Annual Inspection Report
Jeffrey Energy Center
Bottom Ash Area Surface Impoundment

Prepared for:

Westar Energy

Jeffrey Energy Center

St. Marys, Kansas

Prepared by:

APTIM Environmental & Infrastructure, Inc.

Janurary 2018

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FIGURES

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§257.83(b)(1)(i) stipulates: *"(b) Annual inspections by a qualified professional engineer. (1) If the existing or new CCR surface impoundment or any lateral expansion of the CCR surface impoundment is subject to the periodic structural stability assessment requirements under §257.73(d) or §257.74(d), the CCR unit must additionally be inspected on a periodic basis by a qualified professional engineer 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., CCR unit design and construction information required by §§257.73(c)(1) and 257.74(c)(1), previous periodic structural stability assessments required under §§257.73(d) and 257.74(d), the results of inspections by a qualified person, and results of previous annual inspections);"*	Section 3.0
§257.83(b)(1)(ii) stipulates: *"(ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit and appurtenant structures;"*	Section 5.0

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USEPA CCR Rule Criteria 40 CFR §257.83	Jeffrey Energy Center (JEC) Annual Inspection Report
§257.83(b)(1)(iii) stipulates: *"(iii) A visual inspection of any hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit for structural integrity and continued safe and reliable operation."*	Section 5.2
§257.83(b)(2)(i) stipulates: *"(2) Inspection report. The qualified professional engineer must prepare a report following each inspection that addresses the following:* *(i) Any changes in geometry of the impounding structure since the previous annual inspection;"*	Section 6.1
§257.83(b)(2)(ii) stipulates: *"(ii) The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection;"*	Section 6.2
§257.83(b)(2)(iii) stipulates: *"(iii) The approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;"*	Section 6.3

USEPA CCR Rule Criteria 40 CFR §257.83	Jeffrey Energy Center (JEC) Annual Inspection Report
§257.83(b)(2)(iv) stipulates: *"(iv) The storage capacity of the impounding structure at the time of the inspection;"*	Section 6.4
§257.83(b)(2)(v) stipulates: *"(v) The approximate volume of the impounded water and CCR at the time of the inspection;"*	Section 6.5
§257.83(b)(2)(vi) stipulates: *"(vi) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit and appurtenant structures;"*	Section 6.6
§257.83(b)(2)(vii) stipulates: *"(vii) Any other change(s) which may have affected the stability or operation of the impounding structure since the previous annual inspection."*	Section 6.7

USEPA CCR Rule Criteria 40 CFR §257.83	Jeffrey Energy Center (JEC) Annual Inspection Report
§257.83(b)(4) stipulates: *"(4) Frequency of inspections. (i) Except as provided for in paragraph (b)(4)(ii) of this section, the owner or operator of the CCR unit must conduct the inspection required by paragraphs (b)(1) and (2) of this section on an annual basis. The date of completing the initial inspection report is the basis for establishing the deadline to complete the first subsequent inspection. Any required inspection may be conducted prior to the required deadline provided the owner or operator places the completed inspection report into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing subsequent inspection reports is based on the date of completing the previous inspection report. For purposes of this section, the owner or operator has completed an inspection when the inspection report has been placed in the facility's operating record as required by §257.105(g)(6)."*	Section 1.0
§257.83(b)(5) stipulates: *"(5) If a deficiency or release is identified during an inspection, the owner or operator must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken."*	Section 7.0
§257.83(c) stipulates: *"(c) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in §257.105(g), the notification requirements specified in §257.106(g), and the internet requirements specified in §257.107(g)."*	Section 8.0

1.0 INTRODUCTION

APTIM Environmental and Infrastructure, Inc. (Aptim, f/k/a CB&I Environmental & Infrastructure, Inc.) has prepared the following Annual Inspection Report (Report) at the request of Westar Energy (Westar) for the Bottom Ash Area Surface Impoundment (Surface Impoundment) located at the Jeffrey Energy Center (JEC) in St. Marys, Kansas. JEC is a coal-fired fired power plant that has been in operations since 1980. The Surface Impoundment has been deemed to be a regulated coal combustion residue (CCR) unit by the United States Environmental Protection Agency (USEPA), through the Disposal of Coal Combustion Residuals from Electric Utilities Final Rule (CCR Rule) 40 CFR §257 and §261.

In support of compliance to the CCR Rule, Mr. Richard Southorn (a qualified professional engineer with Aptim) conducted an on-site inspection of the Surface Impoundment on November 6th, 2017. Prior to inspection, Aptim personnel reviewed the relevant portions of the facility's operating record and first annual inspection report in relation to this Report, under the direct supervision of Mr. Southorn. This Report meets the requirements set forth within 40 CFR §257.83(b)(1) and (b)(2) based on the review of available information and visual observation, to evaluate if the design, construction, operation, and maintenance of the Surface Impoundment is consistent with good engineering standards. The annual Surface Impoundment inspection has been conducted and completed in compliance with the frequency of inspection timeframe set forth in §257.83(b)(4).

2.0 JEC SURFACE IMPOUNDMENT OVERVIEW

Westar owns and operates CCR Units at JEC near St. Marys, Pottawatomie County, Kansas. JEC is located approximately 4.5 miles north of Belvue, Kansas and approximately 4.5 miles west of Highway 63 and resides in Sections 1, 2, 11, and 12, Township 9 South, Range 11 East and Sections 6 and 7, Township 9 South, Range 12 East. The location of the Surface Impoundment is depicted in **Figure 1.**

The Surface Impoundment is located within the Bottom Ash Area 1. The Bottom Ash Area 1 is approximately 52.5 acres which includes both the Landfill, which is approximately 32.7 acres, and Surface Impoundment, which is approximately 19.8 acres. Existing site topography is depicted in **Figure 2.**

The water sources draining into the Surface Impoundment include:

- ❑ FGD contact water
- ❑ Process water and bottom ash slurry from the JEC plant;
- ❑ Stormwater run-off from the Bottom Ash Area 1 Landfill operations;
- ❑ Stormwater run-off from JEC Power Plant and adjacent East Run-on 1 area; and
- ❑ Direct precipitation.

Process water and bottom ash slurry from the Plant are pumped into the Surface Impoundment as power generation occurs in Units 1, 2 and 3. Unit 1 and Unit 2 are equipped with three pumping units each while Unit 3 is equipped with six pumping units. Each unit collects and recirculates process water to the JEC Power Plant in order to conserve water. Process water that does not recirculate into the JEC Power Plant is stored in bottom ash tanks and discharged from each unit to the Surface Impoundment.

The Surface Impoundment is drained through a 24-inch vertical overflow riser pipe connected to a 36-inch horizontal pipe. The overflow riser pipe allows water to be conveyed from the Surface Impoundment, downward into a horizontal pipe. Stormwater is conveyed by the horizontal pipe through the perimeter berm. Stormwater flows from the pipe to a now constructed natural drainage channel that flows to Tower Hill Lake.

Water that passes through the inflow design flood control system is ultimately conveyed to Tower Hill Lake. Tower Hill Lake is designed to manage all non-CCR containing water, including stormwater drainage from the Surface Impoundment and surrounding areas.

3.0 REVIEW OF AVAILABLE INFORMATION

Prior to the on-site inspection, Mr. Southorn reviewed the available information for the Surface Impoundment as provided by Westar:

- Kansas Department of Health and Environment – Bureau of Waste Management (KDHE-BWM) Industrial Landfill Permit No. 0359, October 15, 2015.
- Jeffrey Energy Center Routine Inspection Reports, January through September 2017.
- Annual Inspection Report Jeffrey Energy Center Bottom Ash Area Surface Impoundment, CB&I Environmental & Infrastructure, Inc., January 2017.

Mr. Southorn verified the available information during the on-site inspection on November 6th, 2017.

3.1 Summary of Inspection Reports

All routine inspections at the Surface Impoundment were reviewed. Run on and run off controls including a newly-installed erosion mat lining within a stormwater channel and rock work (rip-rap placement) were completed. Minor repairs to the perimeter berms and areas of erosion were completed as necessary. Seed was planted on some areas of exposed soil to prevent erosion. Herbicides were applied to vegetation growing in rip-rap areas. There were no deficiencies or malfunctions noted throughout the year.

3.2 Summary of Previous Annual Inspection Report

Based on the 2016 Annual Inspection Report, it was determined that the Surface Impoundment was in good working order. Minor erosion was observed at the Surface Impoundment discharge location on the west side of the berm.

4.0 SURFACE IMPOUNDMENT CONSTRUCTION SUMMARY

Rip-rap was being installed on the outer slope of Bottom Ash Area 1 at the time of the 2016 Annual Inspection. This work has been completed.

In 2017, rip-rap was placed at the Surface Impoundment discharge location on the west side of the berm, to minimize the potential for future erosion. Photograph 15 in **Appendix A** depicts the rip-rap that has been placed at the discharge location.

5.0 INSPECTION SUMMARY

The on-site inspection focused on standard geotechnical signs of distress or malfunction of the CCR unit. Condition and design of the hydraulic and appurtenant structures passing through the perimeter berm was also assessed. Slumping at the toe of slopes, tensile cracking, abnormal or excessive erosion on the side slopes and drainage channels, groundwater/surface water seepage, and conveyance structure function and design were inspected. Any visual signs are potential indicators of structural weakness or malfunction at the Surface Impoundment.

5.1 Visual Signs of Distress or Malfunction

During the on-site inspection, slope appearance, slope stability, and overall site conditions were assessed. No erosion or sloughing was observed along the Surface Impoundment perimeter berm. There are no visual signs of distress or malfunction that may contribute to the instability of the Surface Impoundment. The rip-rap appears stable with no evidence of migration, seeps, or stability concerns.

5.2 Review of Hydraulic Structures

With no evidence to the contrary, the hydraulic structures at the Surface Impoundment are believed to be in good operating condition and functioning as intended. At the time of inspection, stormwater conveyance systems such as the stormwater drainage channels and surface impoundment outlet structure were operating in free-flow conditions with no obstructions, as designed. See **Appendix A** for photographs depicting the channels and outlet structure during operation.

6.0 CONCLUSIONS

Based on a review of the available facility information and on-site inspection, the following conclusions were developed.

6.1 Changes in Geometry

Topographic information from the 2016 Annual Inspection Report and the latest survey conducted in March 2017 was utilized to determine changes in geometry of the impounding structure at the Surface Impoundment. It was determined that the Surface Impoundment has been filled in by 0 to 10 feet of CCR material and possible fill material. There is currently little to no water in the Surface Impoundment. Water is moved through a small channel within the Surface Impoundment to the outlet.

6.2 Instrumentation Readings

No instrumentation associated with the hydraulic structures, impoundment embankments, or slope performance has been installed at the Surface Impoundment. Instrumentation readings were not provided in the previous annual inspection, thus a maximum instrumentation reading is not applicable.

6.3 Impounded Water and CCR Depths and Elevations

At the time of inspection, there was little to no water in the Surface Impoundment (see Photo No. 1 in **Appendix A**). There is a small channel running through the Surface Impoundment which is where most of the water is stored (see Photograph No. 10 in **Appendix A**). It can be seen in Photograph No. 7 that the water is at the elevation of the outlet in the Surface Impoundment, which is approximately at 1239.25 ft mean sea level (MSL).

Material has been moved and areas of the Surface Impoundment have seen an increase in elevation. The lowest point in the Surface Impoundment based on the 2017 survey is approximately 1232 feet MSL. The lowest point in the Surface Impoundment which is in the path of the small channel which contains water is approximately 1238 ft MSL, resulting in a water depth of 1.25 feet at the deepest portion of the Surface Impoundment at the time of inspection. The perimeter berm has remained at an approximate height of approximately 1241.6 ft MSL.

Maximum and minimum depths of CCR since the previous annual inspection have not deviated from the initial depths.

6.4 Remaining Storage Capacity

The remaining CCR material storage capacity within the Surface Impoundment was calculated by determining the volume between the most recent survey, conducted in March 2017, and the minimum elevation of the perimeter berm. The remaining storage capacity within the Surface Impoundment is approximately 36,935 cubic yards (cy).

6.5 Impounded Water and CCR Volumes

The water within the Surface Impoundment currently moves through a small channel within the Surface Impoundment to the outlet. The impounded water volume within the channel was estimated based on the most recent survey, conducted in March 2017, and the

impounded water elevation observed during the site inspection. The impounded water volume within the Surface Impoundment is conservatively estimated to be approximately 3,375 cy.

The CCR material volume within the Surface Impoundment was determined in the 2016 Annual Inspection Report to be approximately 572,732 cy. A comparison of the 2016 survey and the most recent survey conducted in March 2017 indicate that the topography within the Surface Impoundment has increased. It was determined that this increase in elevation throughout the Surface Impoundment is due to fill placement and some CCR material disposal. Based on the comparison, it was determined that the CCR material volume within the Surface Impoundment is approximately 625,070 cy.

6.6 Structural Weakness and Disrupting Conditions

At the time of this inspection, there were no signs of distress or malfunction that would indicate actual or potential structural weakness at the Surface Impoundment. There was no indication that existing conditions at the Surface Impoundment have disrupted or have the potential to disrupt safety or operations. Inspections are utilized to document any signs of distress, malfunction, or disruption and resolve the issues immediately.

6.7 Changes Affecting Stability and Operations

There have been no changes to the Surface Impoundment that pose a threat or concern to the stability of the perimeter berm. Operations and maintenance have not deviated from the original designed plan.

7.0 RECOMMENDATIONS

Based on the on-site inspection performed on November 6th, 2017, Aptim recommend the following actions:

- ❑ Continue to monitor and maintain rip-rap at the base of the outlet pipe of the Surface Impoundment (see Photograph 8 in **Appendix A**).
- ❑ Continue to monitor erosion controls and vegetative cover in line with the required inspections.
- ❑ Continue proper management of the inflow control system and gradient flowing to the outlet structure.
- ❑ Continue to monitor all conveyance features for signs of erosion, damage, obstructions, or malfunction in line with the required inspections

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8.0 RECORDS RETENTION AND MAINTENANCE

8.1 Incorporation of Plan into Operating Record

§257.105(g) of 40 CFR Part §257 provides record keeping requirements to ensure that this Plan will be placed in the facility's operating record. Specifically, §257.105(g) stipulates:

> §257.105(g)*: "(g) Operating criteria. The owner or operator of a CCR unit subject to this subpart must place the following information, as it becomes available, in the facility's operating record: (6) The periodic inspection report as required by §257.83(b)(2)."*

This Report will be placed within the Facility Operating Record upon Westar's review and approval.

8.2 Notification Requirements

§257.106(g) of 40 CFR Part §257 provides guidelines for the notification of the availability of the initial and periodic plan. Specifically, §257.106(g) stipulates:

> §257.106(g): *(g) Operating criteria. The owner or operator of a CCR unit subject to this subpart must notify the State Director and/or appropriate Tribal authority when information has been placed in the operating record and on the owner or operator's publicly accessible internet site. The owner or operator must: (5) Provide notification of the availability of the periodic inspection reports specified under §257.105(g)(6)."*

The State Director and appropriate Tribal Authority will be notified upon placement of this Plan in the Facility Operating Record.

§257.107(g) of 40 CFR Part §257 provides publicly accessible Internet site requirements to ensure that this Report is accessible through the Westar webpage. Specifically, §257.107(g) stipulates:

> §257.107(g): *(g) Operating criteria. The owner or operator of a CCR unit subject to this subpart must place the following information on the owner or operator's CCR Web site: (5) The periodic inspection reports specified under §257.105(g)(6)."*

This Report will be uploaded to Westar's CCR Compliance reporting Website upon Westar's review and approval.

9.0 PROFESSIONAL ENGINEER CERTIFICATION

The undersigned registered professional engineer is familiar with the requirements of the CCR Rule and has visited and examined JEC or has supervised examination of JEC by appropriately qualified personnel. I hereby certify based on a review of available information within the JEC's operating records and observations from my personal on-site inspection (including the photographs contained in **Appendix A**), that the Surface Impoundment does not exhibit any appearances of actual/potential structural weakness that would be disruptive to the normal operations of the unit. The unit is being operated and maintained consistent with recognized and generally accepted good engineering standards and practices. This certification was prepared as required by 40 CFR Part §257.83(b).

Name of Professional Engineer: Richard Southorn

Company: Aptim

Signature:

Date: JAN 5, 2018

PE Registration State: Kansas

PE Registration Number: PE25201

Professional Engineer Seal:

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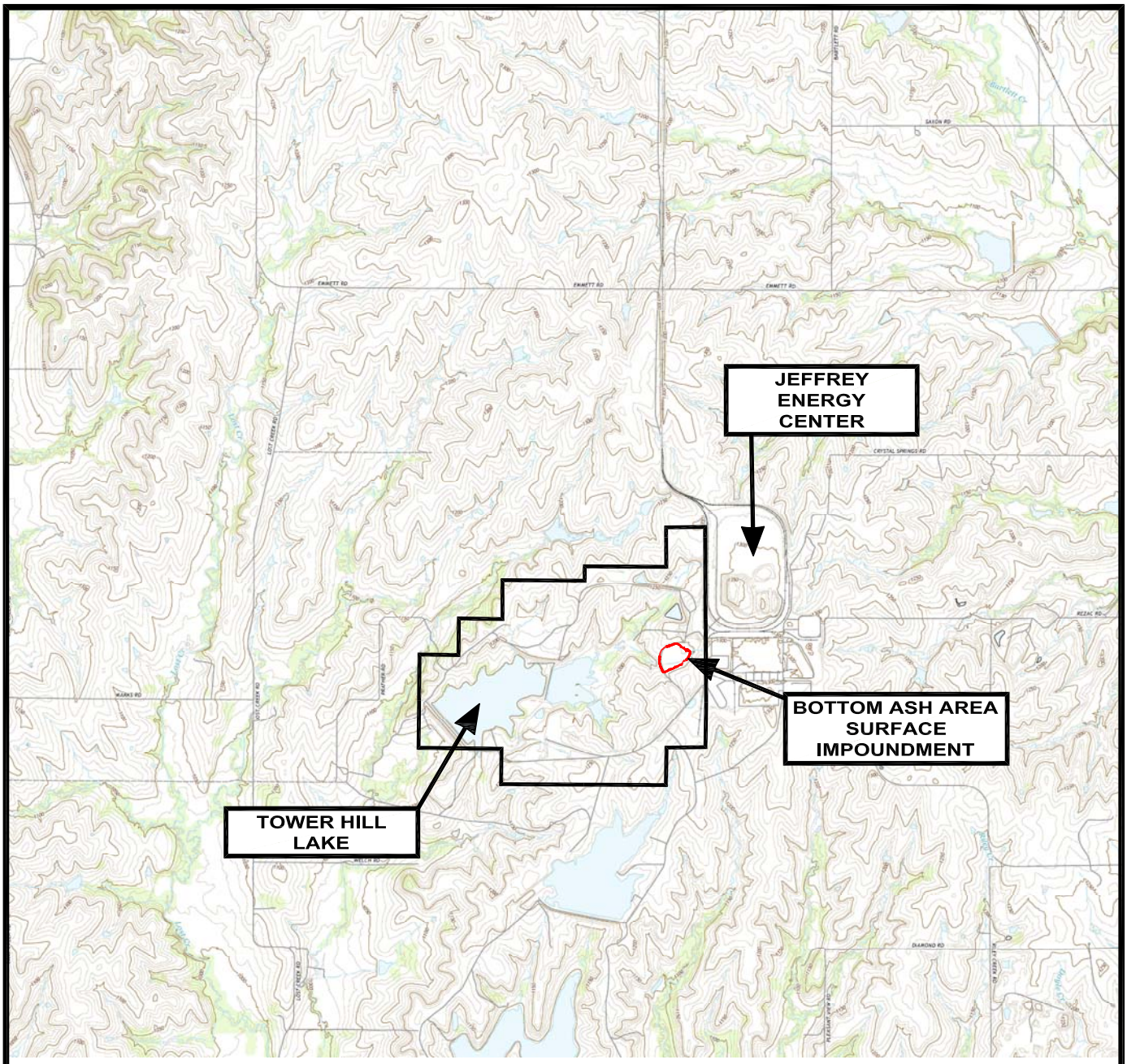
FIGURES



LEGEND

CCR UNIT BOUNDARY

KDHE-BWM INDUSTRIAL LANDFILL PERMIT NO. 0359 BOUNDARY

N

0 5000'

GRAPHIC SCALE

NOTES

1. AERIAL TOPO OBTAINED FROM USGS 7.5-MINUTE SERIES, EMMETT AND LACLEDE QUADRANGLE, KANSAS, 2014.
2. ALL BOUNDARIES ARE APPROXIMATE.

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25905 JEFFREY RD., ST. MARYS, KS

FIGURE 1
BOTTOM ASH AREA SURFACE IMPOUNDMENT
SITE LOCATION PLAN

APPROVED BY: RDS	PROJ. NO.: –	DATE: JANUARY 2018

T:\AutoCAD\Projects\Westar Energy\CCR-Annual-Inspections\2017\Jeffrey\2017 Volumes\Site Location Map.dwg, 1/5/2018 10:05:16 AM, Adobe PDF

N

0 400'

GRAPHIC SCALE

LEGEND

CCR UNIT BOUNDARY

SURFACE IMPOUNDMENT BOUNDRY

NOTES

1. EXISTING CONTOURS DEVELOPED BY PROFESSIONAL ENGINEERING CONSULTANTS IN MARCH 2017.
2. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
3. CCR BOUNDARY IS APPROX. 52.5 ACRES.
4. ALL BOUNDARIES AND BORDERS ARE APPROXIMATE.
5. REFER TO APPENDIX A FOR PHOTOGRAPHIC DOCUMENTATION.

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FIGURE 2
BOTTOM ASH SURFACE IMPOUNDMENT
EXISTING SITE TOPOGRAPHY

DRAWN BY:	ORC	APPROVED BY:	RDS	PROJ. NO.:	–	DATE:	JANUARY 2018

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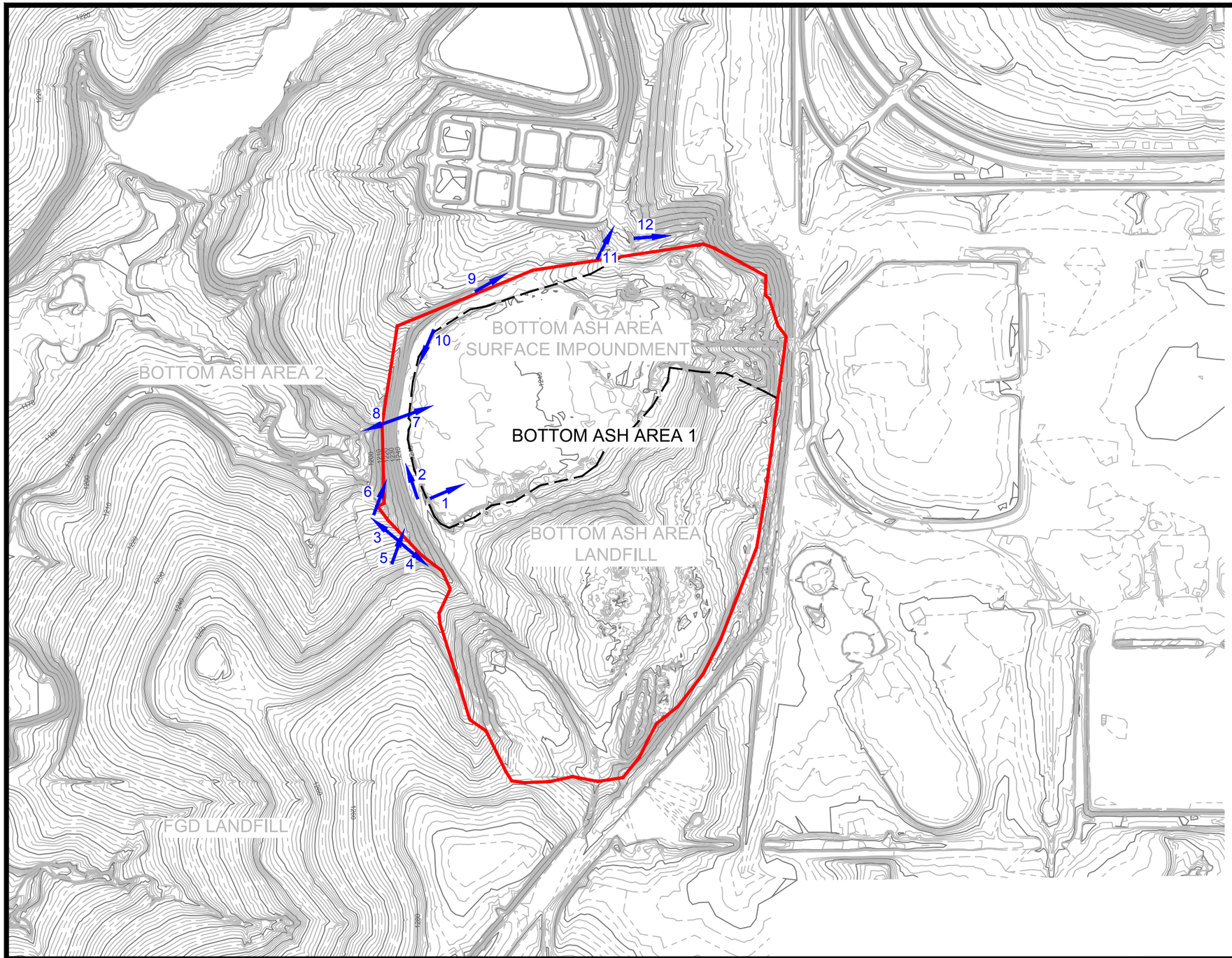

N

0 400'

GRAPHIC SCALE

LEGEND

- CCR UNIT BOUNDARY
- SURFACE IMPOUNDMENT BOUNDARY
- 2017 ANNUAL INSPECTION PHOTOGRAPH (ARROW DENOTES DIRECTION OF VIEW)

NOTES

1. EXISTING CONTOURS DEVELOPED BY PROFESSIONAL ENGINEERING CONSULTANTS IN MARCH 2017.
2. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
3. CCR BOUNDARY IS APPROX. 52.5 ACRES.
4. ALL BOUNDARIES AND BORDERS ARE APPROXIMATE.
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FIGURE 3
BOTTOM ASH SURFACE IMPOUNDMENT
PHOTO LOG PLAN VIEW

DRAWN BY:	ORC	APPROVED BY:	RDS	PROJ. NO.:	–	DATE:	JANUARY 2018

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APPENDIX A

Annual Inspection Photo Log

Project: Bottom Ash Surface Impoundment
Photographer: Richard Southorn

Photograph No. 1

Date:
November 6, 2017

Direction:
67° NE

Description:
Dried bottom ash is present within the Bottom Ash Surface Impoundment area.

Photograph No. 2

Date:
November 6, 2017

Direction:
341° NW

Description:
Photograph shows rip-rap that has been placed on the Bottom Ash Area 1 outer berm/impoundment slope. The rip-rap was installed in 2016 to address seeps that were observed during the 2015 Annual Inspection. Rip-rap placement was ongoing at the time of the 2016 Annual Inspection. The rip-rap appears to be evenly installed with no evidence of migration. No seeps were observed from the wall. Some vegetation is present, but was largely dead due to routine herbicide spraying. The outer slope is in good condition with no stability or erosion issues.

Project: Bottom Ash Surface Impoundment
Photographer: Richard Southorn

Photograph No. 3 **Date:** November 6, 2017 **Direction:** 310° NW **Description:** Observing a newly lined stormwater channel at the base of the Bottom Ash Area 1. The channel is free of obstructions and appears in good condition.	

Photograph No. 4 **Date:** November 6, 2017 **Direction:** 178° SE **Description:** Observing a rip-rap lined stormwater channel at the toe of the bottom ash within Bottom Ash Area 1. The channel is free of obstructions and appears in good condition.	

Project: Bottom Ash Surface Impoundment
Photographer: Richard Southorn

Photograph No. 5

Date:
November 6, 2017

Direction:
20° N

Description:
Observing the ditch base of the Bottom Ash Area 1 berm/impoundment at the location where the ditch lining material changes from rip-rap to erosion control lining. The channels are free of obstructions and functioning as intended.

In the background, the outer slope of Bottom Ash Area 1 is shown. The rip-rap was installed in 2016 to address seeps. No seeps were observed from the wall. Some vegetation is present, but was largely dead due to routine herbicide spraying. The outer slope is in good condition with no stability or erosion issues.

Photograph No. 6

Date:
November 6, 2017

Direction:
4° N

Description:
The perimeter channel and outer slope of Bottom Ash Area 1 is shown. The rip-rap was installed in 2016 to address seeps. No seeps were observed from the wall. Some vegetation is present, but was largely dead due to routine herbicide spraying. The outer slope is in good condition with no stability or erosion issues.

Project: Bottom Ash Surface Impoundment
Photographer: Richard Southorn

Photograph No. 7 **Date:** November 6, 2017 **Direction:** 53° NE **Description:** Observing the inlet of the outlet standpipe structure of the Bottom Ash Area 1. The structure is working as intended.	

Photograph No. 8 **Date:** November 6, 2017 **Direction:** 281° SW **Description:** Observing the bottom ash outlet (center). The outlet structure and channel leading to the outlet are functioning as intended.	

Project: Bottom Ash Surface Impoundment
Photographer: Richard Southorn

Photograph No. 9

Date:
November 6, 2017

Direction:
38° NE

Description:
Observing the stormwater run-on divergence channel. This channel captures stormwater and plant process water that would run onto Bottom Ash Area 1 and directs it around the toe of slope to the west. There are no signs of erosion. The channel is functioning as intended.

Photograph No. 10

Date:
November 6, 2017

Direction:
203° SW

Description:
Observing the Bottom Ash Surface Impoundment within Bottom Ash Area 1. Vegetation is present on the sideslopes.

Project: Bottom Ash Surface Impoundment
Photographer: Richard Southorn

Photograph No. 11

Date:
November 6, 2017

Direction:
27° NE

Description:
Observing the outlet of an in-line culvert at an access road crossing of the stormwater run-on divergence channel. No evidence of erosion or distress. The culvert showed no signs of buckling or crushing and is functioning as intended. No flow obstructions were observed.

Photograph No. 12

Date:
November 6, 2017

Direction:
86° E

Description:
Observing the inlet of the in-line culvert at an access road crossing of the stormwater run-on divergence channel. Functioning as intended.