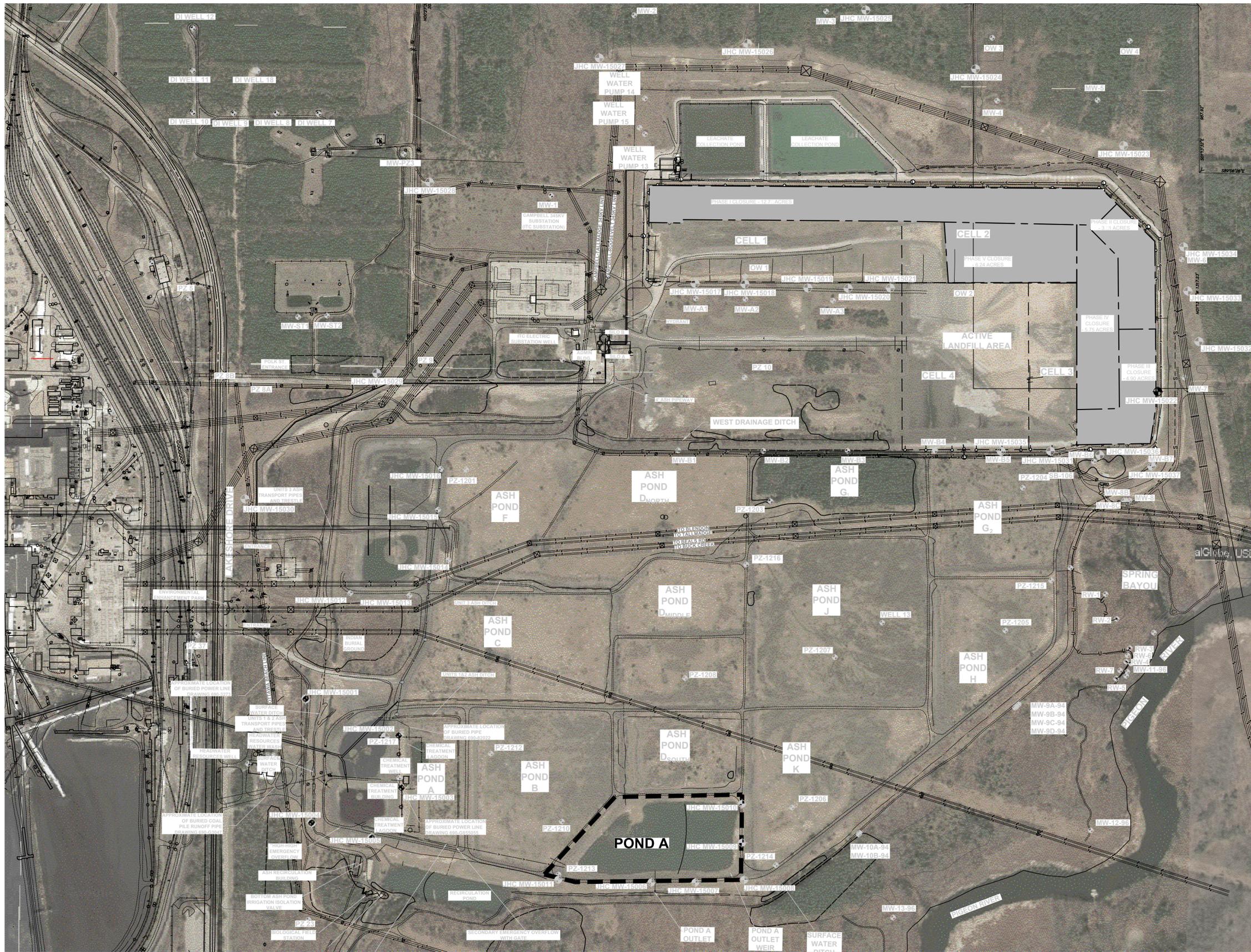
PROJECT NO.
1654923

REV.
#

FIGURE
1

1b IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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0 300 600
SCALE: 1" = 300'

REFERENCE DRAWINGS	REV	DATE	DESCRIPTION	BY	CHK	APP	REV	DATE	DESCRIPTION	BY	CHK	APP
							10/6/2016	FILED IN OWNER'S OPERATING RECORD		AM	DS	JP



J.H. CAMPBELL ASH STORAGE FACILITY

EXISTING CONDITIONS
GENERAL SITE PLAN

SCALE	1" = 300'	DRAWING NO.		FIGURE	2	UNIT#	REV.	A
JOB	1654923							

NOTES

1. CONTOURS SHOWN ARE FROM MAY 2016 GROUND SURVEY.

LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- PROPOSED MAJOR CONTOUR (10' INTERVAL)
- PROPOSED MINOR CONTOUR (2' INTERVAL)
- SOIL BORING (2016)
- HISTORICAL SOIL BORING
- PIEZOMETER
- MONITORING WELL



VOLUME & AREAS

CUT:	33,912 CYDS
FILL:	143,018 CYDS
NET:	109,105 CYDS FILL
CCR VOLUME IN POND AND DIKES: 35,717 CYDS	
SURFACE AREA OF POND A: 10.05 ACRES	
TOTAL SURFACE AREA INCLUDING DIKES: 12.77 ACRES	

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REFERENCE DRAWINGS	REV	DATE	DESCRIPTION	BY	CHK	APP	REV	DATE	DESCRIPTION	BY	CHK	APP
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J.H. CAMPBELL ASH STORAGE FACILITY

CONCEPTUAL CLOSURE PLAN
OPTION 1-CONCEPTUAL GRADING PLAN

SCALE	1" = 40'	DRAWING NO.	FIGURE	UNIT#
JOB	1654923		3	A

Established in 1960, Golder Associates is a global, employee-owned organization that helps clients find sustainable solutions to the challenges of finite resources, energy and water supply and management, waste management, urbanization, and climate change. We provide a wide range of independent consulting, design, and construction services in our specialist areas of earth, environment, and energy. By building strong relationships and meeting the needs of clients, our people have created one of the most trusted professional services organizations in the world.

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