



History of Construction Jeffrey Energy Center Inactive Bottom Ash Pond

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

Prepared by:
APTIM Environmental & Infrastructure, Inc.

April 2018



TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 POND OVERVIEW	2
3.0 HISTORY OF CONSTRUCTION	3
3.1 SITE NAME AND OWNERSHIP INFORMATION (§257.73(c)(1)(i))	3
3.2 CCR UNIT LOCATION MAP (§257.73(c)(1)(ii)).....	3
3.3 STATEMENT OF PURPOSE (§257.73(c)(1)(iii)).....	3
3.4 WATERSHED DESCRIPTION (§257.73(c)(1)(iv)).....	3
3.5 PHYSICAL AND ENGINEERING PROPERTIES (§257.73(c)(1)(v))	3
3.6 SITE PREPARATION/CONSTRUCTION ACTIVITIES (§257.73(c)(1)(vi)).....	3
3.7 ENGINEERING DIAGRAMS FOR CCR IMPOUNDMENT (§257.73(c)(1)(vii)).....	4
3.8 DESCRIPTION OF INSTRUMENTATION (§257.73(c)(1)(viii))	4
3.9 AREA-CAPACITY CURVES FOR THE CCR UNITS (§257.73(c)(1)(ix)).....	4
3.10 SPILLWAY/DIVERSION DESIGN FEATURES AND CAPACITY CALCULATIONS (§257.73(c)(1)(x))	4
3.11 CONSTRUCTION SPECIFICATIONS AND PROVISIONS FOR SURVEILLANCE, MAINTENANCE/REPAIR (§257.73(c)(1)(xi))	5
3.12 KNOWN RECORDS OF STRUCTURAL INSTABILITY (§257.73(c)(1)(xii))	5
4.0 RECORDS RETENTION AND MAINTENANCE	6
4.1 INCORPORATION OF REPORT INTO OPERATING RECORD (§257.73(g)).....	6
4.2 NOTIFICATION REQUIREMENTS (§257.73(g)).....	6
4.3 CHANGES TO HISTORY OF CONSTRUCTION (§257.73(c)(2))	6

LIST OF FIGURES AND APPENDICES

FIGURES

Figure 1 – Inactive Bottom Ash Pond, Site Location Plan

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

APPENDICES

Appendix A – Historical Construction Diagrams

Appendix B – Construction Diagrams & Cross-Sections for Closure of Inactive CCR Unit

Appendix C – Area-Capacity Curves for Inactive CCR Unit

CCR Regulatory Requirements

USEPA CCR Rule Criteria 40 CFR §257.73(c)	Jeffrey Energy Center (JEC) History of Construction Report – Inactive Bottom Ash Pond
<p>§257.73(c)(1) stipulates:</p> <p><i>“(1) No later than October 17,2016, the owner or operator of the CCR unit must compile a history of construction, which shall contain, to the extent feasible, the information specified in paragraphs (c)(1)(i) through (xi) of this section.”</i></p>	Section 1.0
<p>§257.73(c)(1)(i) stipulates:</p> <p><i>“(i) The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.”</i></p>	Section 3.1
<p>§257.73(c)(1)(ii) stipulates:</p> <p><i>“(ii) The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7 1/2 minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.”</i></p>	Section 3.2
<p>§257.73(c)(1)(iii) stipulates:</p> <p><i>“(iii) A statement of the purpose for which the CCR unit is being used.”</i></p>	Section 3.3
<p>§257.73(c)(1)(iv) stipulates:</p> <p><i>“(iv) The name and size in acres of the watershed within which the CCR unit is located.”</i></p>	Section 3.4

USEPA CCR Rule Criteria 40 CFR §257.73(c)	Jeffrey Energy Center (JEC) History of Construction Report – Inactive Bottom Ash Pond
<p>§257.73(c)(1)(v) stipulates:</p> <p><i>“(v) A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.”</i></p>	<p>Section 3.5</p>
<p>§257.73(c)(1)(vi) stipulates:</p> <p><i>“(vi) A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.”</i></p>	<p>Section 3.6</p>
<p>§257.73(c)(1)(vii) stipulates:</p> <p><i>“(vii) At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.”</i></p>	<p>Section 3.7</p>

USEPA CCR Rule Criteria 40 CFR §257.73(c)	Jeffrey Energy Center (JEC) History of Construction Report – Inactive Bottom Ash Pond
§257.73(c)(1)(viii) stipulates: <i>“(viii) A description of the type, purpose, and location of existing instrumentation.”</i>	Section 3.8
§257.73(c)(1)(ix) stipulates: <i>“(ix) Area-capacity curves for the CCR unit.”</i>	Section 3.9
§257.73(c)(1)(x) stipulates: <i>“(x) A description of each spillway and diversion design features and capacities and calculations used in their determination.”</i>	Section 3.10
§257.73(c)(1)(xi) stipulates: <i>“(xi) The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.”</i>	Section 3.11
§257.73(c)(1)(xii) stipulates: <i>“(xii) Any record or knowledge of structural instability of the CCR unit.”</i>	Section 3.12
§257.73(c)(2) stipulates: <i>“(2) Changes to the history of construction. If there is a significant change to any information compiled under paragraph (c)(1) of this section, the owner or operator of the CCR unit must update the relevant information and place it in the facility’s operating record as required by §257.105(f)(9).”</i>	Section 4.3

USEPA CCR Rule Criteria 40 CFR §257.73(c)	Jeffrey Energy Center (JEC) History of Construction Report – Inactive Bottom Ash Pond
<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 4.1 and 4.2</p>



1.0 INTRODUCTION

APTIM Environmental and Infrastructure, Inc. (APTIM, f/k/a CB&I Environmental & Infrastructure, Inc., CB&I) has prepared the following History of Construction Report (Report) 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.

APTIM has reviewed the relevant portions of the facility's operating record, permit application, and design documents for completion of this Report. This Report meets the requirements set forth within 40 CFR §257.73(c) based on the review of this available information and visual observation from previous annual inspections.

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. The location of the Pond is depicted in **Figure 1**.

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 Pond has a surface area of 72.1 acres and a normal operating pool of 1,164 feet mean seal level (ft MSL). Site topography prior to closure is depicted in **Figure 2**.

A Type C fly ash berm and overflow was constructed in the 1980's to separate the Pond and Tower Hill Lake. In 2000 the berm was expanded by raising the embankment and adding an auxiliary spillway, and it was permitted (DPT-0160) as a dam (Pond Dam).

The Pond Dam is approximately 25-feet high, 1,050-feet long, with a 30-foot wide crest, approximate 3H:1V side slopes, and a crest elevation of 1,170 ft MSL. The open flow spillway serves as the outlet from the Pond to Tower Hill Lake and is 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 Pond is currently dewatered and in the process of closure. The Pond has not received CCR material prior to October 2015. Historically the Pond received CCR material from the plant, stormwater run-off, decant water from Bottom Ash Area 1, and miscellaneous process waters.

3.0 HISTORY OF CONSTRUCTION

In accordance with §257.73(c)(1), the history of construction has been compiled from available information sources and is presented in the following subsections.

3.1 Site Name and Ownership Information (§257.73(c)(1)(i))

Owner/Operator:
Westar Energy, Inc.
818 S. Kansas Avenue
Topeka, KS 66612

CCR Unit Name(s):
Bottom Ash Pond (inactive unit)

State CCR Identification Number:
Not Applicable

3.2 CCR Unit Location Map (§257.73(c)(1)(ii))

The location of the JEC and the Pond are depicted on **Figure 1** and **Figure 2**.

3.3 Statement of Purpose (§257.73(c)(1)(iii))

The Pond has been deemed to be a regulated, inactive CCR unit and stopped receiving CCR prior to October 2015. Currently, the Pond is being dewatered to facilitate a closure of the inactive CCR Unit. Historically the Pond settled out CCR material fines prior to discharging into Tower Hill Lake.

3.4 Watershed Description (§257.73(c)(1)(iv))

JEC, including the Pond is located within the *Middle Kansas Watershed* - 10270102 Hydrologic Unit Code (HUC), which has a total catchment area of 1,395,582 acres in north central Kansas, and includes the counties of Douglas, Geary, Jackson, Jefferson, Marshall, Nemaha, Pottawatomie, Riley, Shawnee, and Wabaunsee.

3.5 Physical and Engineering Properties (§257.73(c)(1)(v))

The Pond is characterized as a “cross-valley” impoundment. The impoundment foundation and abutment materials primarily consists of the native underlying geologic materials, in ascending order, including: Roca Shale; Grenola Limestone; Eskridge Shale; and Beattie Limestone. The Pond construction does not include any engineered pond liner system, however, the Pond Dam is constructed of a Type C fly ash material that separates the Pond and Tower Hill Lake.

3.6 Site Preparation/Construction Activities (§257.73(c)(1)(vi))

The embankment was primarily constructed of Type C fly ash materials generated from plant operations. It is reported that the fly ash materials were placed in lifts between 9 and 15 inches, at suitable moisture content and compacted.

In the year 2000, the Pond Dam was expanded by raising the embankment and adding instrumentation and the spillway structure. The expansion was reportedly designed by Black

& Veatch Consulting Engineers approved and stamped by the DWR Chief Engineer on June 29, 2000. The permit number for the Pond Dam is DPT-0160.

Additional Pond construction history and sub-surface characterization information can be found in the following documents:

- ❑ *Fines Containment Dam –Stability Report, Black & Veatch, April 1999*
- ❑ *Phase II Hydrogeologic Investigation and Bottom Ash Pond Characterization Report* (Burns & McDonnell, August 2009), and
- ❑ *Coal Ash Impoundment–Specific Site Assessment Report* (GEI Consultants, September 2009).

3.7 Engineering Diagrams for CCR Impoundment (§257.73(c)(1)(vii))

Available historical engineering diagrams for the Pond and Pond Dam are provided in **Appendix A**. Additional engineering diagrams, including various cross section through the inactive CCR unit, have been prepared as part of the final Pond closure design phase and are included in **Appendix B**.

3.8 Description of Instrumentation (§257.73(c)(1)(viii))

The Pond Dam has a standpipe piezometer (WR-3) which is located on the eastern edge of the spillway. This is used to monitor the water level within the Pond Dam and is sampled every 30 days per the CCR Rule. Potentiometric elevations within this piezometer generally shows the upper water surface to be located near the water elevation of the Pond.

3.9 Area-Capacity Curves for the CCR Units (§257.73(c)(1)(ix))

Area/Capacity data for the subject CCR pond unit was calculated by APTIM utilizing the most recent site topographic survey (PEC 2016). The Area/Capacity curve for the CCR pond unit is provided in **Appendix C**.

3.10 Spillway/Diversion Design Features and Capacity Calculations (§257.73(c)(1)(x))

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.

3.11 Construction Specifications and Provisions for Surveillance, Maintenance/Repair (§257.73(c)(1)(xi))

No construction specifications associated with the inactive CCR unit's initial construction were available for review.

Inspections of the impoundment and associated Pond Dam are critical components and are conducted on a regular basis at the facility. Annual inspections are performed by a qualified professional engineer, and at least weekly by trained plant personnel. In addition, inspections are performed after unusual events such as storms. The inspections provide assurance that structures are sound and that action is taken, as needed, based on the findings.

Safety inspections of the impoundment and associated Pond Dam are conducted as required by the CCR rule. The most recent annual inspection was conducted in May 2017, and was completed in compliance with the frequency of inspection timeframe set forth in §257.83(b)(4). The most recent facility inspection report; *Annual Inspection Report, Jeffrey Energy Center – Inactive Bottom Ash Pond*, dated June 2017, was completed by CB&I Environmental and Infrastructure, Inc., on behalf of Westar.

3.12 Known Records of Structural Instability (§257.73(c)(1)(xii))

There are no records and/or known instances of structural instability associated with the inactive Pond. As previously indicated, a prior stability evaluation and report concerning the Pond Dam was completed in 1999 by Black & Veatch, which concluded:

“In summary, the fines containment dam has satisfactory factors of safety for normal and earthquake loading conditions. The factors of safety exceed the minimums provided by KSDWR and accepted industry standards”.

4.0 RECORDS RETENTION AND MAINTENANCE

4.1 Incorporation of Report into Operating Record (§257.73(g))

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

§257.105(f): "(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: (9) The history of construction, and any revisions of it, as required by §257.73(c), except that these files must be maintained until the CCR unit completes closure of the unit in accordance with §257.102."

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

4.2 Notification Requirements (§257.73(g))

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

§257.106(f): "(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: (8) Provide notification of the availability of the history of construction, and any revision of it, specified under §257.105(f)(9)."

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

§257.107(f) 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(f) stipulates:

§257.107(f): "(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: (8) The history of construction, and any revisions of it, specified under §257.105(f)(9)."

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

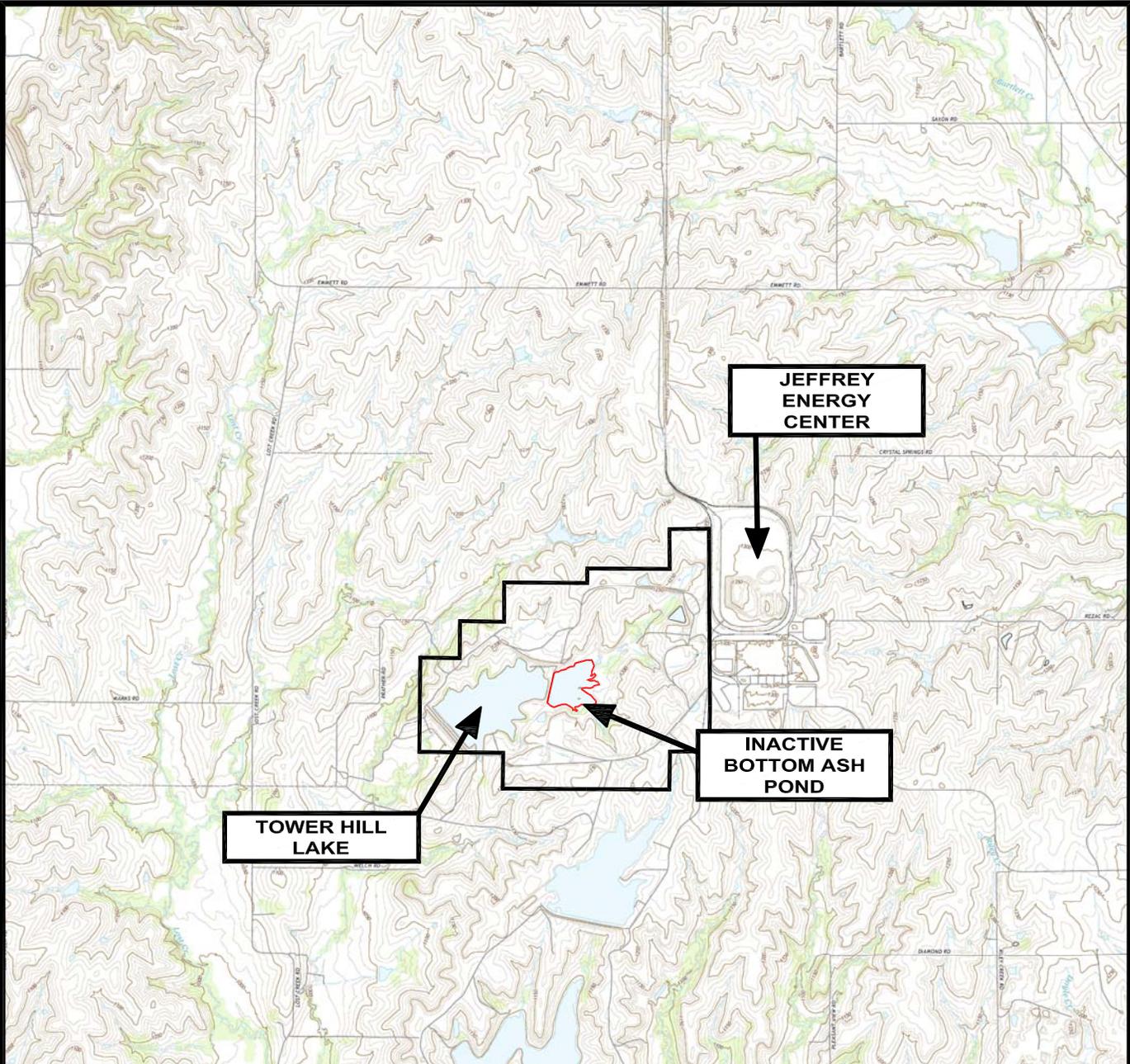
4.3 Changes to History of Construction (§257.73(c)(2))

The Report will be updated to reflect any significant changes to the history of construction information presented in Section 3.0. The update Report will then be placed in the facility's operating record as required by §257.105(f)(9), if applicable.

FIGURES

Figure 1 - Inactive Bottom Ash Pond, Site Location Plan

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

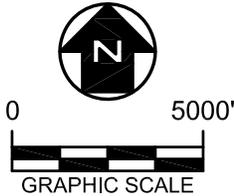


LEGEND

- 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.



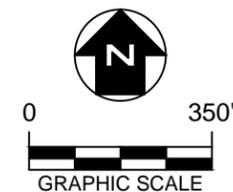
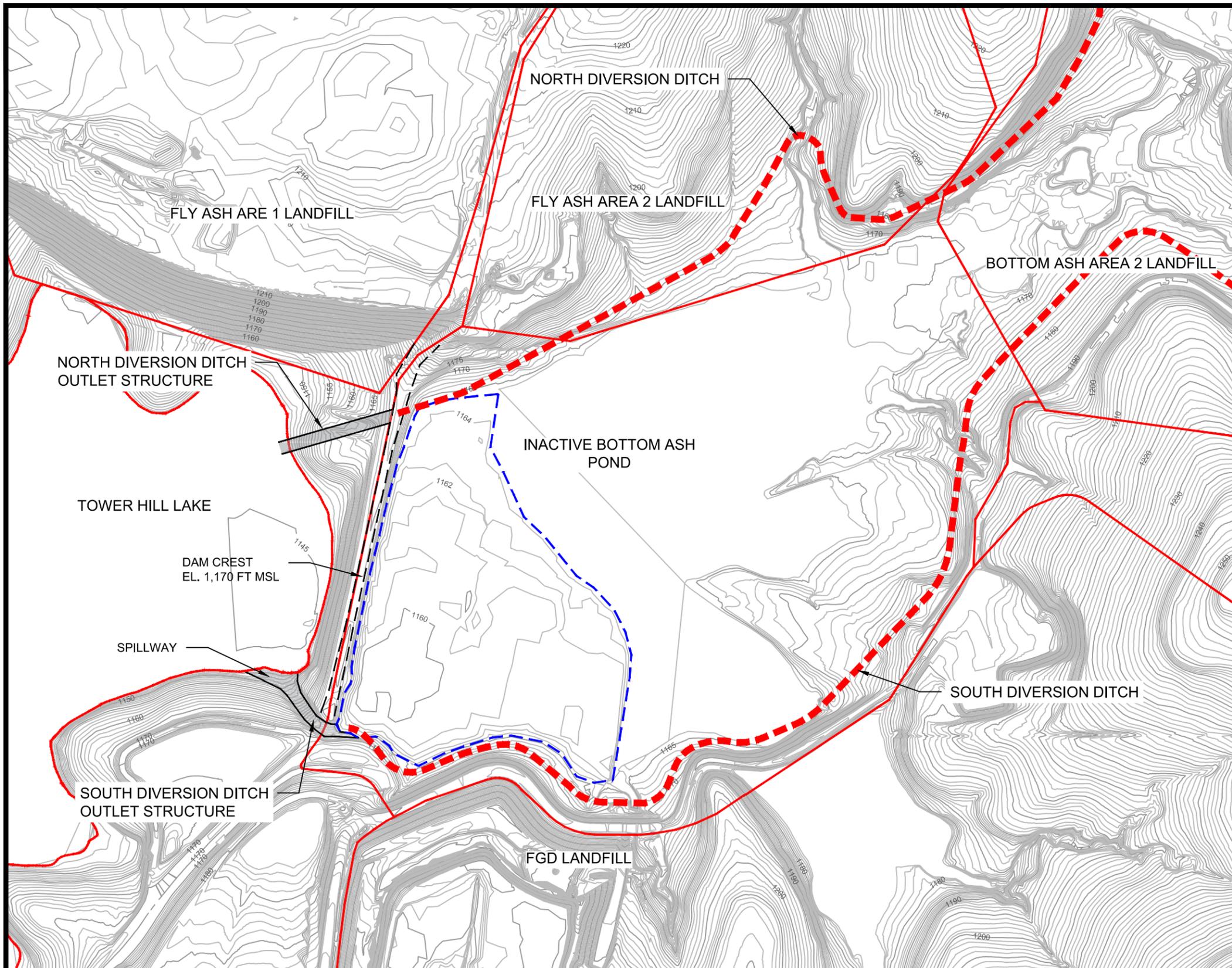
APTIM Environmental & Infrastructure, Inc.

APTIM Environmental & Infrastructure, Inc. has prepared this document for a specific project or purpose. All information contained within this document is copyrighted and remains intellectual property of APTIM Environmental & Infrastructure, Inc. This document may not be used or copied, in part or in whole, for any reason without expressed written consent by APTIM Environmental & Infrastructure, Inc.

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

**FIGURE 1
FGD LANDFILL
SITE LOCATION PLAN**

APPROVED BY: RDS | PROJ. NO.: 631232565 | DATE: APRIL 2018



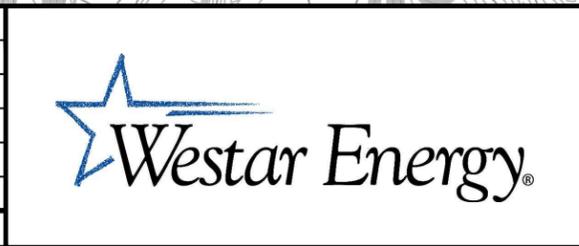
LEGEND

- 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




APTIM Environmental & Infrastructure, Inc.
APTIM Environmental & Infrastructure, Inc. has prepared this document for a specific project or purpose. All information contained within this document is copyrighted and remains intellectual property of APTIM Environmental & Infrastructure, Inc. This document may not be used or copied, in part or in whole, for any reason without expressed written consent by APTIM Environmental & Infrastructure, Inc.

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

FIGURE 2
INACTIVE BOTTOM ASH POND
SITE TOPOGRAPHY PRIOR TO CLOSURE

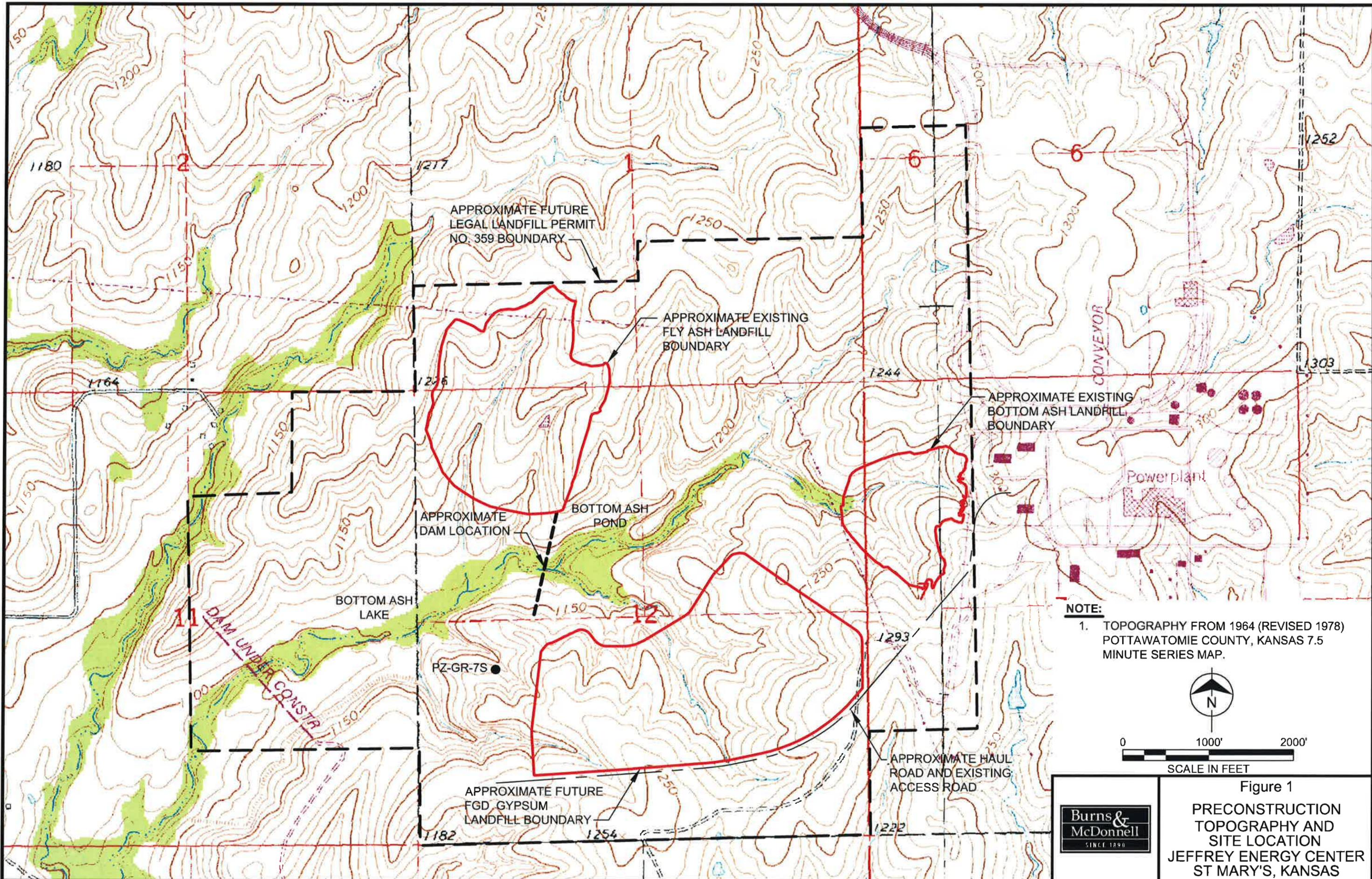
DRAWN BY:	ORC	APPROVED BY:	MMS	PROJ. NO.:	631232565	DATE:	APRIL 2018
-----------	-----	--------------	-----	------------	-----------	-------	------------

T:\AutoCAD\Projects\Westar Energy\Jeffrey\Compliance Reports\Inactive BAP\Inactive Bottom Ash Pond Figures 2 and 3.dwg, DWG To PDF.pc3

APPENDICES

APPENDIX A

Historical Construction Diagrams



NOTE:
 1. TOPOGRAPHY FROM 1964 (REVISED 1978)
 POTTAWATOMIE COUNTY, KANSAS 7.5
 MINUTE SERIES MAP.

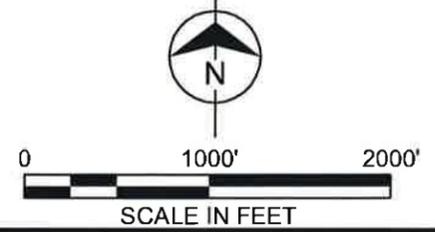
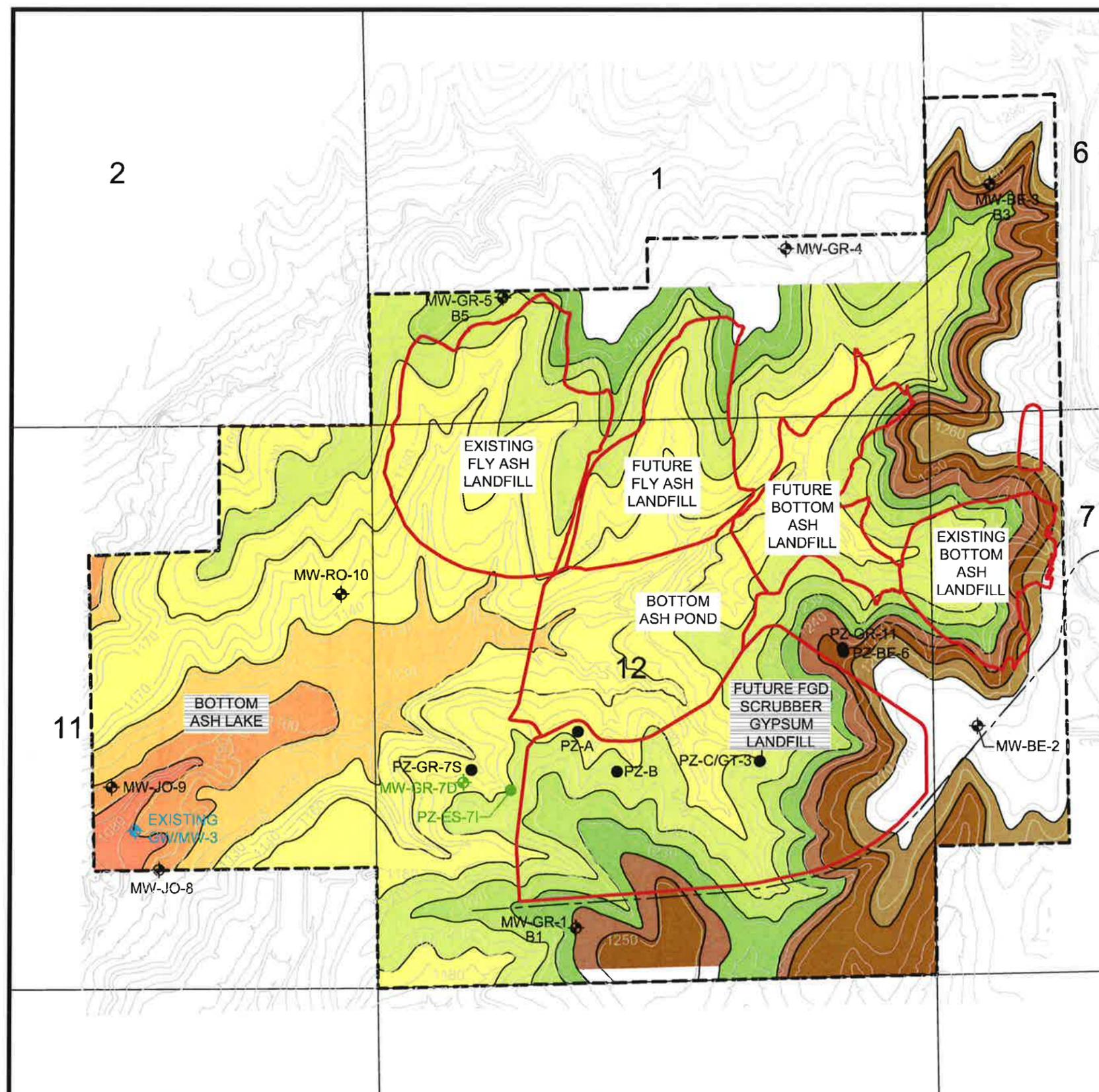


Figure 1
PRECONSTRUCTION
TOPOGRAPHY AND
SITE LOCATION
JEFFREY ENERGY CENTER
ST MARY'S, KANSAS



COPYRIGHT © 2008 BURNS & McDONNELL ENGINEERING COMPANY, INC.



LEGEND

	BLUE RAPIDS SHALE		APPROXIMATE PERMITTED LANDFILL BOUNDARY
	CROUSE LIMESTONE		SECTION LINES
	EASLY CREEK SHALE		DISPOSAL / RECLAIM UNIT BOUNDARY
	BADER LIMESTONE		NEW GROUNDWATER MONITORING WELL
	STEARNS SHALE		NEW PIEZOMETER
	BEATTIE LIMESTONE		EXISTING GROUNDWATER MONITORING WELL
	ESKRIDGE SHALE		EXISTING GROUNDWATER MONITORING WELL
	GRENOLA LIMESTONE		EXISTING PIEZOMETER
	ROCA SHALE		
	RED EAGLE LIMESTONE		
	JOHNSON SHALE		

- NOTES:**
1. TOPOGRAPHY SHOWN WITHIN PERMITTED BOUNDARY FROM 1964 (REVISED 1978) POTTAWATOMIE COUNTY, KANSAS 7.5 MINUTE SERIES MAP.
 2. EXISTING TOPOGRAPHY SHOWN OUTSIDE OF THE PERMITTED BOUNDARY PROVIDED BY WESTERN AIR MAPS, INC., OVERLAND PARK, KANSAS, DATED JUNE 30, 2006 AND FEBRUARY 21, 2007.
 3. GEOLOGIC CONTACTS PORTRAYED ARE FROM THE BORINGS DRILLED DURING THE HYDROGEOLOGIC INVESTIGATION CONDUCTED IN 2007.
 4. THE TOP OF THE BLUE RAPIDS SHALE WAS NOT OBSERVED DURING THE HYDROGEOLOGIC INVESTIGATION.
 5. MW-GR-1, MW-GR-4, AND MW-GR-5 ARE SCREENED WITHIN THE GRENOLA LIMESTONE. MW-BE-2, MW-BE-3, AND PZ-BE-6 ARE SCREENED WITHIN THE BEATTIE LIMESTONE. PZ-GR-7S IS SCREENED AT A FLY ASH/GRENOLA LIMESTONE CONTACT. MW-GR-7D IS SCREENED ACROSS A CLAY/SAND/FILL/GRENOLA LIMESTONE CONTACT. PZ-ES-7I IS SCREENED ACROSS A CLAY/SAND/FILL/ESKRIDGE SHALE CONTACT.
 6. PZ-GR-7S FORMERLY MW-GR-7.

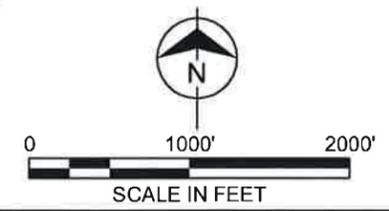
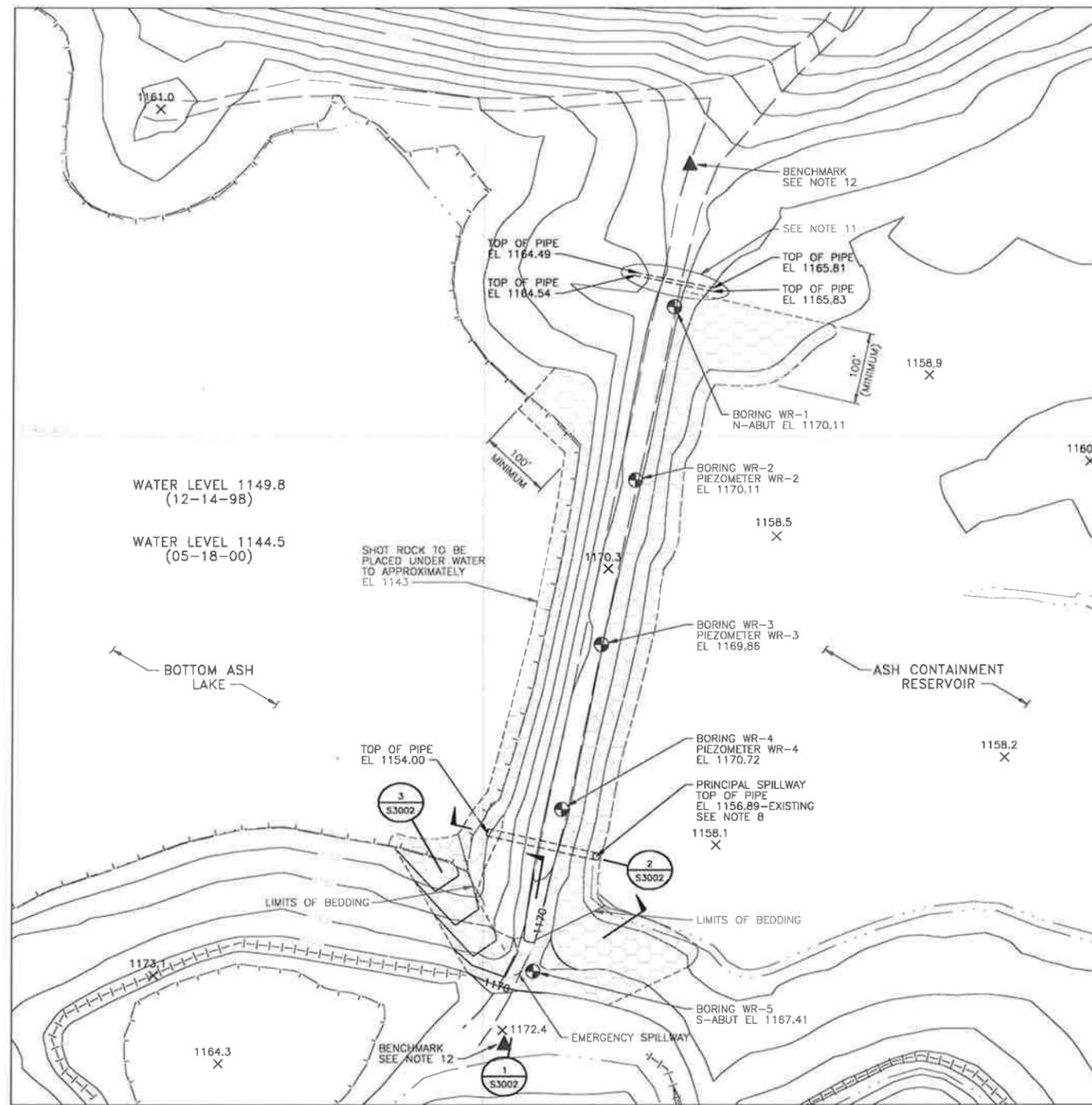


	Figure 14
	GEOLOGIC SURFACE MAP JEFFREY ENERGY CENTER ST. MARY'S, KANSAS



PLAN VIEW



CONSTRUCTION NOTES AND SPECIFICATIONS:

EMERGENCY SPILLWAY MODIFICATIONS:

- THE EMERGENCY SPILLWAY SHALL BE SHAPED AS SHOWN ON THE DRAWINGS ALONG THE DAM CREST. THE UPSTREAM APPROACH FROM THE RESERVOIR TO THE DAM CREST SHALL BE TRANSFORMED GRADUALLY FROM THE CREST DIMENSIONS TO ELEVATION 1158. THE DOWNSTREAM DISCHARGE SHALL BE CONSTRUCTED TO THE CONTOURS SHOWN AND EXTENDED TO ELEVATION 1143. SLOPES SHALL BE TRIMMED TO ADEQUATE ELEVATIONS TO ALLOW THE TOP OF THE INSTALLED SHOT ROCK TO MEET SLOPE LINES INDICATED ON THE DRAWINGS.
- THE EXISTING DAM CREST SHALL BE EXTENDED SOUTH TO CONFORM TO THE MODIFIED EMERGENCY SPILLWAY. THE DAM EXTENSION SHALL BE CONSTRUCTED WITH COMPACTED FLY ASH SIMILAR TO THE EXISTING DAM EMBANKMENT.
- SHOT ROCK AND BEDDING SHALL BE PLACED WITHIN THE LIMITS OF THE EMERGENCY SPILLWAY TO THE LINES SHOWN ON THE DRAWINGS. BEDDING USED TO LINE THE EMERGENCY SPILLWAY SHALL MEET THE FOLLOWING GRADATIONS. THE SHOT ROCK SHALL BE QUARRY RUN (SHOT ROCK) WITH NO MORE THAN TEN PERCENT LARGER THAN FOUR FEET IN CIRCUMFERENCE MEASURED IN ANY DIRECTION AND NOT MORE THAN TEN PERCENT PASSING THE ONE INCH SIEVE AS DETERMINED BY VISUAL INSPECTION. THE MAXIMUM SIZE OF ROCK PLACED WILL BE LIMITED BY THE THICKNESS OF ROCK EMBANKMENT AS SHOWN ON THE DRAWINGS.

BEDDING GRADATION	
US STANDARD SIEVE SIZE	PERCENT PASSING
4 INCH	100
3 INCH	90-100
1 1/2 INCH	60-85
3/4 INCH	35-65
3/8 INCH	15-40
NO. 4	5-20
NO. 10	10

PRINCIPAL SPILLWAY MODIFICATIONS:

- A DRAINAGE DIAPHRAGM SHALL BE INSTALLED AT THE LOCATION SHOWN ON THE DRAWINGS. THE EXCAVATION SHALL BE PERFORMED AROUND THE EXISTING DISCHARGE PIPE. EXCAVATION IMMEDIATELY ADJACENT AND UNDER THE EXISTING PIPE SHALL BE PERFORMED SO AS NOT TO DAMAGE THE PIPE.
- THE SAND FILTER SHALL BE PLACED IN UNIFORM LIFTS OF 12 INCHES AND COMPACTED TO 95 PERCENT OF MAXIMUM DENSITY AS DETERMINED BY ASTM D698. THE SAND FILTER SHALL BE CLEAN, WELL-GRADED SAND MEETING THE FOLLOWING GRADATIONS.

SAND GRADATION	
US STANDARD SIEVE SIZE	PERCENT PASSING
NO. 4	97-100
NO. 10	85-98
NO. 20	65-92
NO. 30	50-75
NO. 50	28-50
NO. 100	5-20
NO. 200 NOT TO EXCEED	0-5

STAGE STORAGE CAPACITY FOR FINES CONTAINMENT RESERVOIR

ELEVATION (FEET)	TOTAL STORAGE (ACRE-Feet)
1123	0
1124	0.055
1130	3.25
1140	51.19
1150	167.81
1160	422.35
1162	497.50
1163	537.14
1164	578.15
1165	621.28
1170	876.48

SPILLWAY DISCHARGE DATA

ELEVATION (FEET)	PRINCIPAL SPILLWAY (CFS)	EMERGENCY SPILLWAY (CFS)	TOTAL DISCHARGE (CFS)
1163.0	0	0	0
1163.5	13.7	0	13.7
1164.0	38.8	0	38.8
1164.5	71.3	0	71.3
1165.0	109.8	0	109.8
1165.5	116.1	37.2	153.3
1166.0	118.3	105.2	223.5
1166.5	120.5	193.3	313.7
1167.0	122.8	297.6	420.2
1167.5	124.7	415.8	540.5
1168.0	126.8	546.6	673.4
1168.5	128.8	688.8	817.6
1169.0	130.8	841.6	972.4
1169.5	132.8	1004.2	1137.0
1170.0	134.7	1176.2	1310.9

PEAK INFLOW INTO RESERVOIR = 2100 CFS
 PEAK DISCHARGE FROM RESERVOIR = 290 CFS
 PEAK RESERVOIR STAGE = 1166.34 FT
 (DATA BASED ON HEC-1 MODEL USING EG-1, 100 YEAR - 6 HOUR PRECIPITATION.)

- THE 6-INCH DRAINAGE PIPE SHALL BE INSTALLED IN THE DRAINAGE DIAPHRAGM IN THE LOCATION AS SHOWN ON THE DRAWING. THE PIPE SHALL BE PERFORMED WITHIN THE DRAINAGE DIAPHRAGM LIMITS AND SOLID OUTSIDE THE LIMITS. OUTSIDE THE LIMITS, THE PIPE SHALL BE INSTALLED WITHIN A TRENCH WITH A MINIMUM WIDTH OF 10 INCHES. THE TRENCH SHALL BE BACKFILLED WITH FLOWABLE FILL TO WITHIN 2 FEET OF THE DAM SURFACE. THE REMAINING TRENCH SHALL BE BACKFILLED WITH COMPACTED FLY ASH FILL. THE PIPE SHALL BE SECURED IN THE BOTTOM OF THE TRENCH TO PREVENT FLOATING DURING PLACEMENT OF THE TRENCH BACKFILL.
 - THE DRAINAGE PIPE SHALL BE ROUTED TO THE BOTTOM ASH LAKE WHERE THE PIPE WILL DISCHARGE AT ELEVATION 1150 FEET. THE PIPE ROUTING SHALL BE FIELD LOCATED IN A LINE PARALLEL TO THE BURIED PRINCIPAL SPILLWAY PIPE A MINIMUM OF 15 FEET NORTH. THE END OF THE 6-INCH DRAINAGE PIPE SHALL BE DISCHARGED INTO THE SHOT ROCK PLACED AT THE TOE OF THE DAM.
 - THE EXISTING INTAKE OF THE PRINCIPAL SPILLWAY SHALL BE EXTENDED TO ELEVATION 1163 WITH A SIMILAR PIPE MATERIAL. THE INTAKE SHALL BE PROTECTED WITH AN INSTALLED TRASH RACK FABRICATED AS SHOWN ON THE DRAWINGS.
- DOWNSTREAM EROSION PROTECTION:
- SHOT ROCK SHALL BE PLACED TO THE DIMENSIONS AS SHOWN ON THE DRAWINGS. THE SHOT ROCK SHALL BE PLACED FROM ELEVATION 1155 TO APPROXIMATELY ELEVATION 1143.
 - MINIMUM THICKNESS OF THE PLACED SHOT ROCK IN A HORIZONTAL PLANE FROM THE DAM SURFACE SHALL BE 4 FEET. SHOT ROCK GRADATION AND PLACEMENT SHALL BE AS SPECIFIED IN NOTE 3.
- EXISTING PIPE REMOVAL:
- THE EXISTING TWO 3-FOOT DIAMETER CORRUGATED METAL PIPES LOCATED AT THE NORTH END OF THE DAM SHALL BE REMOVED. THE EXCAVATION SHALL BE BACKFILLED WITH COMPACTED FLY ASH.
 - TWO BENCHMARKS, ONE AT EACH ABUTMENT, SHALL BE INSTALLED AND LABELED WITH THE JEFFREY ENERGY CENTER PLANT GRID COORDINATES AND ELEVATION. EACH BENCHMARK SHALL BE 4 FEET LONG STEEL ROD EMBEDDED FULL LENGTH IN CONCRETE. DAM STATIONING WILL BE ESTABLISHED AFTER BENCHMARKS ARE INSTALLED AND WILL BE PRESENTED ON AS-BUILT DRAWINGS.
- UPSTREAM EROSION PROTECTION:
- SHOT ROCK SHALL BE PLACED TO THE DIMENSIONS AS SHOWN ON THE DRAWINGS. THE SHOT ROCK SHALL BE PLACED FROM ELEVATION 1170 TO APPROXIMATELY ELEVATION 1158.
 - MINIMUM THICKNESS OF THE PLACED SHOT ROCK IN A HORIZONTAL PLANE FROM THE DAM SURFACE SHALL BE 4 FEET. SHOT ROCK GRADATION AND PLACEMENT SHALL BE AS SPECIFIED IN NOTE 3.

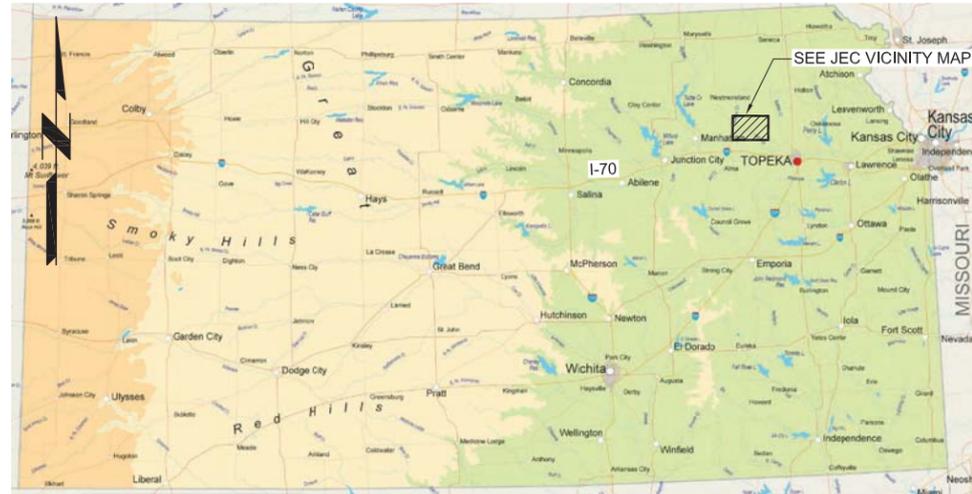
02825RUMP ACAD, 14-01
 05/25/00 14223558

I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF KANSAS. SIGNED: _____ DATE: _____ REG. NO.: _____ CHECKED: _____ DATE: _____		BLACK & VEATCH ENGINEER: MCS DRAWN: MRR CHECKED: _____ DATE: _____	WESTERN RESOURCES, INC. JEFFREY ENERGY CENTER FINES CONTAINMENT DAM PLAN VIEW AND GENERAL NOTES	PROJECT: 28480-DS-S3001 DRAWING NUMBER: 28480-DS-S3001 REV: C
---	--	---	---	---

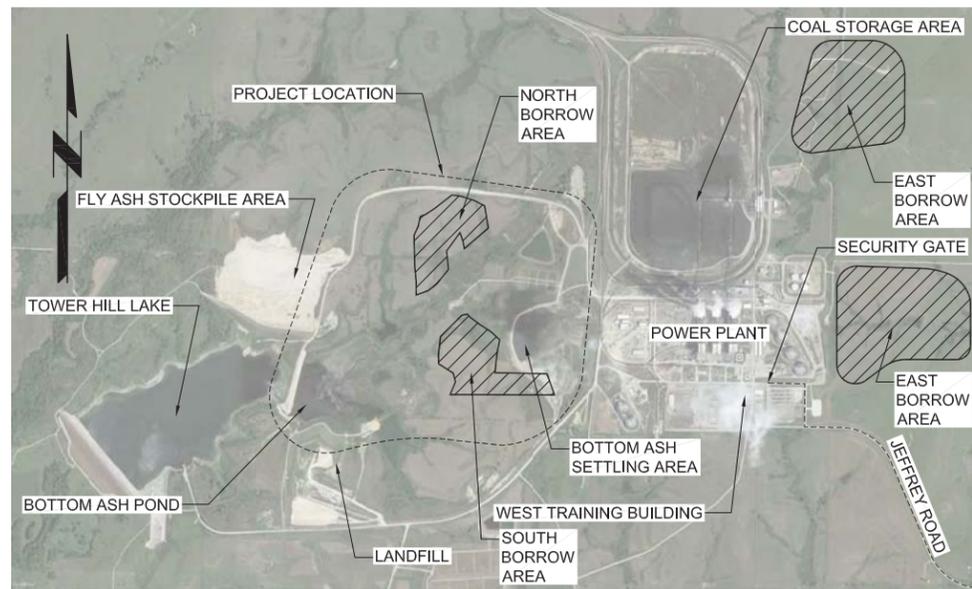
NO.	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	APP
C	05-25-2000	GENERAL REVISIONS	MRR	MCS		
B	09-01-1999	ISSUED FOR PERMIT	MRR	MCS	RAT	
A	05-17-1999	CLIENT REVIEW	MRR	MCS	RAT	

APPENDIX B

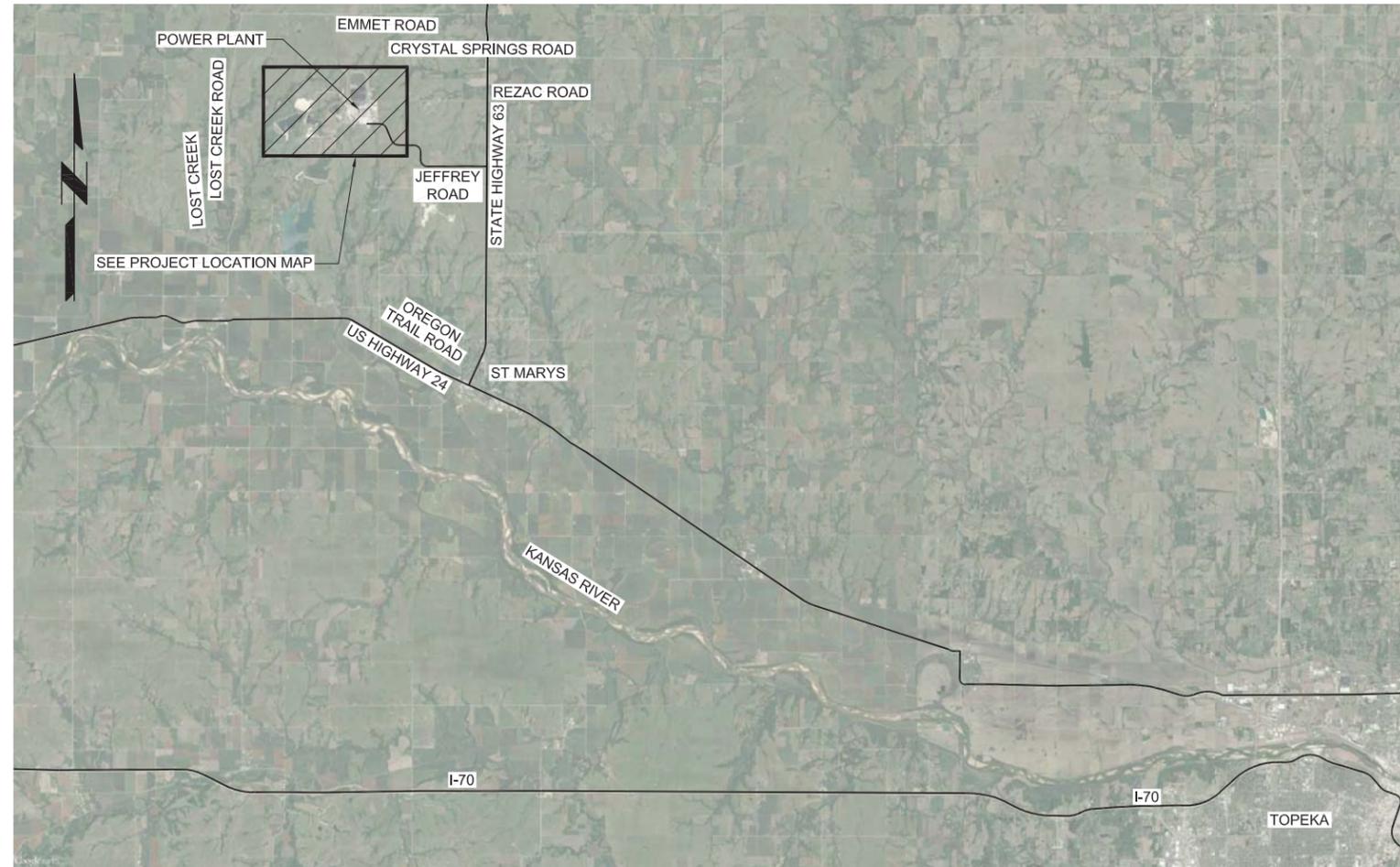
Construction Diagrams & Cross-Sections for Closure of Inactive CCR Unit



KANSAS LOCATION MAP
NOT TO SCALE



PROJECT LOCATION MAP
NOT TO SCALE



JEC VICINITY MAP
NOT TO SCALE

Rev.	Description	Date	App.
16			
15			
14			
13			
12			
11			
10			
9			

Rev.	Description	Date	App.
8			
7			
6			
5			
4			
3			
2			
1			

Date: 2/22/2017 Drawn by: MJF Checked by: JKR Submitted by: CNH File Name: WES-JEC-G-101.Dwg	Designed by: TFP Check by: JKR
--	-----------------------------------



WESTAR ENERGY
JEFFREY ENERGY CENTER
PROJECT LOCATION AND VICINITY MAP

100% DESIGN
FINAL
ISSUED FOR CONSTRUCTION
DATE OF ISSUE 2/22/2017

DRAWING NO.
G-101

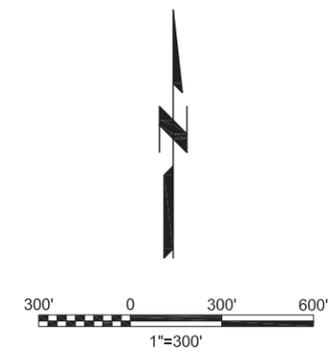


NOTES:

1. SEE SHEETS G-102 AND G-103 FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS.

PHASE 1 - KEY NOTES:

- 1 CONSTRUCT NORTH DIVERSION DITCH.
- 2 CONSTRUCT NORTH OUTLET STRUCTURE.
- 3 SEED NORTH DIVERSION DITCH AND ADD RIPRAP TO CHANNEL BOTTOM.
- 4 CONNECT PLANT FLOWS TO NORTH DIVERSION DITCH.
- 5 REMOVE EXISTING OUTLET STRUCTURE WEIR WALL AND REPAIR OUTLET RIPRAP. EXTEND ARTICULATED RIPRAP MATS AT OUTLET.
- 6 CONSTRUCT SOUTH DIVERSION DITCH.
- 7 SEED SOUTH DIVERSION DITCH AND ADD RIPRAP TO CHANNEL BOTTOM.
- 8 CONNECT PLANT BASA FLOW TO SOUTH DIVERSION DITCH.
- 9 CONSTRUCT DEWATER DITCH 1.
- 10 PUMP FILTERED WATER FROM DEWATER DITCHES TO EXISTING OUTLET AND NORTH OUTLET.
- 11 CONSTRUCT DEWATER DITCH 2.
- 12 CONSTRUCT DEWATER DITCH 3.
- 13 CONSTRUCT DEWATER DITCH 4.
- 14 CONSTRUCT DEWATER DITCH 5.
- 15 CONSTRUCT DEWATER DITCH 6.
- 16 REPAIR SOUTH POND OUTLET.



100% DESIGN
FINAL
 ISSUED FOR CONSTRUCTION
 DATE OF ISSUE 2/22/2017

Rev.	Description	Date	Aut.
16			
15			
14			
13			
12			
11			
10			
9			

Rev.	Description	Date	Aut.
8			
7			
6			
5			
4			
3			
2			
1			

Designed by: TFP	Check by: JKR
Drawn by: MJF	Submitted by: CNH
Date: 2/22/2017	File Name:



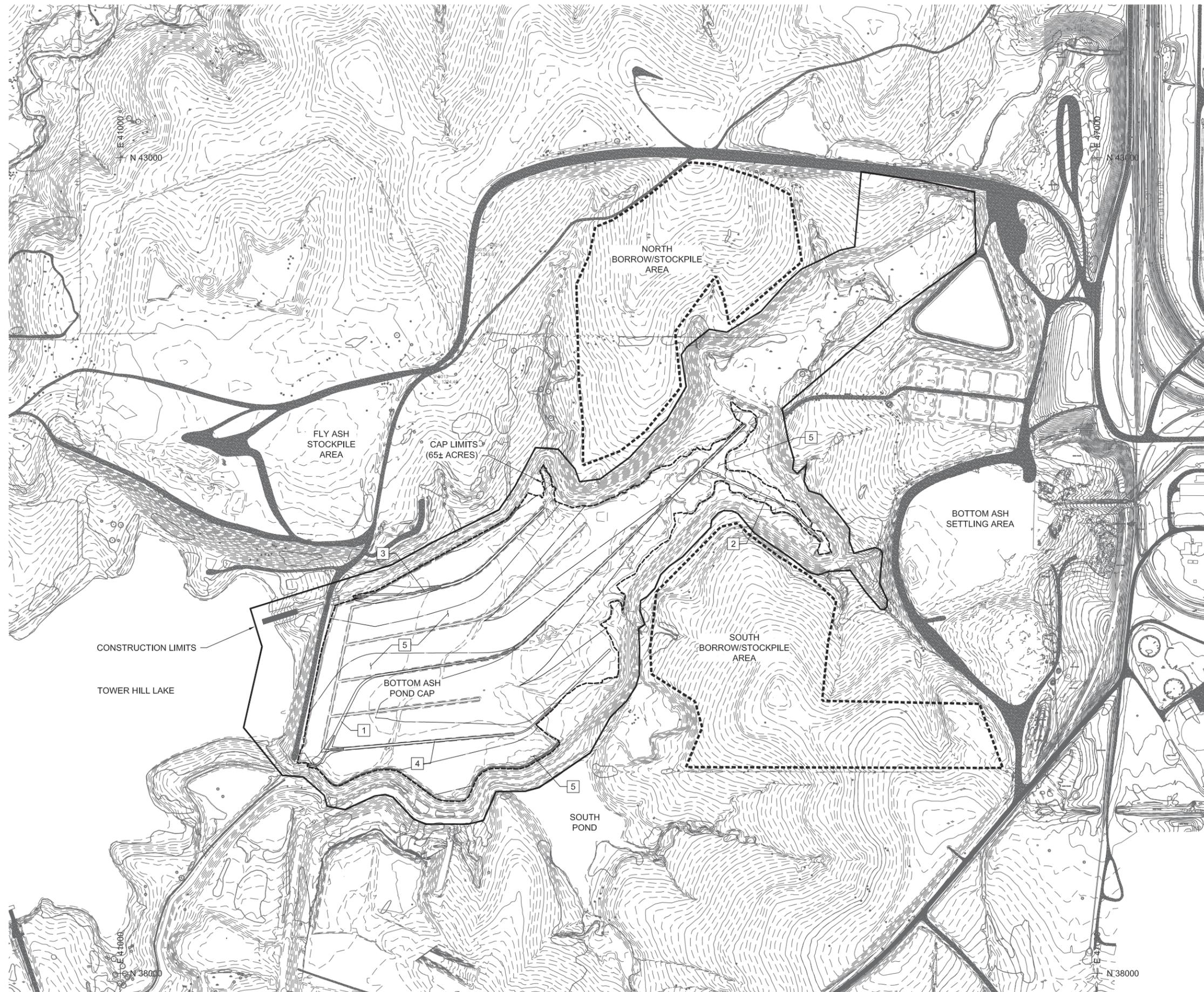
Westar Energy

BLACK & VEATCH
building a world of difference.

WESTAR ENERGY
 JEFFREY ENERGY CENTER

PHASE 1 - CONSTRUCTION PLAN

DRAWING NO.
C-040



NOTES:

- SEE SHEETS G-102 AND G-103 FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS.

PHASE 2 - KEY NOTES:

- CONSTRUCT CAP DITCH 1 AND INTERFACE WITH SOUTH DIVERSION DITCH.
- CONSTRUCT CAP DITCH 4 AND INTERFACE WITH CAP DITCH 1.
- CONSTRUCT CAP DITCH 3 AND INTERFACE WITH NORTH DIVERSION DITCH.
- CONSTRUCT CAP DITCH 2 AND INTERFACE WITH CAP DITCH 1.
- CONSTRUCT CAP.

Rev.	Description	Date	Appr.
16			
15			
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1			

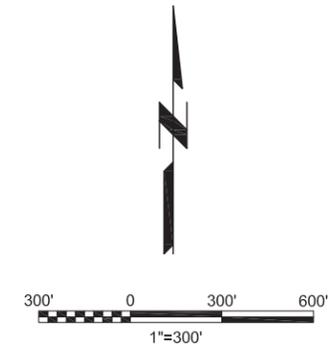
Designed by: TFP
 Drawn by: MJF
 Submitted by: CNH
 File Name:

Date: 2/22/2017
 Check by: JKR



WESTAR ENERGY
JEFFREY ENERGY CENTER

PHASE 2 - CONSTRUCTION PLAN



100% DESIGN
FINAL
ISSUED FOR CONSTRUCTION
DATE OF ISSUE 2/22/2017

DRAWING NO.
C-050

APPENDIX C

Area-Capacity Curves for Inactive Unit

Inactive Bottom Ash Pond Area Capacity Curve

