Annual Inspection Report
Jeffrey Energy Center
Bottom Ash Area Surface Impoundment

Prepared for:

Westar Energy

Jeffrey Energy Center

St. Marys, Kansas

Prepared by:

CB&I Environmental & Infrastructure, Inc.

Janurary 2017

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CCR Regulatory Requirements

USEPA CCR Rule Criteria 40 CFR §257.83	Jeffrey Energy Center (JEC) Annual Inspection Report
§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 4.1

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 4.2
§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 5.1
§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 5.2
§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 5.3

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 5.4
§257.83(b)(2)(v) stipulates: *"(v) The approximate volume of the impounded water and CCR at the time of the inspection;"*	Section 5.5
§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 5.6
§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 5.7

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 6.0
§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 7.0

1.0 INTRODUCTION

CB&I Environmental and Infrastructure, Inc. (CB&I) 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. Mary's, Kansas. JEC is a coal-fired and natural gas fired power plant that has been in operations since 1980. The Bottom Ash Area 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 CB&I) conducted an on-site inspection of the Surface Impoundment on November 29th, 2016. Prior to inspection, CB&I 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 landfill 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 Bottom Ash Area Surface Impoundment is depicted in **Figure 1.**

The Surface Impoundment is located within the Bottom Ash Area 1, consisting of the Surface Impoundment and the Bottom Ash Area 1 Landfill. 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 Landfill Area 1 landfilling operations;
- Stormwater run-off from JEC Power Plant and adjacent East Run-on 1 area;
- 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 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-contact stormwater, including stormwater drainage from the Bottom Ash Surface Impoundment.

3.0 REVIEW OF AVAILABLE INFORMATION

Prior to the on-site inspection, Mr. Southorn reviewed the available information for the Bottom Ash 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 Weekly Inspection Reports, October 2015 through November 2016.
- Initial Annual CCR Surface Impoundment PE Inspection, Bottom Ash Area 1 Impoundment, Haley & Aldrich, Inc., January 2016.
- Initial Periodic Structural Stability Assessment, Bottom Ash Area 1 Impoundment, Haley & Aldrich, Inc., September 2016.

Mr. Southorn verified the available information during the on-site inspection on November 29th, 2016.

3.1 Summary of Weekly Inspection Reports

All weekly inspections at the Bottom Ash Surface Impoundment were reviewed. Minor erosion rills have been documented and resolved throughout the following year. Seepage erosion located on the west side of the perimeter berm has been documented throughout the year. Westar has conducted an investigation into the cause and remedial actions to resolve this issue. During the on-site inspection, construction was completed to provide an designated flow path for the seepage. The investigation concluded that the seepage has not caused an instability issue for the perimeter berm. There were no other deficiencies or malfunctions noted throughout the year.

3.2 Summary of Previous Annual Inspection Report

Based on a review of the 2015 Annual Inspection Report, it was determined that the following deficiencies were observed:

- Seepage erosion on the downstream slope of the west perimeter berm
- Large areas without vegetation or other appropriate slope protection on the downstream slope of the west and north perimeter berms.
- Overgrown vegetation along the west and north perimeter berms.

- ❑ Erosion rills on the downstream slope of the west perimeter berm.
- ❑ Channel erosion cutting into the west perimeter berm toe of slope along the perimeter stormwater drainage channel.
- ❑ Erosion at the outlet of the Surface Impoundment drainage culvert.
- ❑ Damage to the vertical riser intake pipe within the Surface Impoundment.

3.3 Completed Activities Associated with 2015 Recommendations

The following remedial actions to resolve these deficiencies have been completed throughout the year:

- ❑ Erosion areas that were identified have been stabilized with vegetation or riprap. See Photograph 13.
- ❑ The vertical riser intake pipe has been repaired. All vegetated side slopes have been properly cut and maintained. See Photograph 8.
- ❑ The north perimeter channel has been redesigned with riprap to minimize the potential for erosion along the perimeter berm toe of slope. See Photograph 3.
- ❑ Seepage erosion on the downstream slope of the west perimeter berm has been repaired with a riprap stabilized flow path to direct seepage in a non-erosive manner. See Photograph 10.

Following the previous annual inspection, the Surface Impoundment has been properly maintained and operated in conjunction with the facility operating procedures to continue safe and reliable operation.

4.0 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 CCR Impoundment.

4.1 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. Minor erosion was observed at the Bottom Ash Area Surface Impoundment discharge location on the west side of the berm. Following the annual inspection, rip-rap has been placed at this discharge location to minimize the potential for erosion. Photograph 9 depicts the discharge location during the annual inspection. Photograph 15 depicts the rip-rap that has been placed at the discharge location.

4.2 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 as designed.

5.0 CONCLUSIONS

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

5.1 Changes in Geometry

Topographic information from the 2015 Annual Landfill Inspection Report and the latest survey conducted in April 2016 was utilized to determine changes in geometry of the impounding structure at the Surface Impoundment. It was determined that no changes have occurred to the impounding structure.

5.2 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.

5.3 Impounded Water and CCR Depths and Elevations

At the time of inspection, the impounded water elevation at the Surface Impoundment was approximately 1239.5 feet mean sea level (MSL). The lowest point in the Surface Impoundment is approximately 1226.6 feet MSL, resulting in a water depth of 12.9 feet at the deepest portion of the impoundment. Water depth at the outlet riser structure is approximately 0.5 feet. Maximum and minimum depths of impounded water since the previous annual inspection have not deviated from the initial depths.

CCR depths vary within the Surface Impoundments due to the continual deposit, dewatering, and dredging of CCR materials. Maximum and minimum depths of CCR since the previous annual inspection have not deviated from the initial depths.

5.4 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 April 2016, and the minimum elevation of the perimeter berm. The remaining storage capacity within the Surface Impoundment is approximately 55,226 cubic yards (cy).

5.5 Impounded Water and CCR Volumes

The impounded water volume within the Surface Impoundment was calculated by determining the volume between the most recent survey, conducted in April 2016, and the impounded water elevation observed during the site inspection. The impounded water volume within the Surface Impoundment is approximately 24,870 cy.

The CCR material volume within the Surface Impoundment is estimated to be 572,732 cy. The CCR material volume was determined in the previous annual inspection, calculating the volume between the 2014 survey and a topographic survey from the United States Geological Survey (USGS) from 1964, prior to the construction of the Surface Impoundment. A comparison of the 2014 survey and the most recent survey conducted in April 2016 indicate that the topography within the Surface Impoundment has not changed. It is concluded that the CCR material volume within the Surface Impoundment has not changed since the previous annual inspection report.

5.6 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. Weekly inspections are utilized to document any signs of distress, malfunction, or disruption and resolve the issues immediately.

5.7 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.

6.0 RECOMMENDATIONS

Based on the on-site inspection performed on November 29th, 2016, CB&I recommend the following actions:

- ❑ Continue to monitor and maintain rip-rap at the base of the outlet pipe of the Bottom Ash Area Surface Impoundment (see Photograph 15).
- ❑ Continue to monitor erosion controls and vegetative cover in line with the weekly 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 weekly inspections

7.0 RECORDS RETENTION AND MAINTENANCE

7.1 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.

7.2 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 Plan is accessible through the Westar Energy 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 Plan will be uploaded to Westar Energy's CCR Compliance reporting Website upon Westar's review and approval.

8.0 PROFESSIONAL ENGINEER CERTIFICATION

The undersigned registered professional engineer is familiar with the requirements of the CCR Rule and has visited and examined the Jeffrey Energy Center or has supervised examination of the Jeffrey Energy Center by appropriately qualified personnel. I hereby certify based on a review of available information within the facility's operating records and observations from my personal on-site inspection (including the photographs contained in **Appendix A**), that the Bottom Ash Surface Impoundment does not exhibit any appearances of actual/potential structural weakness that would be disruptive to the normal operations of the Jeffery Energy Center CCR 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: CB&I

Signature:

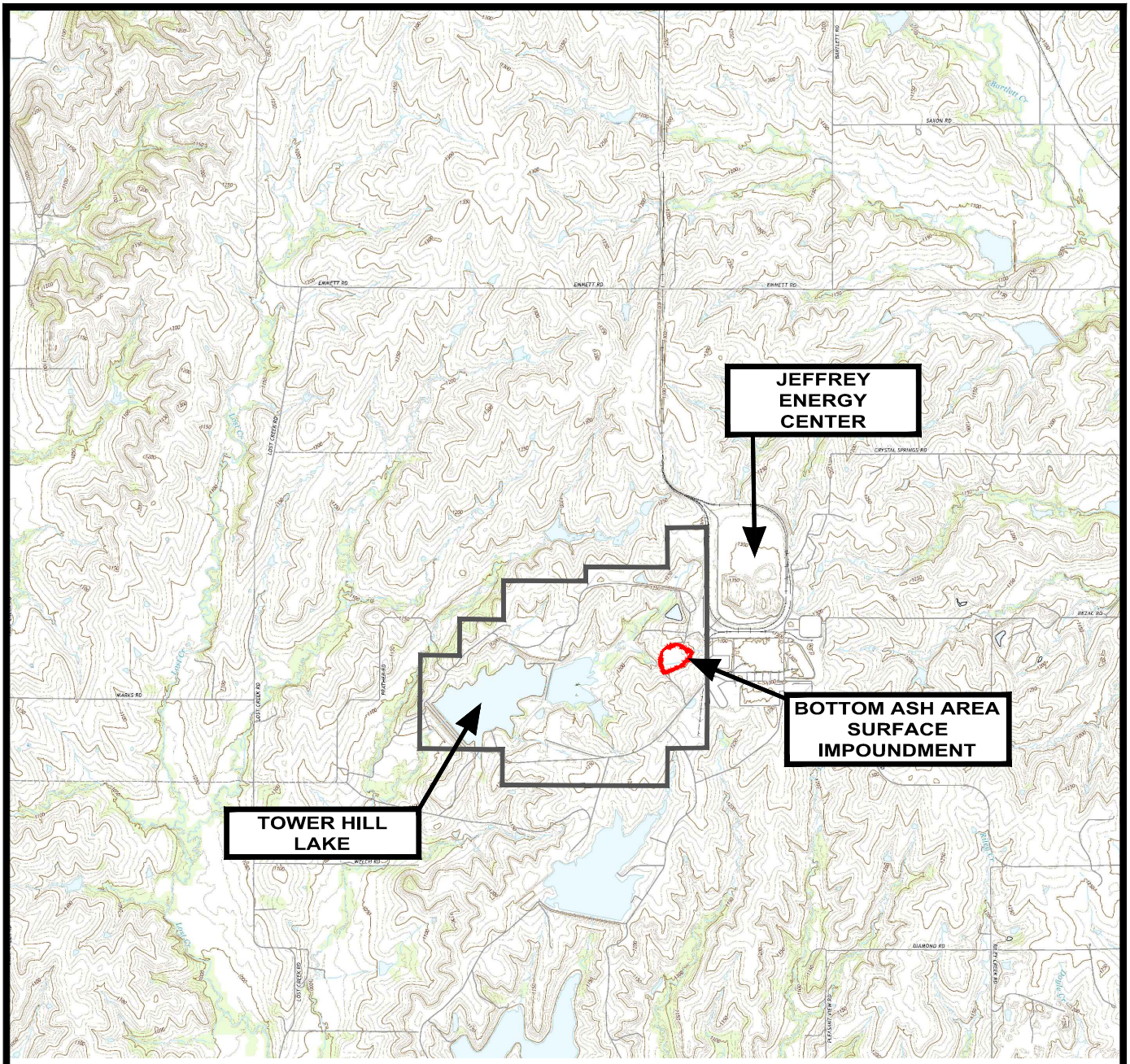
Date: Jan 12, 2017

PE Registration State: Kansas

PE Registration Number: PE25201

Professional Engineer Seal:

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.

CB&I Environmental & Infrastructure, Inc.

WESTAR ENERGY
25905 JEFFREY RD., ST. MARYS, KS

FIGURE 1
BOTTOM ASH AREA SURFACE IMPOUNDMENT
SITE LOCATION PLAN

APPROVED BY: MMS	PROJ. NO.: 631214397	DATE: JANUARY 2017

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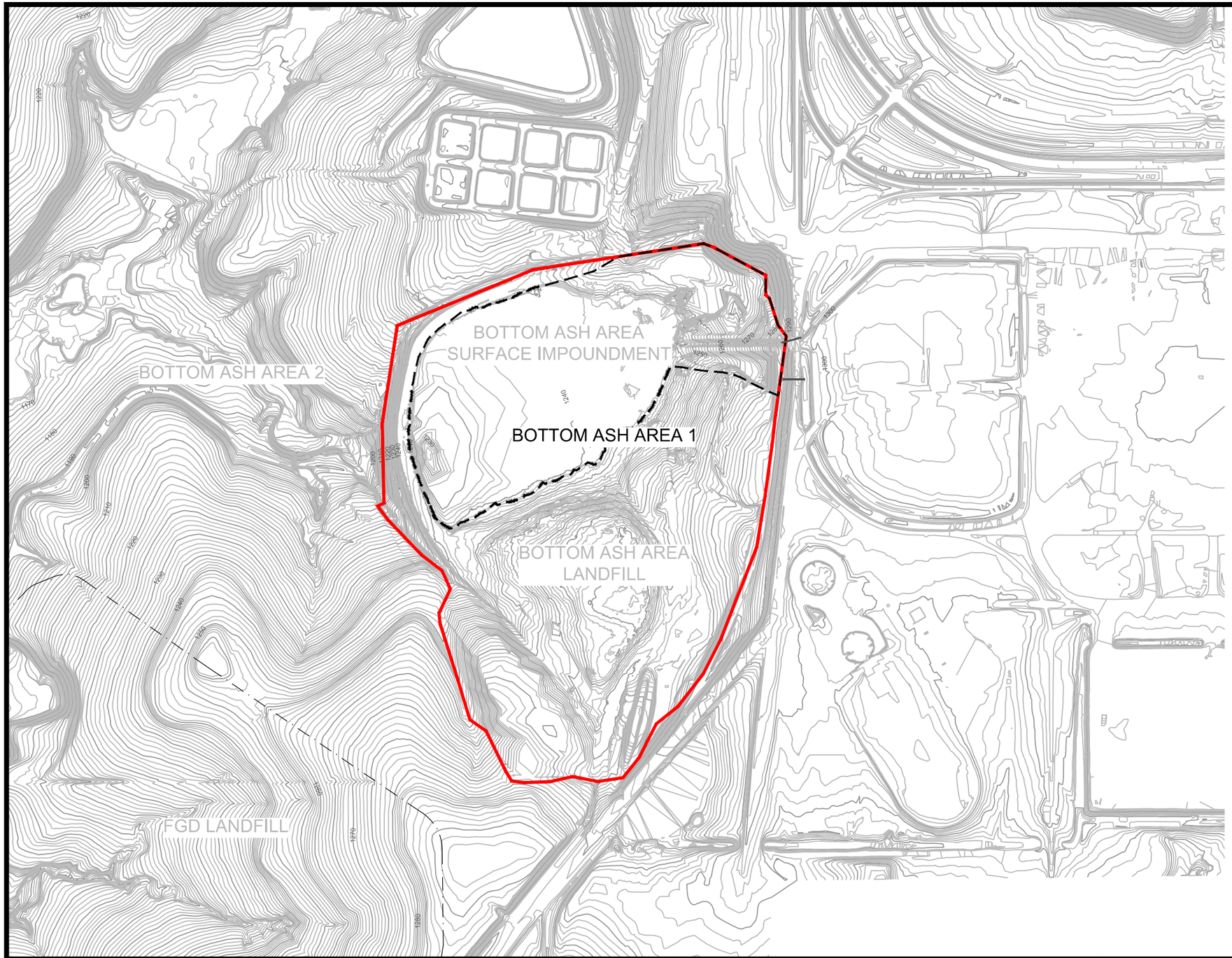

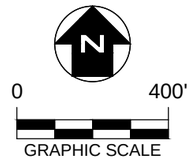

LEGEND

- CCR UNIT BOUNDARY
- SURFACE IMPOUNDMENT BOUNDRY

NOTES

1. EXISTING CONTOURS DEVELOPED BY PROFESSIONAL ENGINEERING CONSULTANTS IN APRIL 2016.
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.

REV. NO.	DATE	DESCRIPTION

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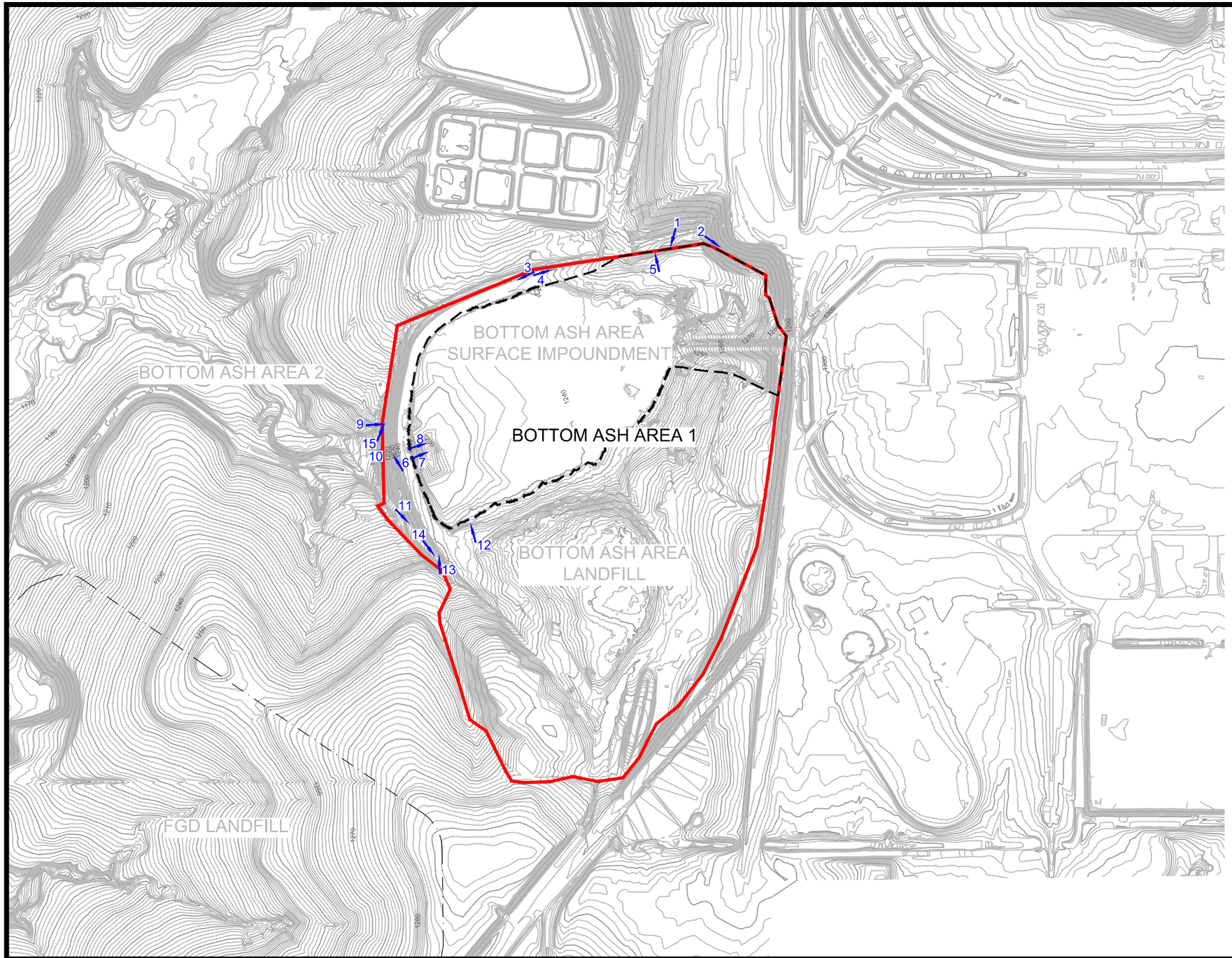
FIGURE 2
BOTTOM ASH SURFACE IMPOUNDMENT
EXISTING SITE TOPOGRAPHY

DRAWN BY:	APPROVED BY:	PROJ. NO.:	DATE:
SJL	RDS	631214397	JANUARY 2017



0 400'

GRAPHIC SCALE

LEGEND

CCR UNIT BOUNDARY

SURFACE IMPOUNDMENT BOUNDRY

NOTES

1. EXISTING CONTOURS DEVELOPED BY PROFESSIONAL ENGINEERING CONSULTANTS IN APRIL 2016.
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REV. NO.	DATE	DESCRIPTION

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FIGURE 3
BOTTOM ASH SURFACE IMPOUNDMENT
PHOTO LOG PLAN VIEW

DRAWN BY:	APPROVED BY:	PROJ. NO.:	DATE:
SJL	RDS	631214397	JANUARY 2017

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APPENDIX A

Annual Inspection Photo Log

Photograph No. 1 **Date:** November 29, 2016 **Direction:** Southwest	
Description: Observing the surface impoundment within the Bottom Ash Area 1.	

Photograph No. 2 **Date:** November 29, 2016 **Direction:** Southeast	
Description: Observing the inflow structure to the surface impoundment. Vegetation is well-established and maintained. No evidence of erosion or malfunction.	

Photograph No. 3 **Date:** November 29, 2016 **Direction:** Southwest	
Description: Non-contact drainage channel with riprap-lined interior slope to address erosion observed during 2015 inspection. Will be seeded and/or lined prior to accepting flow.	

Photograph No. 4 **Date:** November 29, 2016 **Direction:** Northeast	
Description: Looking up-slope of channel at access road crossing. No evidence of erosion or distress.	

Photograph No. 5 **Date:** November 29, 2016 **Direction:** North	
Description: Looking up-slope at temporary channel used during construction. No evidence of erosion or distress.	

Photograph No. 6 **Date:** November 29, 2016 **Direction:** Northwest	
Description: Observing a backhoe placing and compacting riprap to address seepage erosion observed during 2015 inspection.	

Photograph No. 7 **Date:** November 29, 2016 **Direction:** Northeast	
Description: Observing process water collection within the surface impoundment. No evidence of malfunction.	

Photograph No. 8 **Date:** November 29, 2016 **Direction:** Northeast	
Description: Observing the repaired outlet pipe structure of the surface impoundment to address damage observed during 2015 inspection.	

Photograph No. 9 **Date:** November 29, 2016 **Direction:** East	
Description: Observing outlet pipe structure at the toe of the surface impoundment slope. Erosion stabilization controls are recommended at this outlet.	

Photograph No. 10 **Date:** November 29, 2016 **Direction:** Northeast	
Description: Observing a backhoe placing and compacting riprap to address seepage erosion observed during 2015 inspection.	

Photograph No. 11 **Date:** November 29, 2016 **Direction:** Southeast	
Description: Observing the landfill perimeter berm slopes and non-contact stormwater ditch. Vegetation is well-established and maintained. No evidence of erosion or sloughing.	

Photograph No. 12 **Date:** November 29, 2016 **Direction:** North	
Description: Observing the Bottom Ash Area 1 and surface impoundment signage.	

Photograph No. 13 **Date:** November 29, 2016 **Direction:** North	
Description: Overview of the Bottom Ash Area 1 surface impoundment.	

Photograph No. 14 **Date:** November 29, 2016 **Direction:** Southeast	
Description: Observing newly constructed non-contact stormwater ditch along western perimeter.	

Photograph No. 15 **Date:** December 27 – 30, 2016 **Direction:** Northwest	
Description: Observing erosion repaired with rip-rap at Bottom Ash discharge location.	