



Structural Stability Assessment Jeffrey Energy Center Inactive Bottom Ash Pond

Prepared for:
Westar Energy
Jeffrey Energy Center
St. Marys, Kansas

Prepared by:
APTIM Environmental & Infrastructure, Inc.

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Plan Review/Amendment Log §257.73(d)

Date of Review	Reviewer Name	Sections Amended and Reason	Version



CCR Regulatory Requirements

USEPA CCR Rule Criteria 40 CFR §257.73	Jeffrey Energy Center (JEC) Structural Stability Assessment – Inactive Bottom Ash Pond
<p>§257.73(d)(1)(i) stipulates:</p> <p><i>(d) Periodic structural stability assessments. (1) The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with:</i></p> <p><i>(i) Stable foundations and abutments;</i></p>	Section 3.1
<p>§257.73(d)(1)(ii) stipulates:</p> <p><i>(ii) Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown;</i></p>	Section 3.2
<p>§257.73(d)(1)(iii) stipulates:</p> <p><i>(iii) Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit;</i></p>	Section 3.3
<p>§257.73(d)(1)(iv) stipulates:</p> <p><i>(iv) Vegetated slopes of dikes and surrounding areas not to exceed a height of six inches above the slope of the dike, except for slopes which have an alternate form or forms of slope protection;</i></p>	Section 3.4

USEPA CCR Rule Criteria 40 CFR §257.73	Jeffrey Energy Center (JEC) Structural Stability Assessment – Inactive Bottom Ash Pond
<p>§257.73(d)(1)(v)(A) stipulates:</p> <p><i>(v) A single spillway or a combination of spillways configured as specified in paragraph (d)(1)(v)(A) of this section. The combined capacity of all spillways must be designed, constructed, operated, and maintained to adequately manage flow during and following the peak discharge from the event specified in paragraph (d)(1)(v)(B) of this section.</i></p> <p><i>(A) All spillways must be either: (1) Of non-erodible construction and designed to carry sustained flows; or</i></p> <p><i>(2) Earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.</i></p>	<p>Section 3.5</p>
<p>§257.73(d)(1)(v)(B) stipulates:</p> <p><i>(B) The combined capacity of all spillways must be adequately manage flow during and following the peak discharge from a:</i></p> <p><i>(1) probably maximum flood (PMF) for a high hazard potential CCR surface impoundment; or</i></p> <p><i>(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or</i></p> <p><i>(3) 100-year flood for a low hazard potential CCR surface impoundment.</i></p>	<p>Section 3.6</p>

USEPA CCR Rule Criteria 40 CFR §257.73	Jeffrey Energy Center (JEC) Structural Stability Assessment – Inactive Bottom Ash Pond
<p>§257.73(d)(1)(vi) stipulates:</p> <p><i>(vi) Hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure; and</i></p>	<p>Section 3.7</p>
<p>§257.73(d)(1)(vii) stipulates:</p> <p><i>(vii) For CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.</i></p>	<p>Section 3.8</p>
<p>§257.73(d)(2) stipulates:</p> <p><i>(2) The periodic assessment described in paragraph (d)(1) of this section must identify an structural stability deficiencies associated with the CCR unit in addition to recommending corrective measures. If a deficiency or a release is identified during the periodic assessment, the owner or operator unit must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.</i></p>	<p>Section 4.0</p>
<p>§257.73(d)(3) stipulates:</p> <p><i>(3) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial assessment and each subsequent periodic assessment was conducted in accordance with the requirements of this section.</i></p>	<p>Section 6.0</p>

USEPA CCR Rule Criteria 40 CFR §257.73	Jeffrey Energy Center (JEC) Structural Stability Assessment – Inactive Bottom Ash Pond
<p>§257.73(f)(1) stipulates:</p> <p><i>(f) Timeframes for periodic assessments –</i></p> <p><i>(1) Initial Assessments. Except as provided by paragraph (f)(2) of this section, the owner or operator of the CCR unit must complete the initial assessments required by paragraphs (a)(2), (d), and (e) of this section no later than October 17, 2016*. The owner or operator has completed an initial assessment when the owner or operator has placed the assessment required by paragraphs (a)(2), (d), and (e) of this section in the facility's operating record as required by §257.105(f)(5), (10), (12).</i></p> <p>*However due to the Bottom Ash Pond meets the requirements of §257.100(e)(1) and therefore the timeframe in §257.100(e)(3)(v) is applied, which states:</p> <p><i>(v) No later than April 17, 2018, complete the initial hazard potential classification, structural stability, and safety factor assessments as set forth by §257.73(a)(2), (b), (d), (e), and (f).</i></p>	<p>Section 5.1</p>

USEPA CCR Rule Criteria 40 CFR §257.73	Jeffrey Energy Center (JEC) Structural Stability Assessment – Inactive Bottom Ash Pond
<p>§257.73(f)(2) stipulates:</p> <p><i>(2) Use of a previously completed assessment(s) in lieu of the initial assessment(s). The owner or operator of the CCR unit may elect to use a previously completed assessment to serve as the initial assessment required by paragraphs (a)(2), (d), and (e) of this section provided that the previously completed assessments(s):</i></p> <p><i>(i) Was completed no earlier than 42 months prior to October 17, 2016; and</i></p> <p><i>(ii) Meets the applicable requirements of paragraphs (a)(2), (d) and (e) of this section.</i></p>	<p>Not Applicable.</p>

USEPA CCR Rule Criteria 40 CFR §257.73	Jeffrey Energy Center (JEC) Structural Stability Assessment – Inactive Bottom Ash Pond
<p>§257.73(f)(3) stipulates:</p> <p><i>(3) Frequency for conducting periodic assessments. The owner or operator of the CCR unit must conduct and complete the assessments required by paragraphs (a)(2), (d), (e) of this section every five years. The date of completing the initial assessment is the basis for establishing the deadline to complete the first subsequent assessment. If the owner or operator elects to use a previously completed assessment(s) in lieu of the initial assessment as provided by paragraph (f)(2) of this section, the date of the report for the previously completed assessment is the basis for establishing the deadline to complete the first subsequent assessment. The owner or operator may complete any required assessment prior to the deadline provided the owner or operator places the completed assessment(s) into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing subsequent assessments is based on the date of completing the previous assessment. For purposes of this paragraph (f)(3), the owner or operator has completed an assessment when the relevant assessment(s) required by paragraphs (a)(2), (d), and (e) of this section has been placed in the facility's operating record as required by §257.105(f)(5), (10), and (12).</i></p>	<p>Section 5.3</p>
<p>§257.73 (g) stipulates:</p> <p><i>(g) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in §257.105(f), the notification requirements specified in §257.106(f), and the internet requirements specified in §257.107(f).</i></p>	<p>Section 5.1 and 5.2</p>

1.0 INTRODUCTION

APTIM Environmental and Infrastructure, Inc. (APTIM, f/k/a CB&I Environmental & Infrastructure Inc., CB&I) has prepared this Structural Stability Assessment (Assessment) at the request of Westar Energy (Westar) for the inactive Bottom Ash Pond (Pond) located at Jeffrey Energy Center (JEC) in St. Marys, Kansas. JEC is a coal-fired power plant that has been in operation since 1980.

On July 26, 2016 the United States Environmental Protection Agency (USEPA) extended the requirements of the Disposal of Coal Combustion Residuals from Electric Utilities Final Rule (CCR Rule) 40 CFR §257 and §261, for certain inactive CCR surface impoundments. The Pond has been determined to be inactive by 40 CFR §257.53 and therefore has been deemed to be a regulated, inactive CCR unit by the USEPA through the CCR Rule. Westar is currently in the process of closing the Pond in-place in accordance with §257.100(d) of the CCR Rule and intends to complete closure of the Pond in 2018.

In support of compliance with the CCR Rule, APTIM has conducted an on-site inspection of the Pond and reviewed the relevant portions of the facility's operating record and permit application in relation to this Assessment. This Assessment evaluates whether the design, construction, operation, and maintenance of the Pond is consistent with generally accepted good engineering practices and meets the requirements set forth within 40 CFR §257.73(d).

2.0 POND OVERVIEW

Westar owns and operates all waste management units at JEC in St. Marys, Pottawatomie County, Kansas. JEC is located approximately 4.5 miles north of Belvue, Kansas and approximately 4.3 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. At JEC the Pond is located southeast of Fly Ash Area 1, north of the FGD Landfill, west of Bottom Ash Area 1, and east of the Tower Hill Lake. The location of the Pond is depicted in **Figure 1**.

2.1 Design and Construction History

2.1.1 Original Design

A Type C fly ash berm and overflow was constructed in the early 1980's by plant staff to separate the Pond and Tower Hill Lake. The fly ash was deposited in lifts of approximately 9 to 15-inches, processed to a desired moisture content, and compacted. The Pond foundation and abutment materials primarily consists of the native underlying geologic materials. The Pond was not constructed with an engineered liner system. There are no drawings or documents available for review for the original design/construction of the berm.

2.1.2 Design Modifications

In 2000 the berm was expanded by raising the embankment to its current elevation to provide additional CCR material storage volume and to add an emergency spillway and instrumentation devices. These modifications were designed by Black & Veatch and were approved and stamped by the Kansas Department of Agriculture, Department of Water Resources (KSDWR) Chief Engineer on June 29, 2000. With the modifications, the berm became a permitted dam (Pond Dam) under Permit DPT-0160.

2.1.3 Pond Closure

The Pond has not received CCR material prior to October 2015 and is in the process of being dewatered for closure. Historically the Pond received CCR material from the plant, stormwater, decant water from Bottom Ash Area 1, and site runoff. The final cover design and construction of the Pond will meet 40 CFR §257.100(b)(3)(i) and (ii). See **Appendix A** for the submitted Intent to Initiate Closure for the Pond.

2.2 Operations and Maintenance

The Pond is currently operated and maintained by Westar. Annual inspections of the Pond and Pond Dam are performed by a qualified professional engineer to detect signs of structural instability or operational issues. The most recent annual inspection was conducted in May 2017 in compliance with 40 CFR §257.83.

Weekly inspections and additional inspections after storm events are conducted by approved JEC personnel. Weekly inspections are performed in accordance with the CCR Rule requirements.

2.3 Current Dimensions and Capacities

The following dimensions of the Pond, Pond Dam, and spillway structures were determined based on the most recent survey of the Pond, estimates from the Coal Ash Impoundment – Specific Site Assessment Report conducted in September 2009 by GEI Consultants, Inc. (GEI), and the Jeffrey Energy Center - CCR Impoundment Closure Design 100% Design submitted in February 2017:

- ❑ Pond
 - Surface area of 72.1 acres
 - Normal operating pool water level of 1,164 feet mean seal level (ft MSL)
 - Maximum water level elevation of 1,165 ft MSL, based on the south spillway crest design elevation
 - Minimum elevation in Pond is 1,160 ft MSL based on the 2016 survey
 - Maximum water depth of approximately 5 feet (at the deepest portion of the Pond at maximum water elevations)
- ❑ Pond Dam
 - 1,050-feet long
 - 30-foot wide crest
 - 3H:1V sideslopes
 - Crest elevation of 1,170 ft MSL
- ❑ Spillway Structures
 - South Outlet Structure
 - Open-channel spillway
 - 450-feet long
 - 40-feet wide
 - 3H:1V sideslopes
 - Rock control crest at 1,165 ft MSL
 - Upstream side lined with 1.5-foot thick layer of limestone riprap
 - North Outlet Structure
 - Concrete-lined box culvert
 - 271-feet long
 - 12-feet wide
 - 6-feet tall
 - Downstream side lined with riprap

The Pond is currently undergoing closure and has been dewatered. Historically, the typical impounded water volume within the Pond was determined to be approximately 62,680 cubic yards (cy), as described in the 2017 Annual Inspection Report. The CCR depths within the Pond have varied through time due to the continual deposit and discharge of water and CCR materials, and whether the fines have settled out in the alluvial fan/ravine (elevation higher than 1,164 ft MSL). The remaining CCR material storage capacity within the Pond was calculated in the 2017 Annual Inspection Report and was determined to be approximately 138,232 cy. The total CCR volume is unknown due to a range of ash material sources historically being routed to the Pond. Site topography prior to closure is depicted in **Figure 2**.

2.4 Instrumentation

As part of the 1999 Pond Dam Study, five borings (WR-1 through WR-5) were drilled along the crest of the Pond Dam and three piezometers (at WR-2, -3, -4) were installed. WR-3 is the only currently operational piezometer. These piezometers is used to monitor water levels within the Pond Dam and is sampled every 30 days per the CCR Rule. Potentiometric elevations within this piezometer shows the upper water surface to be located near the water elevation of the Pond.

2.5 2017 Annual Inspection Conclusions and Recommendations

During the May 6, 2017 on-site inspection the Pond Dam slope appearance, slope stability, and overall Pond conditions were assessed. During the inspection it was noted that rip-rap had been placed on the eastern (upstream) slope of the Pond Dam. The only location that was identified to require maintenance was the Pond Dam's western side (downstream slope), which displayed erosion rills. **Appendix A** depicts the observed erosion rills on the downstream slope of the Pond Dam. It was determined that the erosion rills were not an immediate stability concern. Westar has indicated that the rills will be repaired as part of the final stages of construction of the cap.

The following actions were recommended in the 2017 Annual Inspection Report:

- Fill in and regrade the erosion rills on downstream slope of the Pond Dam as part of closure capping construction. Placement of rip-rap may be considered after filling and regrading to provide additional erosion protection;
- Continue to monitor and maintain rip-rap on the upstream slope;
- Continue proper management of the inflow control system and gradient flowing to the outlet structure; and
- Continue to monitor all conveyance features for signs of erosion, damage, obstructions, or malfunction.

3.0 PERIODIC STRUCTURAL STABILITY ASSESSMENT (§257.73(d))

The available information for the Pond was provided to and reviewed by APTIM for this Assessment:

- ❑ Annual Inspection Report Jeffrey Energy Center Inactive Bottom Ash Pond, CB&I, June 2017.
- ❑ Coal Ash Impoundment – Specific Site Assessment Report, GEI Consultants, Inc., September 2009.
- ❑ JEC Survey, Professional Engineering Consultants (PEC), April 2016.
- ❑ NPDES Permit No. I-KS67-PO06.
- ❑ Volume I and II of the Industrial Landfill Permit No. 0359, August 2009.

Based on our review of the information and observations during the inspection conducted on May 16, 2017, the following Assessment has been conducted to determine whether the design, construction, operation, and maintenance of the Pond is consistent with recognized and generally accepted good engineering practices in accordance with 40 CFR §257.73(d).

3.1 Foundation and Abutment Stability (§257.73(d)(1)(i))

As previously mentioned, five borings (WR-1 through WR-5) were drilled along the crest of the Pond Dam as part of the 1999 Bottom Ash Pond Dam Study conducted by Black & Veatch. The borings ranged from 41.5 feet to 80 feet below the top of the Pond Dam. WR-1 and WR-5 were drilled over the abutments and showed they were founded directly on the Neva Limestone bedrock. WR-2 through WR-4 showed the main portion of the Pond Dam is constructed of fly ash and was founded on an upper layer of soft alluvial clay and a lower layer of stiff to very stiff clay or silty clay till. The clay layers overly weathered bedrock.

Within the 1999 study conducted by Black & Veatch, a stability analysis report was completed which analyzed the Pond Dam and the foundation of the Pond Dam under seismic and static conditions. The analysis determined that the Pond Dam is located on a stable base.

It is APTIM's professional opinion that the Pond Dam and abutments are located on a stable foundation, based on the results of the analysis conducted by Black & Veatch, the boring logs, lab results, and the observations obtained during the site visit. A Safety Factor Assessment, which is required under 40 CFR §257.73(e), was not completed as part of this Assessment and will be completed under a separate cover.

3.2 Slope Protection (§257.73(d)(1)(ii))

The erosion protection on the south, east, and north slopes of the Pond consists of well-established vegetation. This includes tall grass, brush, bushes, and some small trees. See Photographs 1 and 2 in **Appendix A**.

The erosion protection on the upstream slope of the Pond Dam (i.e. western slope of the Pond) consists majorly of rip-rap and some localized areas of tall grasses where the Pond Dam meets the surface of the water (see Photographs 3 through 8 in **Appendix A**). The downstream slope of the Pond Dam does use rip-rap as erosion protection. It has localized

areas of vegetation where the Pond Dam meets the surface of Tower Hill Lake. As previously mentioned, erosion rills are present on the downstream slope of the Pond Dam. Photographs 12 through 15 in **Appendix A** depict the observed erosion rills. The lack of other slope protection on the downstream slope does not appear to present a stability concern. Maintenance on the Pond Dam erosion rills will be addressed during the Pond closure activities. There was no evidence of any other deficiencies, including seeps, during the site visit.

3.3 Dikes Compaction (§257.73(d)(1)(iii))

The Pond Dam was originally constructed by plant personnel in the 1980's. It is believed that the fly ash was deposited in lifts of approximately 9 to 15-inches, processed to a desired moisture content, and compacted. There are no drawings or documents available for review for the original design/construction of the berm.

The borings logs completed in 1999 on the crest of the Pond Dam typically have an SPT N-value greater than 50. This is indicative of stiff or dense material and it can therefore it can be assumed that the Pond Dam was mechanically compacted.

3.4 Vegetation Height (§257.73(d)(1)(iv))

The vegetation at the Pond during the site visit conducted May 16, 2017 can be seen in **Appendix A**. The photographs depict the vegetation on the eastern and southern slopes of the Pond and on the downstream slope of the Pond Dam as well established, including some small trees and bushes. Minor vegetation, including grasses, can be seen on the Pond Dam slopes near the water elevation. It should be noted that the Pond Dam includes rip-rap as an alternate form of slope protection.

3.5 Spillway Cover and Capacity (§257.73(d)(1)(v)(A) and §257.73(d)(1)(v)(B))

The Pond includes a two spillway structures serving as outlets from the Pond to Tower Hill Lake. The south outlet structure was designed and constructed as part of the original Pond Dam. The south outlet structure is an open-channel spillway approximately 450-feet long, 40-feet wide, with 3H:1V side slopes. It has a rock control crest at 1,165 ft MSL. The upstream side of the spillway is lined with a minimum of 1.5-foot thick layer of limestone riprap. The south outlet structure manages stormwater flow from adjacent areas to the south captured by the south diversion ditch and the southern portion of the capped Pond.

The north outlet structure was designed and constructed as part of Pond closure activities. The CCR unit has been dewatered and is currently undergoing closure via capping in-place. The north outlet structure is a concrete-lined box culvert connecting stormwater flows from adjacent areas to the north captured by the north diversion ditch and the northern portion of the capped Pond. The box culvert is approximately 271-feet long, 12-feet wide, and 6-feet tall. The downstream side of the box culvert is lined with riprap to minimize erosion or scour.

APTIM has modeled and calculated an updated capacities for the spillway structures for the 100-year, 24-hour storm event as part of the Inflow Design Flood Control System Plan in accordance with §257.82.

3.6 Hydraulic Structures (§257.73(d)(1)(vi))

The north outlet structure and south outlet structure currently convey water through the Pond Dam. During the previous annual site inspection the north outlet structure had not been constructed. During this inspection, the south outlet structure was checked for abnormal or excessive erosion and malfunction. No deficiencies that would affect the structural integrity of the spillway structure or Pond Dam were noted, including sedimentation/debris, distortion, or seepage near the spillway.

3.7 Downstream Slope Inundation (§257.73(d)(1)(vii))

For CCR units with downstream slopes which can be inundated by the pool of an adjacent water body it is required that the slopes that will maintain structural integrity in events of drawdown of the adjacent water body. A Factor of Safety Assessment was submitted under a separate cover and analyzes if the stability of the downstream slope of the Pond Dam has an adequate factor of safety under extreme water conditions including low and high water levels, as well as sudden drawdown conditions.

4.0 DEFICIENCIES AND RECOMMENDATIONS (§257.73(d)(2))

There are no records or known instances of structural instability associated with the inactive Pond. Based on this information and the information summarized in Section 3.0, APTIM recommends the following be completed:

- Fill in and regrade the erosion rills on downstream slope of the Pond Dam as part of closure capping construction. Placement of rip-rap may be considered after filling and regrading to provide additional erosion protection;
- Continue to monitor and maintain rip-rap on the upstream slope;
- Continue proper management of the inflow control system and gradient flowing to the outlet structure; and
- Continue to monitor all conveyance features for signs of erosion, damage, obstructions, or malfunction.

5.0 RECORDS RETENTION AND MAINTENANCE

5.1 Incorporation of Assessment into Operating Record (§257.73(f)(1) & (g))

§257.105(f)(1) and (g) of 40 CFR Part 257 provides record keeping requirements to ensure that the Assessment must be placed in the Facility's Operating Record. Specifically, §257.105(f) stipulates:

§257.105(f) stipulates: "(f) Design 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: (5) The initial and periodic hazard potential classification assessments as required by §§257.73(a)(2) and 257.74(a)(2)."

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

5.2 Notification Requirements (§257.73(g))

§257.106(f) of 40 CFR Part 257 provides guidelines for the notification of the availability of the Assessment. Specifically, §257.106(f) stipulates:

§257.106(f) stipulates: "(f) Design 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: (4) Provide notification of the availability of the initial and periodic hazard potential classification assessments specified under §257.05(f)(5)"

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

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

§257.107(f) stipulates: "(f) Design 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: (4) The initial and periodic hazard potential classification assessments specified under §257.105(f)(5)."

This Assessment will be uploaded to Westar's CCR compliance reporting website upon Westar's review and approval.

5.3 Periodic Assessment Frequency (§257.73(f)(3))

A periodic assessment will be conducted every five years in accordance with 40 CFR 257.73(f)(3). The deadline for completing the assessment is based on the date of the previously completed assessment. Each periodic assessment will be placed in the Facility's Operating Record as required by §257.105(f)(5).

6.0 PROFESSIONAL ENGINEER CERTIFICATION (§257.73(d)(3))

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. The undersigned registered professional engineer attests that this Assessment has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and meets the requirements of §257.73(d). This certification was prepared as required by §257.73(d)(3).

Name of Professional Engineer: Richard Southorn

Company: APTIM

Signature: 

Date: 04/12/18

PE Registration State: Kansas

PE Registration Number: PE25201

Professional Engineer Seal:

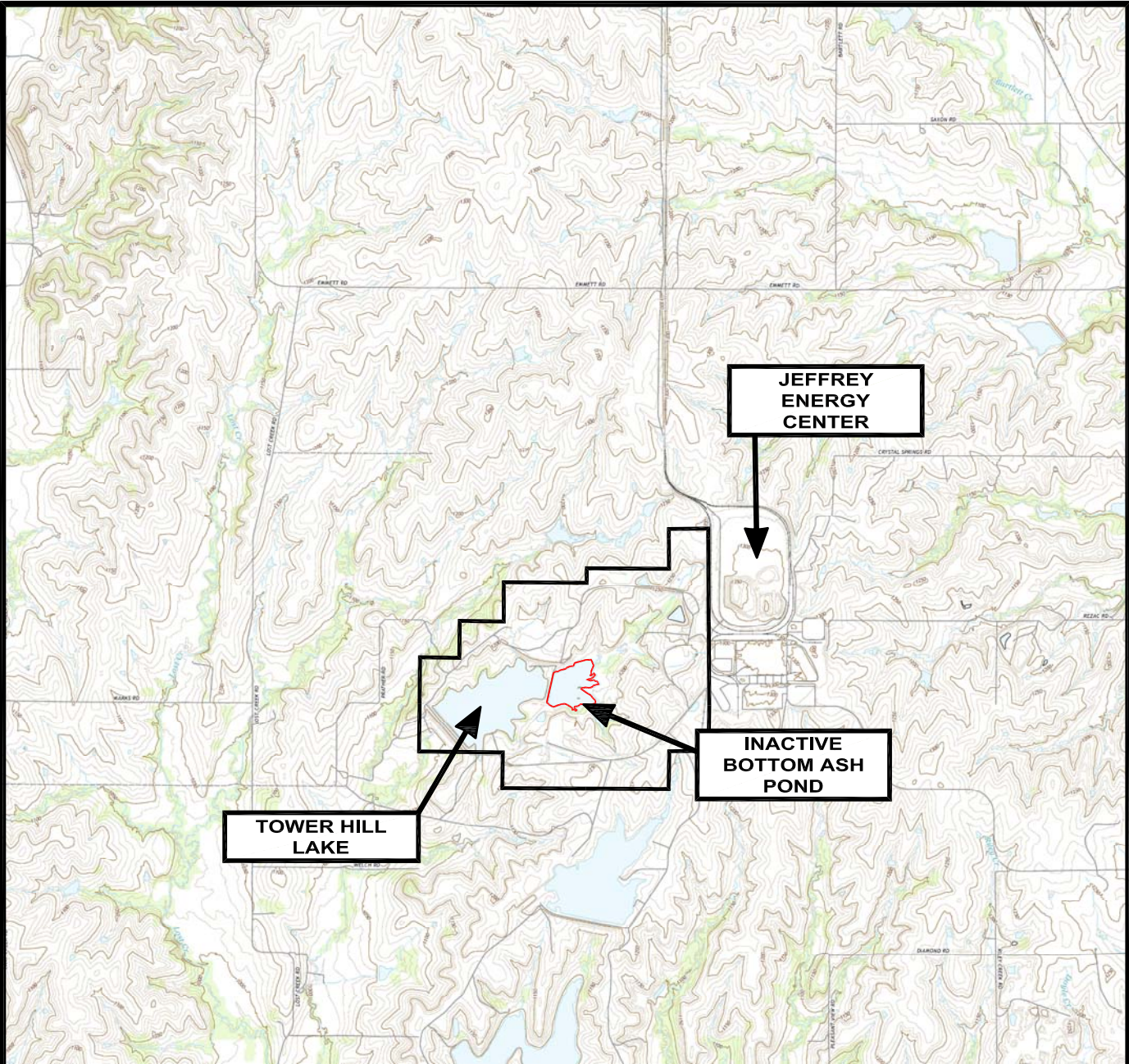


FIGURES

Figure 1 - Inactive Bottom Ash Pond, Site Location Plan

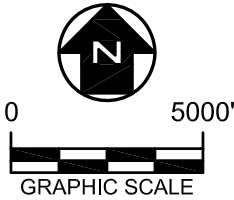
Figure 2 - Inactive Bottom Ash Pond, Site Topography Prior to Closure

Figure 3 - Inactive Bottom Ash Pond, Photo Log



LEGEND

- CCR UNIT BOUNDARY
- KDHE-BWM INDUSTRIAL LANDFILL PERMIT NO. 0359 BOUNDARY



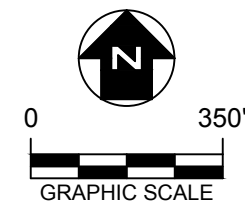
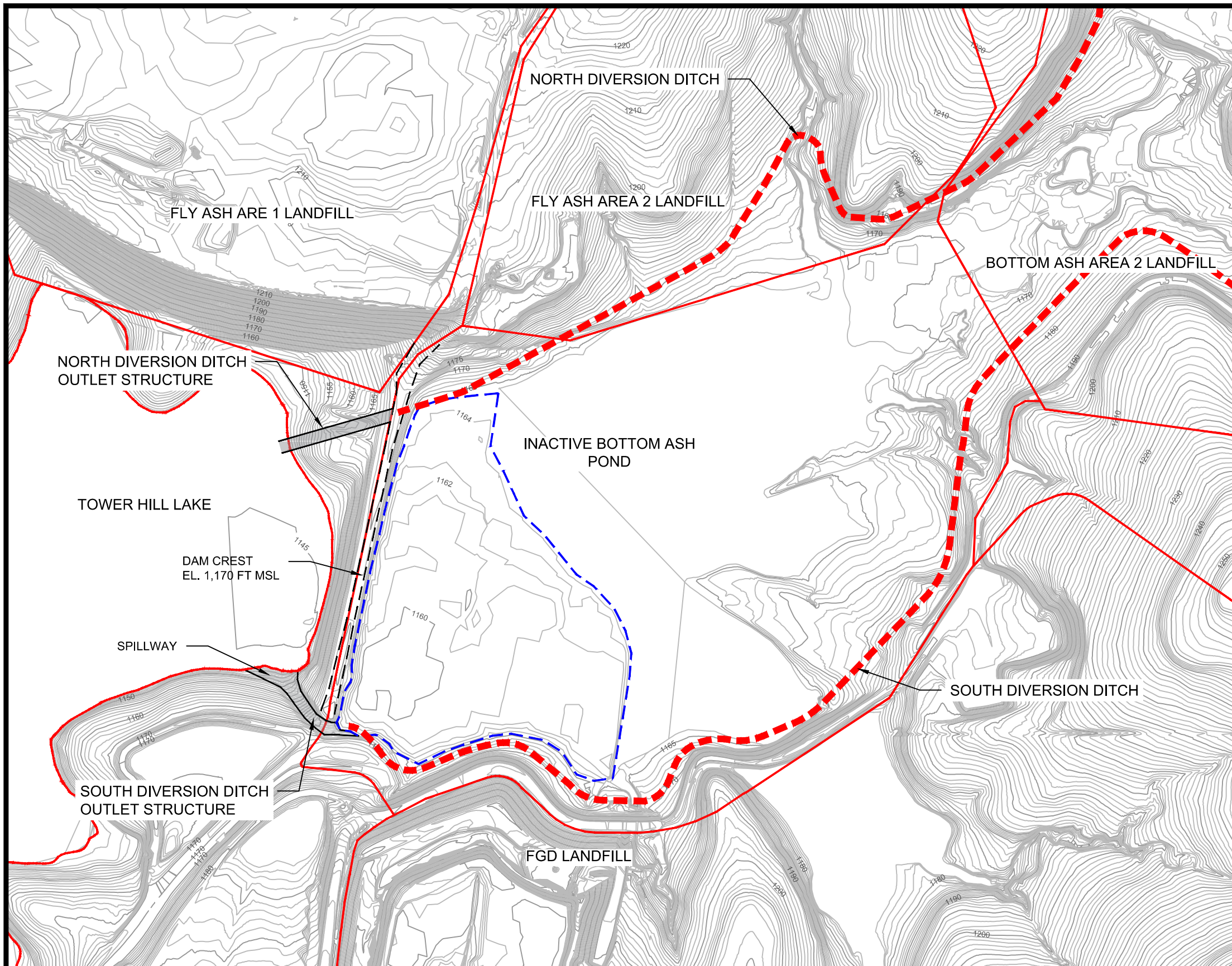
NOTES

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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WESTAR ENERGY			
25905 JEFFREY RD., ST. MARYS, KS			
FIGURE 1			
FGD LANDFILL			
SITE LOCATION PLAN			
APPROVED BY:	RDS	PROJ. NO.:	631232565
DATE:	APRIL 2018		



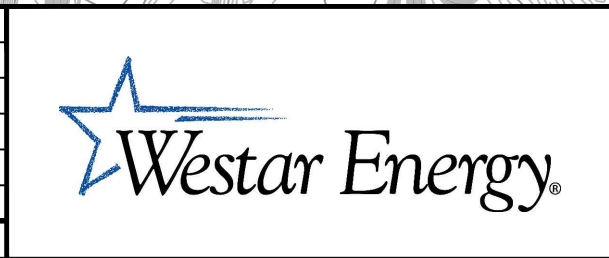
LEGEND

- APPROXIMATE CCR UNIT BOUNDARY
- - - APPROXIMATE WATER ELEVATION
- - - - - APPROXIMATE POND DAM BOUNDARY
- APPROXIMATE SPILLWAY BOUNDARY
- - - - - APPROXIMATE DIVERSION DITCH DELINEATION

NOTES

1. EXISTING CONTOURS DEVELOPED BY PROFESSIONAL ENGINEERING CONSULTANTS IN APRIL 2016.
2. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
3. ALL BOUNDARY AND FEATURE LOCATIONS ARE APPROXIMATE.

REV. NO.	DATE	DESCRIPTION



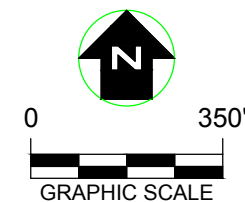
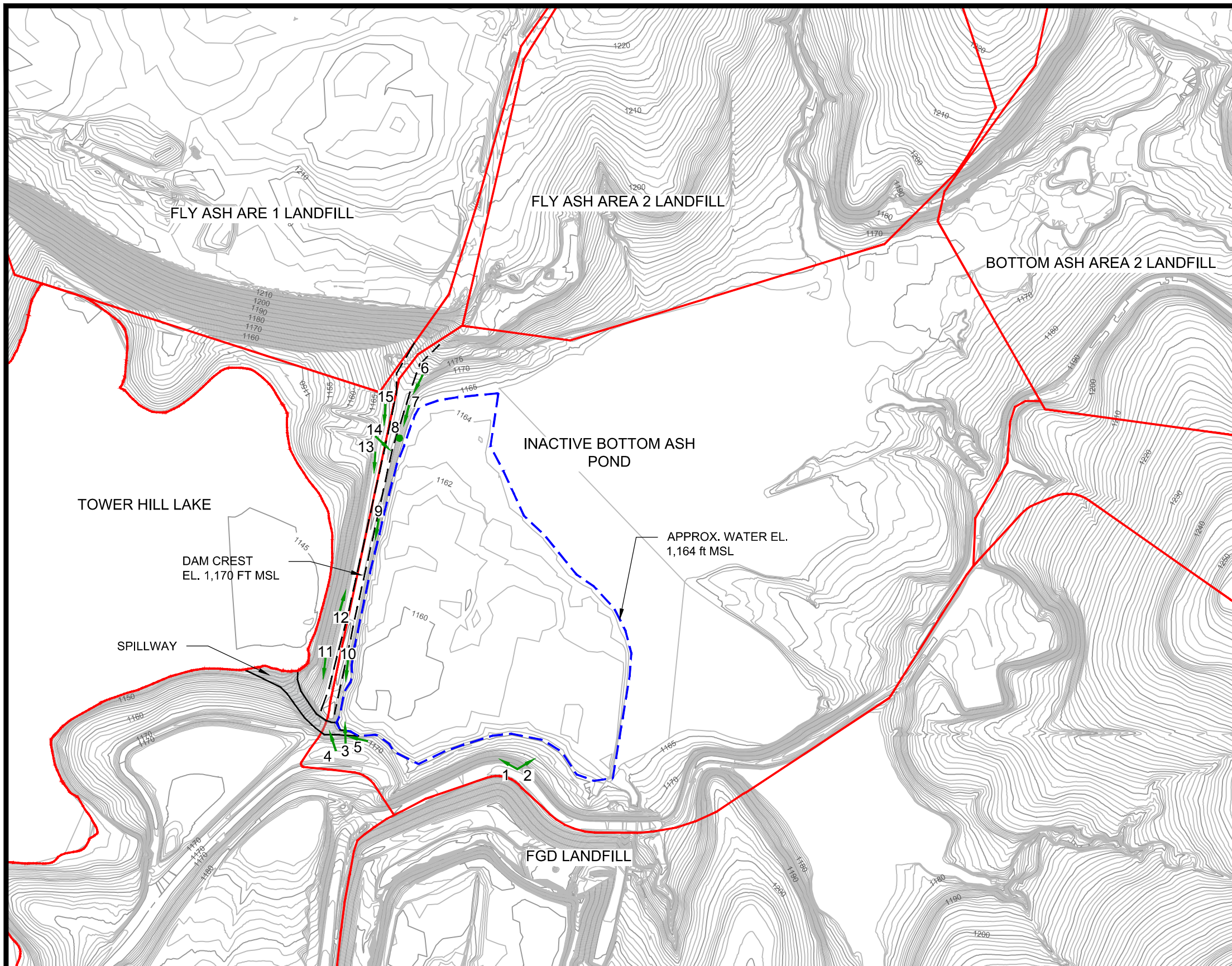
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FIGURE 2
INACTIVE BOTTOM ASH POND
SITE TOPOGRAPHY PRIOR TO CLOSURE

DRAWN BY:	ORC	APPROVED BY:	MMS	PROJ. NO.:	631232565	DATE:	APRIL 2018
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T:\AutoCAD\Projects\Westar Energy\Jeffrey\Compliance Reports\Inactive BAP\Inactive Bottom Ash Pond Figures 2 and 3.dwg, DWG To PDF.pc3



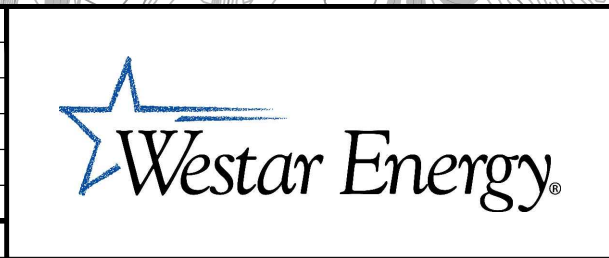

LEGEND

- APPROXIMATE CCR UNIT BOUNDARY
- - - APPROXIMATE WATER ELEVATION
- - - APPROXIMATE POND DAM BOUNDARY
- APPROXIMATE SPILLWAY BOUNDARY

NOTES

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FIGURE 3
INACTIVE BOTTOM ASH POND
PHOTO LOG


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APPENDICES


APPENDIX A


2017 Photo Log

<p>Photograph No. 1</p> <p>Date: May 16, 2017</p> <p>Direction: Northwest</p>	
<p>Description: Observing Bottom Ash Pond and the surrounding vegetation on the south slope.</p>	


<p>Photograph No. 2</p> <p>Date: May 16, 2017</p> <p>Direction: Northeast</p>	
<p>Description: Observing the eastern edge of the Bottom Ash Pond. Vegetation is well established.</p>	

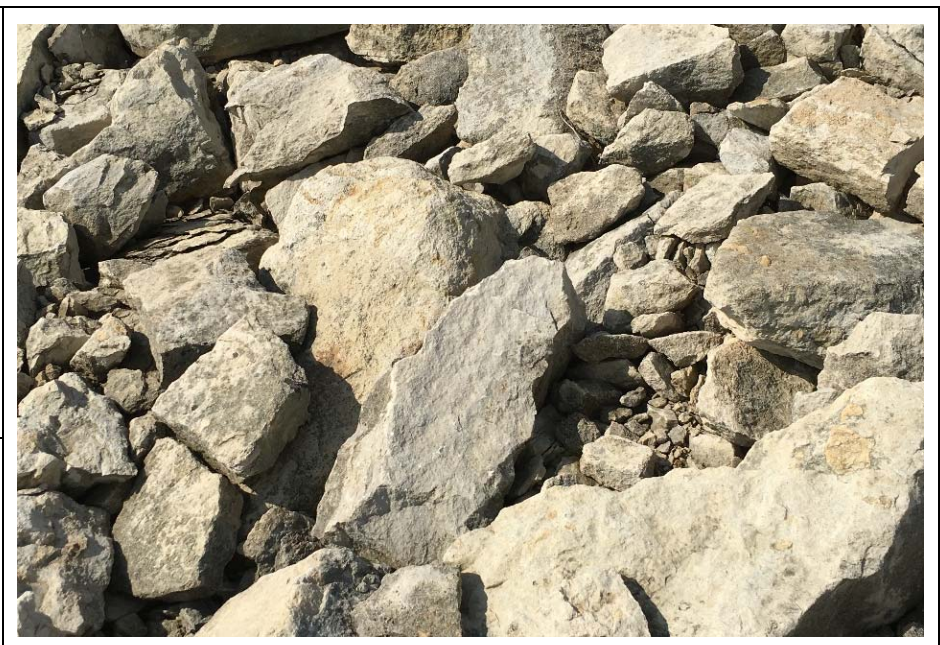
<p>Photograph No. 3</p> <p>Date: May 16, 2017</p> <p>Direction: North</p>	
<p>Description: Looking at spillway and dam between the Bottom Ash Pond and Tower Hill Lake. Slopes are rip-rap lined. Some vegetation. No noticeable erosion.</p>	


<p>Photograph No. 4</p> <p>Date: May 16, 2017</p> <p>Direction: Northwest</p>	
<p>Description: Looking at spillway from Bottom Ash Pond to Tower Hill Lake. No evidence of erosion or malfunction.</p>	

<p>Photograph No. 5</p> <p>Date: May 16, 2017</p> <p>Direction: Northwest</p>	
<p>Description: Looking at spillway from Bottom Ash Pond to Tower Hill Lake. No evidence of erosion or malfunction. Some vegetation present.</p>	

<p>Photograph No. 6</p> <p>Date: May 16, 2017</p> <p>Direction: Southwest</p>	
<p>Description: Looking at the dam from the access road crossing. No evidence of erosion or distress. Established vegetation present.</p>	


<p>Photograph No. 7</p> <p>Date: May 16, 2017</p> <p>Direction: Southwest</p>	
<p>Description: Observing the upstream side of the dam separating the Bottom Ash Pond and Tower Hill Lake. No significant erosion. Established vegetation present.</p>	

<p>Photograph No. 8</p> <p>Date: May 16, 2017</p> <p>Direction: -</p>	
<p>Description: Observing rip-rap present on the upstream slope of the dam.</p>	

<p>Photograph No. 9</p> <p>Date: May 16, 2017</p> <p>Direction: Southwest</p>	
<p>Description: Observing the dam separating the Bottom Ash Pond and Tower Hill Lake on the downstream slope. No significant erosion present. Established vegetation present.</p>	

<p>Photograph No. 10</p> <p>Date: May 16, 2017</p> <p>Direction: Southwest</p>	
<p>Description: Observing the berm separating the Bottom Ash Pond and Tower Hill Pond on the upstream slope. No significant erosion present. Established vegetation present.</p>	

<p>Photograph No. 11</p> <p>Date: May 16, 2017</p> <p>Direction: Southwest</p>	
<p>Description: Observing the downstream slope of the dam separating the Bottom Ash Pond and Tower Hill Lake. No erosion in this location.</p>	

<p>Photograph No. 12</p> <p>Date: May 16, 2017</p> <p>Direction: Northeast</p>	
<p>Description: Observing minor erosion of the dam separating the Bottom Ash Pond and Tower Hill Lake on the downstream slope. Established vegetation present.</p>	

<p>Photograph No. 13</p> <p>Date: May 16, 2017</p> <p>Direction: South</p>	
<p>Description: Observing erosion rills on the dam separating the Bottom Ash Pond and Tower Hill Lake on the downstream slope.</p>	

<p>Photograph No. 14</p> <p>Date: May 16, 2017</p> <p>Direction: Southeast</p>	
<p>Description: Observing the erosion rills on the dam separating the Bottom Ash Pond and Tower Hill Lake on the downstream slope.</p>	

Photograph No. 15

Date:

May 16, 2017

Direction:

Southwest

Description:

Observing the dam that separates the Bottom Ash Pond from Tower Hill Lake. Erosion rills on downstream slope.

