



Closure Plan Jeffrey Energy Center Bottom Ash Area Landfill and Impoundment

Prepared for:

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October 2016



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Plan Review/Amendment Log §257.102(b)(3)

Date of Review	Reviewer Name	Amendment Required (YES/NO)	Sections Amended and Reason



CCR Regulatory Requirements

USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(a) stipulates:</p> <p><i>(a) Closure of a CCR landfill, CCR surface impoundment, or any lateral expansion of a CCR unit must be completed either by leaving the CCR in place and installing a final cover system or through removal of the CCR and decontamination of the CCR unit, as described in paragraphs (b) through (j) of this section. Retrofit of a CCR surface impoundment must be completed in accordance with the requirements in paragraph (k) of this section.</i></p>	<p>Section 1.0, Page 1</p>
<p>§257.102(b)(1) stipulates:</p> <p><i>(b) Written closure plan—(1) Content of the plan. The owner or operator of a CCR unit must prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. The written closure plan must include, at a minimum, the information specified in paragraphs (b)(1)(i) through (vi) of this section.</i></p>	<p>Section 4.0, Page 8</p>
<p>§257.102(b)(1)(i) stipulates:</p> <p><i>(i) A narrative description of how the CCR unit will be closed in accordance with this section.</i></p>	<p>Section 4.1, Page 8</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(b)(1)(iii) stipulates:</p> <p><i>(iii) If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed in accordance with paragraph (d) of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system will achieve the performance standards specified in paragraph (d) of this section.</i></p>	<p>Section 4.2, Page 8</p>
<p>§257.102(b)(1)(iv) stipulates:</p> <p><i>(iv) An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.</i></p>	<p>Section 3.5, Page 6</p>
<p>§257.102(b)(1)(v) stipulates:</p> <p><i>(v) An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life</i></p>	<p>Section 3.6, Page 7</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(b)(1)(vi) stipulates:</p> <p><i>(vi) A schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phases of CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of CCR unit closure. When preparing the written closure plan, if the owner or operator of a CCR unit estimates that the time required to complete closure will exceed the timeframes specified in paragraph (f)(1) of this section, the written closure plan must include the site-specific information, factors and considerations that would support any time extension sought under paragraph (f)(2) of this section.</i></p>	<p>Section 8.0, Page 14</p>
<p>§257.102(b)(2)(i) stipulates:</p> <p><i>(2) Timeframes for preparing the initial written closure plan – (i) Existing CCR landfills and existing CCR surface impoundments. No later than October 17, 2016, the owner or operator of the CCR unit must prepare an initial written closure plan consistent with the requirements specified in paragraph (b)(1) of this section.</i></p>	<p>Report submitted prior to October 17, 2016</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(b)(2)(iii) stipulates:</p> <p><i>(iii) The owner or operator has completed the written closure plan when the plan, including the certification required by paragraph (b)(4) of this section, has been placed in the facility's operating record as required by §257.105(i)(4).</i></p>	<p>Section 9.0, Page 15</p>
<p>§257.102(b)(3) stipulates:</p> <p><i>(3) Amendment of a written closure plan.</i></p> <p><i>(i) The owner or operator may amend the initial or any subsequent written closure plan developed pursuant to paragraph (b)(1) of this section at any time.</i></p> <p><i>(ii) The owner or operator must amend the written closure plan whenever:</i></p> <p><i>(A) There is a change in the operation of the CCR unit that would substantially affect the written closure plan in effect; or</i></p> <p><i>(B) Before or after closure activities have commenced, unanticipated events necessitate a revision of the written closure plan.</i></p> <p><i>(iii) The owner or operator must amend the closure plan at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written closure plan. If a written closure plan is revised after closure activities have commenced for a CCR unit, the owner or operator must amend the current closure plan no later than 30 days following the triggering event.</i></p>	<p>Section 9.1, Page 15</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(b)(4) stipulates:</p> <p><i>(4) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the initial and any amendment of the written closure plan meets the requirements of this section.</i></p>	<p>Section 9.2, Page 16</p>
<p>§257.102(d)(1) stipulates:</p> <p><i>(d) Closure performance standard when leaving CCR in place – (1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will:</i></p> <p><i>(i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate or contaminated run-off to the ground or surface waters or to the atmosphere;</i></p> <p><i>(ii) Preclude the probability of future impoundment of water, sediment or slurry;</i></p> <p><i>(iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;</i></p> <p><i>(iv) Minimize the need for further maintenance of the CCR unit; and</i></p> <p><i>(v) Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.</i></p>	<p>Section 7.0 – 7.5, Page 13</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(d)(2) stipulates:</p> <p><i>(2) Drainage and stabilization of CCR surface impoundments. The owner or operator of a CCR surface impoundment or any lateral expansion of a CCR surface impoundment must meet the requirements of paragraphs (d)(2)(i) and (ii) of this section prior to installing the final cover system required under paragraph (d)(3) of this section.</i></p> <p><i>(i) Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residues.</i></p> <p><i>(ii) Remaining wastes must be stabilized sufficient to support the final cover system.</i></p>	<p>Section 4.1, Page 8</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(d)(3)(i) stipulates:</p> <p><i>(3) Final cover system. If a CCR unit is closed by leaving CCR in place, the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section. (i) The final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(i)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.</i></p> <p><i>(A) The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less.</i></p> <p><i>(B) The infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.</i></p> <p><i>(C) The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.</i></p> <p><i>(D) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.</i></p>	<p>Section 4.2 and 5.0, Pages 8 and 10</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(d)(3)(ii) stipulates:</p> <p><i>(ii) The owner or operator may select an alternative final cover system design, provided the alternative final cover system is designed and constructed to meet the criteria in paragraphs (f)(3)(ii)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.</i></p> <p><i>(A) The design of the final cover system must include an infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (d)(3)(i)(A) and (B) of this section.</i></p> <p><i>(B) The design of the final cover system must include an erosion layer that provides equivalent protection from wind or water erosion as the erosion layer specified in paragraph (d)(3)(i)(C) of this section.</i></p> <p><i>(C) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.</i></p>	<p>Section 4.2, Page 8</p>
<p>§257.102(d)(3)(iii) stipulates:</p> <p><i>(iii) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the design of the final cover system meets the requirements of this section.</i></p>	<p>Section 11.0, Page 19</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(e)(1) stipulates:</p> <p><i>(e) Initiation of closure activities. Except as provided for in paragraph (e)(4) of this section and §257.103, the owner or operator of a CCR unit must commence closure of the CCR unit no later than the applicable timeframes specified in either paragraph (e)(1) or (2) of this section. (1) The owner or operator must commence closure of the CCR unit no later than 30 days after the date on which the CCR unit either:</i></p> <p><i>(i) Receives the known final receipt of waste, either CCR or any non-CCR waste stream; or</i></p> <p><i>(ii) Removes the known final volume of CCR from the CCR unit for the purpose of beneficial use of CCR.</i></p>	<p>Section 8.0, Page 14</p>
<p>§257.102(e)(3) stipulates:</p> <p><i>(3) For purposes of this subpart, closure of the CCR unit has commenced if the owner or operator has ceased placing waste and completes any of the following actions or activities:</i></p> <p><i>(i) Taken any steps necessary to implement the written closure plan required by paragraph (b) of this section;</i></p> <p><i>(ii) Submitted a completed application for any required state or agency permit or permit modification; or</i></p> <p><i>(iii) Taken any steps necessary to comply with any state or other agency standards that are prerequisite, or are otherwise applicable, to initiating or completing the closure of a CCR unit.</i></p>	<p>Section 8.0, Page 14</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(f)(1) stipulates:</p> <p><i>(f) Completion of closure activities. (1) Except as provided for in paragraph (f)(2) of this section, the owner or operator must complete closure of the CCR unit:</i></p> <p><i>(i) For existing and new CCR landfills and any lateral expansion of a CCR landfill, within six months of commencing closure activities.</i></p> <p><i>(ii) For existing and new CCR surface impoundments and any lateral expansion of a CCR surface impoundment, within five years of commencing closure activities.</i></p>	<p>Section 8.0, Page 14</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(f)(2)(i) stipulates:</p> <p><i>(2)(i) Extensions of closure timeframes. The timeframes for completing closure of a CCR unit specified under paragraphs (f)(1) of this section may be extended if the owner or operator can demonstrate that it was not feasible to complete closure of the CCR unit within the required timeframes due to factors beyond the facility's control. If the owner or operator is seeking a time extension beyond the time specified in the written closure plan as required by paragraph (b)(1) of this section, the demonstration must include a narrative discussion providing the basis for additional time beyond that specified in the closure plan. The owner or operator must place each completed demonstration, if more than one time extension is sought, in the facility's operating record as required by §257.105(i)(6) prior to the end of any two-year period. Factors that may support such a demonstration include:</i></p> <p><i>(A) Complications stemming from the climate and weather, such as unusual amounts of precipitation or a significantly shortened construction season;</i></p> <p><i>(B) Time required to dewater a surface impoundment due to the volume of CCR contained in the CCR unit or characteristics of the CCR in the unit;</i></p> <p><i>(C) The geology and terrain surrounding the CCR unit will affect the amount of material needed to close the CCR unit; or</i></p> <p><i>(D) Time required or delays caused by the need to coordinate with and obtain necessary approvals and permits from a state or other agency.</i></p>	<p>Section 8.0, Page 14</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(f)(2)(ii) stipulates:</p> <p>(2)(ii) <i>Maximum time extensions.</i></p> <p>(A) <i>CCR surface impoundments of 40 acres or smaller may extend the time to complete closure by no longer than two years</i></p> <p>(B) <i>CCR surface impoundments larger than 40 acres may extend the timeframe to complete closure of the CCR unit multiple times, in two-year increments. For each two-year extension sought, the owner or operator must substantiate the factual circumstances demonstrating the need for the extension. No more than a total of five two-year extensions may be obtained for any CCR surface impoundment.</i></p> <p>(C) <i>CCR landfills may extend the timeframe to complete closure of the CCR unit multiple times, in one-year increments. For each one-year extension sought, the owner or operator must substantiate the factual circumstances demonstrating the need for the extension. No more than a total of two one-year extensions may be obtained for any CCR landfill.</i></p>	<p>Section 8.0, Page 14</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(f)(2)(iii) stipulates:</p> <p><i>(iii) In order to obtain additional time extension(s) to complete closure of a CCR unit beyond the times provided by paragraph (f)(1) of this section, the owner or operator of the CCR unit must include with the demonstration required by paragraph (f)(2)(i) of this section the following statement signed by the owner or operator or an authorized representative:</i></p> <p><i>I certify under penalty of law that I have personally examined and am familiar with the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.</i></p>	<p>Section 8.0, Page 14</p>
<p>§257.102(f)(3) stipulates:</p> <p><i>(3) Upon completion, the owner or operator of the CCR unit must obtain a certification from a qualified professional engineer verifying that closure has been completed in accordance with the closure plan specified in paragraph (b) of this section and the requirements of this section.</i></p>	<p>Section 11.0, Page 19</p>
<p>§257.102(g) stipulates:</p> <p><i>(g) No later than the date the owner or operator initiate closure of a CCR unit, the owner or operator must prepare a notification of intent to close a CCR unit. The notification must include the certification by a qualified professional engineer for the design of the final cover system as required by §257.102(d)(3)(iii), if applicable. The owner or operator has completed the notification when it has been placed in the facility's operating record as required by §257.105(i)(7).</i></p>	<p>Section 9.3, Page 16</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Bottom Ash Area Closure Plan
<p>§257.102(h) stipulates:</p> <p><i>(h) Within 30 days of completion of closure of the CCR unit, the owner or operator must prepare a notification of closure of a CCR unit. The notification must include the certification by a qualified professional engineer as required by §257.102(f)(3). The owner or operator has completed the notification when it has been placed in the facility's operating record as required by §257.105(i)(8).</i></p>	<p>Section 9.4, Page 17</p>
<p>§257.102(i) stipulates:</p> <p><i>(i) Deed notations. (1) Except as provided by paragraph (i)(4) of this section, following closure of a CCR unit, the owner or operator must record a notation on the deed to the property, or some other instrument that is normally examined during title search. (2) The notation on the deed must in perpetuity notify any potential purchaser of the property that: (i) The land has been used as a CCR unit; and (ii) Its use is restricted under the post-closure care requirements as provided by §257.104(d)(1)(iii).</i></p>	<p>Section 9.5, Page 17</p>
<p>§257.102(j) stipulates:</p> <p><i>(j) The owner or operator of the CCR unit must comply with the closure recordkeeping requirements specified in §257.105(i), the closure notification requirements specified in §257.106(i), and the closure Internet requirements specified in §257.107(i).</i></p>	<p>Section 9.0, Page 15</p>



1.0 INTRODUCTION

CB&I Environmental and Infrastructure, Inc. (CB&I) has prepared the following Closure Plan (Plan) at the request of Westar Energy (Westar) for the Bottom Ash Area 1 Landfill and Surface Impoundment located within the Bottom Ash Area at its Jeffrey Energy Center (JEC) in St. Marys, Kansas. JEC is a coal-fired and natural gas-fired power plant that has been in operation since 1980. Bottom ash is permitted for disposal at JEC in the existing Bottom Ash Area, which is comprised of two units: Bottom Ash Area 1, which is operational, and the proposed Bottom Ash Area 2. The Bottom Ash Area 1 (Bottom Ash Area) Landfill and Surface Impoundment have been deemed to be regulated coal combustion residual (CCR) units 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.

This Plan details the closure requirements outlined in §257.102, for CCR units closed in place. The criteria for conducting the closure or retrofit of CCR units for the Bottom Ash Area Landfill and Surface Impoundment (Impoundment) are detailed in Section 2.0. Additionally, the following Plan details the necessary steps to close the Bottom Ash Area at any point in the active life of the Bottom Ash Area, based on recognized and good engineering practices. All closure processes have been established to control, minimize, and eliminate infiltration of liquids into waste and release of leachate.



2.0 REGULATORY OVERVIEW OF CCR PLAN REQUIREMENTS

On April 17, 2015, the USEPA published the CCR Rule under Subtitle D of the Resource Conservation and Recovery Act (RCRA) as 40 CFR Parts §257 and §261. The purpose of the CCR Rule is to regulate the management of CCR material in regulated CCR units for landfill and surface impoundments. The Bottom Ash Area Landfill and Impoundment have been deemed to be regulated CCR units at JEC.

Section 257.102(b) of the CCR Rule requires owners or operators of CCR landfills and surface impoundments to prepare a written Plan describing the closure of the unit and schedule for implementation of the plan. The following citations from the CCR Rule are applicable for the Bottom Ash Area Landfill and Surface Impoundment as discussed in this Plan:

§257.102(b)(1) stipulates:

(b) Written closure plan – (1) Content of the plan. The owner or operator of a CCR unit must prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. The written closure plan must include, at a minimum, the information specified in paragraphs (b)(1)(i) through (vi) of this section

- (i) A narrative description that discusses how the CCR unit will be closed in accordance with this section.*
- (ii) If closure of the CCR unit will be accomplished through removal of CCR from the CCR unit, a description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with paragraph (c) of this section.*
- (iii) If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed and methods and procedures to be used to install the final cover will achieve performance standards specified in paragraph (d) of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system achieves the performance standards specified in paragraph (d) of this section.*
- (iv) An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.*
- (v) An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life.*
- (vi) A schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phases of CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of CCR unit closure. When preparing the written closure plan, if the owner or operator of a CCR unit estimates that the time required to complete closure will exceed the timeframes specified in paragraph (f)(1) of this section, the written closure plan must include the site-specific information, factors and*



considerations that would support any time extension sought under paragraph (f)(2) of this section.

§257.102(b)(iii) outlines closure performance standards for closure of units where CCR material will be left in place. The section requires a description of the final cover system and the design, methods, and procedures to be used to install the final cover to ensure that it will achieve the performance standards specified in and §257.102(d), which stipulates:

(d) Closure performance standard when leaving CCR in place – (1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will:

- (i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or the atmosphere;*
- (ii) Preclude the probability of future impoundment of water, sediment or slurry;*
- (iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during closure and post-closure period;*
- (iv) Minimize the need for further maintenance of the CCR unit; and*
- (v) Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.*

Moreover, the final cover system has been planned in accordance with the following requirements of §257.102(d)(3), which stipulates:

(3) Final cover system. If a CCR unit is closed by leaving CCR in place the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section.

- (i) The final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(i)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.*
 - (A) The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less.*
 - (B) The infiltration of liquids through the CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.*
 - (C) The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.*
 - (D) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.*



In addition to the above, Plans must ensure compliance with the closure recordkeeping requirements specified in §257.105(i), the closure notification requirements specified in

§257.106(i), and the closure intent requirements specified in §257.107(i). A written certification is provided in Section 11.0 from a qualified professional engineer in the State of Kansas, to certify that this Plan meets the requirements of the CCR Rule.



3.0 JEC BOTTOM ASH AREA OVERVIEW

3.1 Location, Topography, and Description

Bottom ash is deposited within JEC's Bottom Ash Area Landfill and Impoundment. The closure of the Bottom Ash Area will be accomplished by leaving the bottom ash in place within both the landfill and impoundment. The following Plan was developed to satisfy the CCR Rule requirements for in place closure §257.102(b)(1)(iii).

The Bottom Ash Area is located in St. Marys, Kansas, approximately 4.5 miles west of Highway 63, in Pottawatomie County, Kansas. The Bottom Ash Area is located within JEC and due east of Tower Hill Lake. The location of the Bottom Ash Area is depicted in **Figure 1**.

The existing Bottom Ash Area is approximately 52.5 acres, and the proposed Bottom Ash Area 2, will be approximately 62 acres. The Bottom Ash Area includes both a landfill, which has an approximate area of 32.7 acres, and a surface impoundment, which has an approximate area of 19.8 acres.

The Bottom Ash Area currently consists of large berms and deep ravines which are being filled with bottom ash. The topography varies across the Bottom Ash Area ranging in elevations from 1,226 to 1,299 feet mean sea level (ft MSL). Once the bottom ash disposal, final cover installation, and closure of the Bottom Ash Area are complete, the Bottom Ash Area will have a one percent slope towards Tower Hill Lake. Existing and permitted site topography is depicted in **Figure 2** and **Figure 3**, respectively.

3.2 Existing Regulatory Permits and Consents

Westar was granted an Industrial Landfill Permit at JEC by the Kansas Department of Health and Environment – Bureau of Waste Management (KDHE-BWM) for the Bottom Ash Area through Industrial Landfill Permit No. 0359, in accordance with Kansas Statutes Annotated (KSA) 65-3407.

KDHE modified the solid waste permit, per K.A.R. 28-29-6a, in response to the CCR Rule to include CCR material handling areas where fugitive dust control was required. The current Industrial Landfill Permit modification was approved on October 15, 2015. This allows CCR material generated on-site at JEC and to be properly treated and/or disposed within the Industrial Landfill Permit boundary, including the Bottom Ash Area.

As part of the Industrial Landfill Permit the Bottom Ash Area has previously approved final grades, which can be seen in **Figure 3**. These grades will be updated in line with §251.102(d), which states:

§257.102: “(d) Closure performance standard when leaving CCR in place—(1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will: (ii) Preclude the probability of future impoundment of water, sediment, or slurry;...”

A modeled final grading plan, as detailed in **Figure 4**, was developed to ensure a one percent slope towards the berm to promote positive drainage off the Bottom Ash Area final cover. These modeled final grades have been utilized to determine the remaining waste volume for the Bottom Ash Area Landfill in Section 3.5.



3.3 Bottom Ash Generation, Recycling, and Disposal

Bottom ash has been generated at JEC since operations began in 1980. Bottom ash is the by-product of molten ash being quenched with water in the coal boilers. Bottom ash is typically larger in particle size than fly ash, with a size ranging from 0.01 to 15 millimeters (mm). The color of bottom ash typically varies from black to cream, with a sandy texture, and bottom ash has a high shear strength when compacted.

Bottom ash generated at JEC is collected in a hopper and gravity sluiced, in a water slurry to the Bottom Ash Area Impoundment. The bottom ash is allowed to settle out and dry in the Bottom Ash Area Impoundment prior to transport to the adjacent Bottom Ash Area Landfill, located in the southern portion of the Bottom Ash Area. Bottom ash is segregated at the Bottom Ash Area Landfill for recycling efforts and either used for resale to the construction industry, or disposed at the Bottom Ash Area Landfill. Recycled bottom ash rates depend on the market demand, opportunities and variability of material and can affect the life of the Bottom Ash Area Landfill.

3.4 Bottom Ash Area Operations

Bottom ash is transported by trucks from the Bottom Ash Area Impoundment to the adjacent Bottom Ash Area Landfill. In the Bottom Ash Area Landfill the bottom ash is discharged, graded, and compacted to promote positive drainage towards the Bottom Ash Area Surface Impoundment. The landfilling of bottom ash is phased until the permitted final grades have been achieved. Grading is undertaken, as required, within the active area to maintain a relatively uniform height.

Daily and intermediate covers are not applied as part of the operational activities for the Bottom Ash Area Landfill. Weekly (7-day) and annual inspections, as well as annual reporting, are undertaken for the CCR units in line with the site inspection requirements in 40 CFR Part §257.84(b): Inspection Requirements for CCR Landfills. Any operational modifications which require attention will be identified as part of the inspection and reporting requirements for the Bottom Ash Area Landfill.

Stormwater control measures including dikes, berms, and other features will be constructed as necessary and in accordance with the Run-on and Run-off Control Plan for the Bottom Ash Area. Perimeter berms, located along the north and west borders of the Bottom Ash Area, are constructed ahead of the bottom ash placement to prevent erosion and provide run-on and run-off control. The perimeter berm structure incorporates an overflow riser structure. Both structures are raised contemporaneously in 5-foot intervals as the bottom ash elevation increases. This ensures that an appropriate freeboard is maintained between these structures and the top of the bottom ash fill is maintained.

3.5 Remaining Bottom Ash Area Landfill Volume and Life (§257.102(b)(1)(iv))

The total disposal capacity of the Bottom Ash Area is approximately 1,593,100 cubic yards (cy), as stated in the 2015 Annual Landfill Inspection. AutoCAD Civil 3D surface comparisons were used to determine the remaining capacity of the Bottom Ash Area Landfill. The most recent top of waste survey conducted by Professional Engineering Consultants (PEC), in April 2016, was compared to the final design top of waste elevations. The final design top of waste elevations were estimated by lowering the permitted final design grades, shown in **Figure 4**, by two feet (accounting for the 18-inch infiltration layer and the 6-inch erosion control layer). From the comparison between these surfaces, the



remaining capacity of the Bottom Ash Area Landfill is approximately 401,500 airspace cy (ascy).

As detailed in the 2015 Annual Report, the average fill rate for the Bottom Ash Area Landfill is approximately 6,335 tons per year (tons/yr) of CCR material. The assumed dry density of the bottom ash for JEC is approximately 70 pounds per cubed feet (lb/ft³) (or 0.945 tons per cubic yard (tons/cy) dry weight), it is determined that the average volume fill rate is approximately 6,704 cubic yards per year (cy/yr). At this fill rate and the estimated remaining capacity determined in AutoCAD, the remaining life of the Bottom Ash Area Landfill was determined to be approximately 59 years (year 2075).

3.6 Largest Area Requiring Final Cover (§257.102(b)(1)(v))

The Bottom Ash Area has been designed, and will be operated so that contemporaneous operation and closure occurs. The final cover will be constructed in stages so as to facilitate JEC operational requirements. The largest area requiring final cover at any time during the CCR unit's operating period is estimated to be the current operational area of the Bottom Ash Area, which is approximately 52.5 acres in size.



4.0 CLOSURE PLAN (§257.102(b)(1))

As detailed this Plan has been prepared in accordance with requirements of the CCR Rule and includes a written certification in Section 11.0 from a qualified professional engineer for the State of Kansas.

4.1 Narrative Description (§257.102(b)(1)(i))

As previously detailed above, the Bottom Ash Area comprises of both a landfill and surface impoundment. Closure of both the Bottom Ash Area Landfill and the Impoundment will be accomplished by leaving the CCR material in place. As the Bottom Ash Area Landfill approaches the final grades, the surface impoundment will be dewatered and stabilized to enable dry fill to be deposited, as per 257.102(d)(2), until the final grades are reached for the Bottom Ash Area.

The method of closure has been designed to minimize maintenance, leachate generation, control run-on and run-off, and ensure the protection of human health and the environment. Closure of the Bottom Ash Area will follow Construction Quality Assurance (CQA) procedures to ensure the final cover is designed, constructed, and installed in accordance with recognized standards and accepted good engineering practices as detailed in the following sections.

4.2 Final Cover and Subgrade Overview (§257.102(b)(1)(iii) and §257.102(d)(3)(i))

The final cover has been designed to meet the following objectives:

- Minimize the potential post-closure infiltration of liquids into the waste;
- Minimize the potential for releases of CCR material, leachate, or contaminated run-off to the ground or surface waters or the atmosphere;
- Provide long-term slope stability to prevent the sloughing or movement of the final cover system during closure and post-closure period; and
- Minimize the need for further maintenance of the CCR unit.

The final cover will be installed on top of a minimum of a 12-inch subgrade layer of compacted and graded bottom ash. The top slope of the final cover, using the suggested modeled grades, will be a minimum of one percent to allow for drainage. The Bottom Ash Area exterior slopes will be constructed to allow for adequate drainage of run-off. Positive drainage will minimize the potential for infiltration of liquids into the CCR unit. Once bottom ash disposal and the final cover installation/closure are complete, the Bottom Ash Area will peak at an approximate elevation of 1,266 ft. MSL. The final cover of the Bottom Ash Area will be constructed when final grades have been achieved and will be comprised of the following layers, from bottom to top:

- A minimum of 18-inch of compacted soil (or) 40-mil Liner Low Density Polyethylene (LLDPE) geomembrane (or equivalent), infiltration layer; and
- A minimum 6-inch vegetated, erosion control layer.



The final cover system will meet the requirements of §257.102(d)(3)(i) and have a minimum permeability of 1×10^{-5} cm/sec. An alternate final cover may be used in lieu of the final cover system described above, and will follow §257.102(d)(3)(ii). In the event that an alternate liner system is considered, the KDHE will be notified and appropriate permitting will be secured.

4.2.1 Low Permeability Subgrade Construction

Prior to construction of the final cover, a 12-inch subgrade area comprised of bottom ash will be prepared and used to support the final cover system. The subgrade will be compacted, then graded with a bulldozer, and smoothed to ensure a uniform surface.

After the grading and compaction of the subgrade, the area will be inspected to ensure the working surface is smooth and free from sharp objects or abrupt changes in grade, and proper sloping allowed for drainage. Upon inspection, the area will be surveyed on a minimum of a 100-foot grid prior to the commencement of the installation of the final cover.

4.2.2 Infiltration Layer

An 18-inch compacted soil layer or a 40-mil textured LLDPE geomembrane (or equivalent) may be installed at the Landfill to serve as the infiltration layer. This layer will prevent infiltration of moisture through the final cover into the CCR material.

A total of approximately 93,136 cy of soil for the 18-inch compacted soil layer will be required, if used. The infiltration layer will be constructed from soil obtained from either local or on-site borrow sources and will be free of large particles or debris.

If the geomembrane is used, installation will follow the best practice procedures and in accordance with third-party conformance testing. Third-party conformance testing will be conducted on key parameters for the geomembrane material properties. Testing will be reported as part of the Construction Quality Assurance (CQA) for the Bottom Ash Area Landfill.

4.2.3 Erosion Control Layer

The erosion control layer will include 6-inches of natural soils capable of sustaining vegetation. This layer will be located above the infiltration layer and will require approximately 31,046 cy of soil. After placement, the soil will be seeded to promote the establishment of a healthy stand of grass and native vegetation. The vegetation will assist in limiting the infiltration of surface waters and effects of erosion on the final cover system.

The thickness of the erosion control soils will be verified by surveying the top of the layer in the same locations completed on the top of subgrade. The specified thicknesses of the layer are minimum thicknesses that will be developed in the field.



5.0 CONSTRUCTION CONSIDERATIONS

5.1 Equipment

Westar, or their contractor, is responsible for providing sufficient equipment to carry out Bottom Ash Area Landfill closure operations, as designed, in a satisfactory manner. Equipment for Bottom Ash Area closure operations may include any or all of the following, as described in Table 1, and potentially other equipment if deemed appropriate by Westar and their contractors:

TABLE 1: CONSTRUCTION EQUIPMENT	
EQUIPMENT	PURPOSE
Tracked Dozer	Spreading low permeability soil and protective /vegetative material
Excavators	Slope leveling near geomembrane tie-in at the waste boundary. Excavating soil material from borrow area into haul trucks and final cover installation
Compactor	Compacting cohesive soil layer to achieve proper density
Haul Trucks	Haul cohesive soil and material from borrow area/ stockpile into construction area
Drum Rollers	Preparing the low permeability soil layer top surface for geomembrane placement
Water Trucks	Spraying water on JEC roads for dust suppression

5.2 Phased Construction

The final cover will be placed progressively as each construction phase is complete. Construction of the cover system, haul road, and fill placement will take place throughout the year as needed. The objective will be to establish the stabilized final surface as efficiently as possible after the filling has been completed.

5.3 Stormwater Run-On and Run-Off Controls

A perimeter drainage channel will prevent stormwater flow onto Bottom Ash Area in order to comply with 40 CFR Part §257.81(a)(1). Perimeter channels will incorporate a 4H:1V side slope and a 2-foot depth running adjacent to the Bottom Ash Area Landfill waste boundary. All stormwater features have been designed and will be constructed so as to convey run-on from a 25-year, 24-hour storm event.



In order to preclude the probability of water ponding on compacted bottom ash, a drainage channel will be constructed to properly convey stormwater away from the Bottom Ash Area Landfill. To comply with 40 CFR Part §257.102, the drainage channel will be constructed as the Bottom Ash Area Impoundment is dewatered in order to convey stormwater away from the Bottom Ash Area Landfill. A v-notch channel with 4H:1V side slopes and a 3-foot depth running along the inside of the perimeter berm will have the capacity to convey stormwater run-off from the Bottom Ash Area Landfill. An alternative Bottom Ash Area Landfill drainage channel design may be utilized if it is appropriately sized to convey landfill run-off from the 25-year, 24-hour storm event.

Tower Hill Lake is designed to serve as the stormwater run-off management system for the regional watershed, including the Bottom Ash Area. Tower Hill Lake was analyzed to determine if it has been designed to collect and control stormwater run-off from the regional subcatchment for a 25-year, 24-hour storm event.

Once the final cover installation/closure of the Bottom Ash Area is completed, direct precipitation and non-contact stormwater run-off from the Bottom Ash Area will drain to the Bottom Ash Pond and eventually Tower Hill Lake, via gravity flow. Tower Hill Lake discharges into a tributary of the Kansas River. The outfall location at Tower Hill Lake is monitored to ensure that effluent limits meet the standards set by the NPDES Permit No. I-KS67-PO06 and 40 CFR Part §257.81(b). See the Run-on and Run-off Control Plan for further information on the stormwater controls.

5.4 Erosion Control

Erosion control measures such as riprap, erosion control blankets, and turf reinforcing mats will be used to minimize erosion in the perimeter drainage channels. Other erosion control measures may include a relatively shallow slope of the final cover and the use of the perimeter berms, all of which will control surface run-off rates on and around the Bottom Ash Area. The vegetated final cover will assist in preventing erosion of the final cover soils. Construction of erosion control measures including dikes, berms, and other features will be installed in accordance with the Run-on and Run-off Control Plan for the Bottom Ash Area.

5.5 Stability

The final cover system may experience minor settlement over time relative to the base grade settlement due to waste consolidation. Only minimal waste consolidation is anticipated due to the physical characteristics of bottom ash, the bottom ash will be compacted during placement, and most of the settlement will have already occurred shortly after landfilling.

In the event future non-uniform settlement is observed to be impacting the functional design and/or operation of the Bottom Ash Area and surrounding areas, minor regrading and repair of the soil components may be required. The optional geomembrane and the final cover soil components are flexible and will retain their integrity under minor differential settlement.



6.0 OPERATIONS AND MAINTENANCE

Following closure, the final cover will be maintained to prevent erosion and control excessive vegetative growth. Maintenance of the final cover will include periodic mowing of the vegetative cover and reseeding as necessary. The grass will be maintained at such a level as to facilitate inspection. This will help to discourage the inhabitation of burrowing animals. Mowing activities will be conducted on an as-need basis. The erosion control layer on the final cover system will be inspected, filled with soil, and regraded if the erosion channels are approximately 6-inches deep. Further details on the operations and maintenance are provided in the Post-Closure Plan for the Bottom Ash Area.



7.0 CLOSURE PERFORMANCE STANDARDS (§257.102(d)(1))

7.1 Minimization of Liquid Infiltration into CCR Material Mass (§257.102(d)(1)(i))

As detailed above, the final cover system for the Bottom Ash Area Landfill will include an infiltration layer, consisting of either compacted soils and/or a low-permeability geomembrane layer, and an erosion control layer. The compacted soils and/or geomembrane will help to minimize the potential infiltration of water to the CCR material.

The final cover system will assist in preventing the contact between the surface water and the CCR material. This will minimize the movement of potentially contaminated water to ground or surface water systems. Additionally, it will assist in controlling, minimizing and in some cases eliminating, to the maximum extent feasible, post-closure infiltration of liquids into the waste, and the potential release of CCR material and leachate, as required by the performance standards.

7.2 Preclusion of Future Impoundment of Water, Sediment, or Slurry (§257.102(d)(1)(ii))

Westar does not anticipate the need for future impoundment of water, sediment, or slurry within the Bottom Ash Area once the final cover system is installed. Therefore, the Bottom Ash Area follows the required performance standards.

7.3 Measures to Maintain Slope Stability (§257.102(d)(1)(iii))

In order to maintain slope stability of the final cover, run-off is collected and controlled in highly erodible areas, such as the side slopes and top slope. The run-off controls and shallow slopes prevent erosion, movement, and sloughing of the final cover system, as required by the performance standard. Further details on the stormwater run-on and run-off controls for the Bottom Ash Area are provided in the Run-On and Run-Off Control Plan.

7.4 Design to Minimize Ongoing Maintenance (§257.102(d)(1)(iv))

The incorporation of slope stability and erosion control measures will minimize the need for on-going maintenance on the Bottom Ash Area Landfill. The weekly inspections will assist in identifying maintenance at the earliest opportunity, so as to prevent larger maintenance requirements in the future.

Both the preventative maintenance measures in addition to the weekly inspections will minimize the requirement for larger maintenance of the Bottom Ash Area, and therefore fulfills the required performance standards.

7.5 Engineering Good Practices (§257.102(d)(1)(v))

The planned quick completion and phasing of final cover operations will prevent large amounts of contact water from being generated. The use of time efficiency with a high standard for quality is an example of a good engineering practice and satisfaction of the required performance standards.



8.0 CLOSURE ACTIVITY SCHEDULE (§257.102(b)(1)(vi))

The closure of the Bottom Ash Area will be completed according to the following schedule milestones:

- Based on Section 3.5, it can be seen that the estimated closure date of Bottom Ash Area will be in 2075. As the Bottom Ash Area is filled this date may change depending on the rates of disposed bottom ash. This closure date will be updated accordingly as required as part of an amendment to this Plan.
- Notify KDHE in writing at least 60 days before closure.
- The final cover installation will be initiated as soon as possible after regulatory approval, in line with suitable weather for construction.
- Construction and analytical testing will be conducted in a systematic and timely manner. Delays will be avoided in completion. Construction and testing of the soil will generally not exceed 60 working days from beginning to completion.
- Commence closure of the area, by following §257.102(e)(3), no later than 30 days after the date on which the CCR unit receives the final receipt of CCR material, per §257.102(e)(1)(i).
- Completion of closure activities will occur within 6 months of commencing closure activities as required by §257.102(f)(1). Upon completion a certified Kansas Professional Engineer will provide KDHE with a closure certification. This will verify that the closure was performed and completed in accordance with the Plan. A request for an extension of the closure timeframe may be submitted following the guidelines in §257.102(f)(2)(i-iii).
- Within 30 days of the completion of closure of the CCR unit, the notification of closure of the CCR unit will be submitted as per §257.102(h).
- Post-closure monitoring of the cap and run-on/run-off controls will be conducted on a routine schedule to identify any potential stability issues with the cap and appropriate maintenance to be undertaken. A post-closure monitoring plan for the Bottom Ash Area has been detailed in the Post-Closure Plan for the Bottom Ash Area.



9.0 RECORD KEEPING/NOTIFICATION REQUIREMENTS (§257.102(j))

Per §257.102(j), Westar maintains an operating record consisting of the following documents specified in §257.105(i):

- Inspection records that are conducted for the disposal materials;
- Groundwater sampling and analysis results for the Bottom Ash Area, records of recycled materials, operational requirements, complaints register, associated corrective measures, and employee training records;
- A copy of the SWPPP and the SWPPP Record Forms;
- The Closure and Post-Closure Plans, as required by §257.102(b)(2)(iii), as well as the CQA certification and inspection documentation;
- Proof of financial insurance;
- A copy of the current operating permit and any subsequent addenda; and
- Copies of the permit applications and all supporting documents.

Additionally as per §257.104(f), Westar will comply with the notification requirements specified in §257.106(i). This includes submitting the following notification documents and any amendments to these documents to the state director:

- Intent to initiate closure;
- Availability of annual progress reports of closure implementation;
- Closure and Post-Closure Plan and any alternative closure requirements;
- Any required time extensions;
- Completion of closure of a CCR unit; and the
- Deed notation;

Internet requirements specified in §257.107(i) will be placed on owner and operators publicly accessible website, as per §257.104(f). These documents include any notification on the closure or post-closure intent or completion, annual progress reports, the written Closure and Post-Closure Plans and any amendments, demonstrations for time extensions, and the record of the deed.

All records that are relevant within the past 5 years will be maintained at JEC and/or by Westar. The records are available to KDHE representatives for review upon request.

9.1 Plan Amendments (§257.102(b)(3))

This Plan will continue to undergo review as the Bottom Ash Area continues phased construction activities. The amended Plan will be reviewed and recertified by a registered



professional engineer and will be placed in JEC's facility operating record as required per §257.105(i)(4). The amended Plan will supersede and replace any prior versions. Availability of the amended Plan will be noticed to the State Director per §257.106(i) and posted to the publicly accessible internet site per §257.107(i).

A record of Plan reviews/assessments is provided on the first page of this document, immediately following the Table of Contents. Any subsequent amendment of a written Plan will be prepared as required, such as:

- There is a change in the operation of the CCR unit that would substantially affect the written Plan in effect; or
- Before or after closure activities have commenced, unanticipated events necessitate a revision of the written Plan.

The owner or operator will amend the Plan at least 60 days prior to a planned change in the operation of JEC or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written Plan. If a written Plan is revised after closure activities have commenced for a CCR unit, the owner or operator will amend the Plan no later than 30 days following the triggering event.

9.2 Amended Plan Certification (§257.102(b)(4))

CB&I reviewed any previously developed closure information/plans which exist for the Bottom Ash Area Landfill. CB&I prepared a Plan for the Bottom Ash Area Landfill to address closure with CCR materials left in place. CB&I has utilized the existing Plans in this report to minimize costs associated with development of these plans.

This Plan will continue to undergo review as the Bottom Ash Area Landfill continues phased construction activities. Any future amendments to the current Plan will be tracked in the log at the beginning of this document and will be certified by a qualified professional engineer that the amended plan meets the requirements of the applicable portions of the CCR Rule. The amended Plan will be placed in JEC's facility operating record as required per §257.105(i)(4), noticed to the State Director per §257.106(i), and posted to the publicly accessible internet site per §257.107(i)

9.3 Notice of Intent to Initiate Closure (§257.102(g))

Westar will file a Notice of Intent of closure activities no later than the date of initiation of closure of the Bottom Ash Areas. The notification will include the certification by a registered professional engineer in the State of Kansas for the design of the final cover system as required by §257.102(d)(3)(iii).

If required, Westar may request an extension of an additional two years to initiate closure of the Bottom Ash Area, and provide written documentation that the area will continue to accept waste or will start removing CCR material for the purpose of beneficial use. The documentation to extend the closure of an idle CCR unit must be supported by specific information specified in the CCR Rule. The factors that may support such a demonstration are not included in the current Plan at this time. If such an extension is needed in the future, the Plan will be amended to address this issue at a later date.



9.4 Notice of Completion of Closure (§257.102(h))

Westar will complete a Notice of Completion of closure activities within 30 (thirty) days of completion of closure of the Bottom Ash Area Landfill. The notification will include the certification by a registered professional engineer as required by §257.102(f)(3).

9.5 Deed Notation (§257.102(i))

Per §257.102(i), a notation on the deed to the property, or some other instrument, that is normally examined during a title search will be recorded to notify any potential purchaser of the property that the land has been used as a CCR unit and its use is restricted under the post-closure care requirements provided within §257.104(d)(1)(iii). The following information will be recorded in accordance with the CCR Rule:

- The name and address of the person with knowledge of the contents of the Bottom Ash Area Landfill
- The prior land use as a CCR unit
- The restrictions of future land use under the post-closure care requirements



10.0 CLOSURE COST ESTIMATE

The combined closure cost for the Bottom Ash Area is estimated to be approximately \$1,748,615.38, as of October 2016. This includes preparing the site for construction of the final cover, the cost of the actual final cover, the implementation of erosion control measures, and possible reclamation costs. The maximum closure cost estimates when operating the Bottom Ash Area can be found in **Appendix A**.

In providing these cost estimates, it is recognized that Westar does not have control over the costs of labor, equipment, or materials, or over a contractor's method(s) of determining prices or bidding.



11.0 PROFESSIONAL ENGINEER CERTIFICATION (§257.102(d)(3)(iii))

The undersigned registered professional engineer is familiar with the requirements of §257.102 of the CCR Rule and has visited and examined the JEC or has supervised examination of JEC by appropriately qualified personnel. The undersigned registered professional engineer attests that this CCR Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and meets the requirements of §257.102, and that this Plan is adequate for JEC's facility. This certification was prepared as required by §257.102(d)(3)(iii).

Name of Professional Engineer: Richard Southorn

Company: CB&I

Signature: 

Date: 10/13/16

PE Registration State: Kansas

PE Registration Number: PE25201

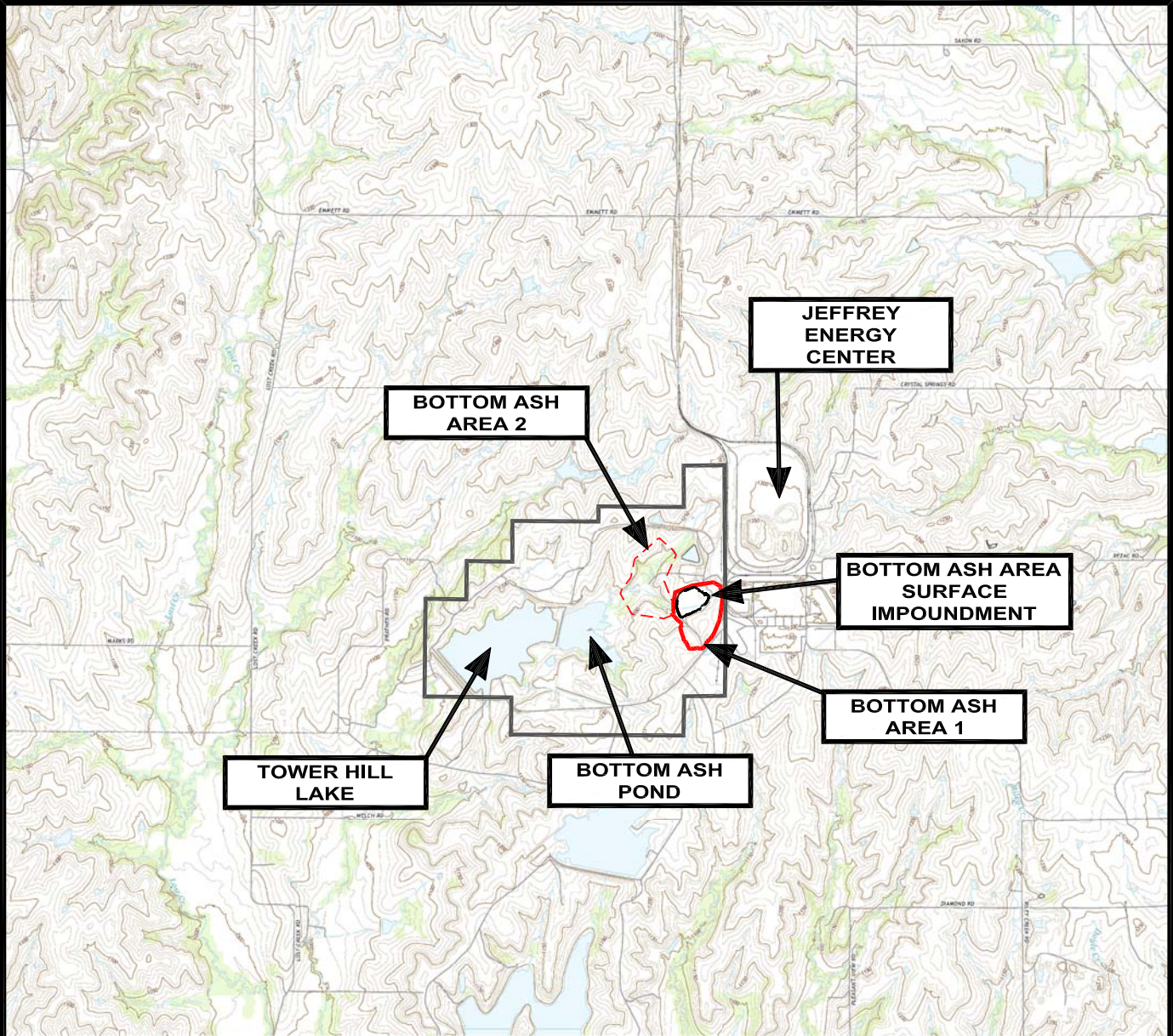
Professional Engineer Seal:






FIGURES

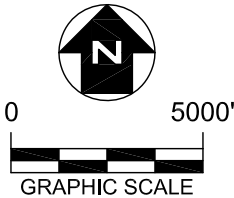
- Figure 1 – Bottom Ash Area, Site Location Plan
- Figure 2 – Bottom Ash Area 1, Existing Site Topography
- Figure 3 – Bottom Ash Area 1, Permitted Final Landform
- Figure 4 – Bottom Ash Area 1, Remaining Capacity Model

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LEGEND

-  CCR UNIT BOUNDARY
-  PROPOSED CCR UNIT BOUNDARY
-  APPROXIMATE 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.



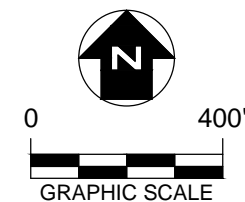
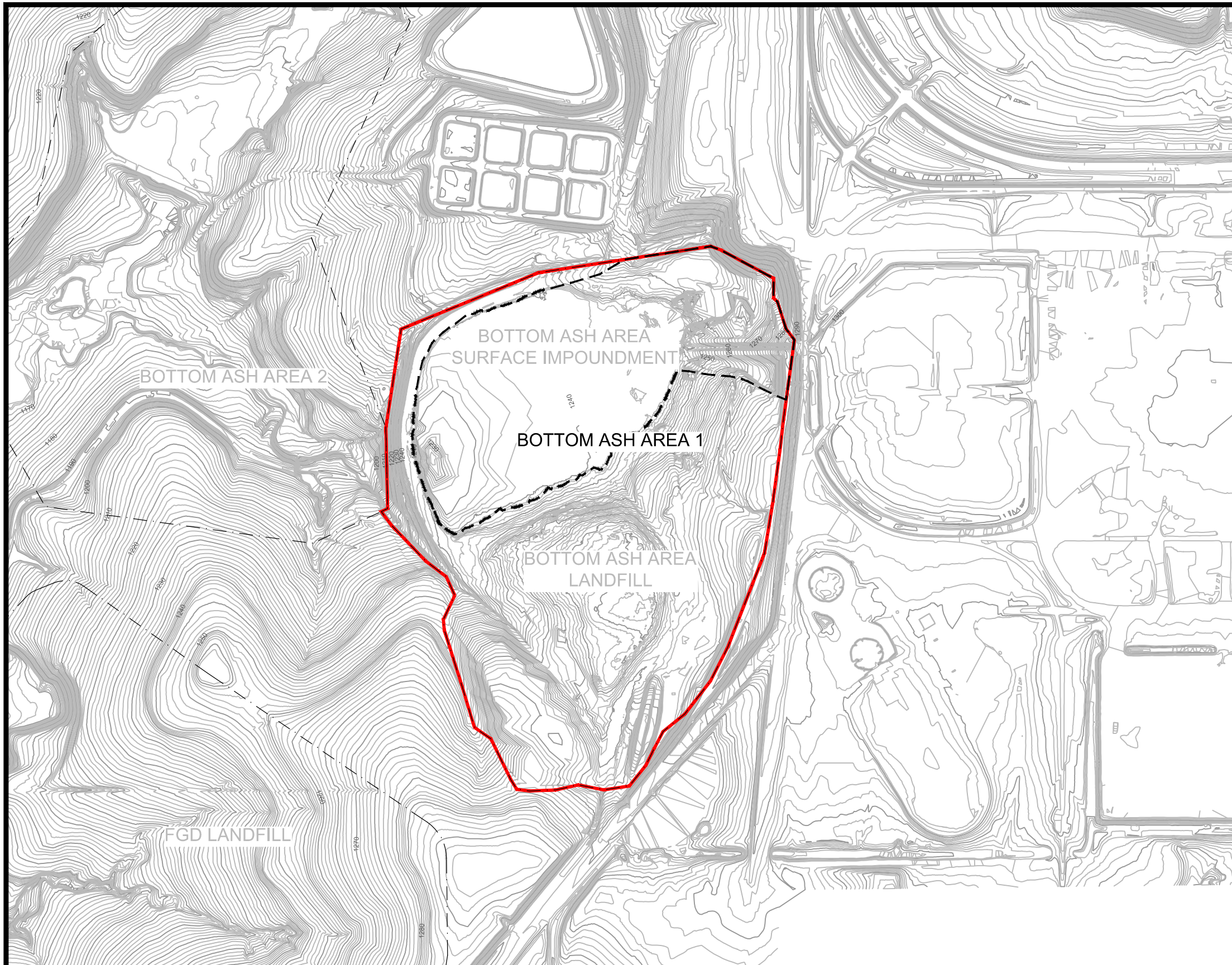
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**WESTAR ENERGY
25905 JEFFREY RD., ST. MARYS, KS**

**FIGURE 1
BOTTOM ASH AREA
SITE LOCATION PLAN**

APPROVED BY: MMS | PROJ. NO.: 631214397 | DATE: OCTOBER 2016




LEGEND

- CCR UNIT BOUNDARY
- - - - - SURFACE IMPOUNDMENT BOUNDARY

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.

REV. NO.	DATE	DESCRIPTION



CB&I Environmental & Infrastructure, Inc.

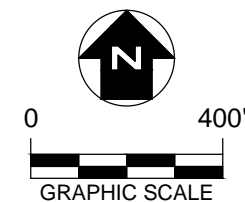
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FIGURE 2
BOTTOM ASH AREA 1
EXISTING SITE TOPOGRAPHY

DRAWN BY:	NV	APPROVED BY:	MMS	PROJ. NO.:	631214397	DATE:	OCTOBER 2016
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T:\AutoCAD\Projects\Westar Energy\Jeffrey\Final Grades and Current Grades.dwg, 9/28/2016 5:21:43 PM, DWG To PDF.pc3




LEGEND

- CCR UNIT BOUNDARY
- EXISTING SITE CONTOUR
- PERMITTED SITE CONTOUR

NOTES

1. EXISTING CONTOURS DEVELOPED BY PROFESSIONAL ENGINEERING CONSULTANTS IN APRIL 2016.
2. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
3. FINAL GRADES WERE TAKEN FROM KDHE-BWM INDUSTRIAL LANDFILL PERMIT NO. 0359.
4. PERMITTED SITE GRADES REQUIRE MODIFICATION IN ORDER TO COMPLY WITH TITLE 40 CFR PART 257.102.
5. ALL BOUNDARIES ARE APPROXIMATE.

REV. NO.	DATE	DESCRIPTION



CB&I Environmental & Infrastructure, Inc.

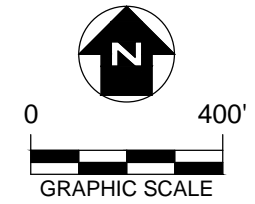
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FIGURE 3
BOTTOM ASH AREA 1
PERMITTED FINAL LANDFORM

DRAWN BY:	NV	APPROVED BY:	MMS	PROJ. NO.:	631214397	DATE:	OCTOBER 2016
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LEGEND

- CCR UNIT BOUNDARY
- REMAINING CAPACITY MODEL GRADES

NOTES

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

REV. NO.	DATE	DESCRIPTION



CB&I Environmental & Infrastructure, Inc.

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

**FIGURE 4
BOTTOM ASH AREA 1
REMAINING CAPACITY MODEL**

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APPENDICES

APPENDIX A

Closure Cost Estimate

Landfill Closure - 2016 Annual Cost Estimate Worksheet - Kansas Department of Health & Environment

OWNER: <u>Westar Energy, Inc.</u>	PERMIT No.: <u>359</u>
OPERATOR: <u>Westar Energy, Inc.</u>	ESTIMATOR: <u>CB&I Environment and Infrastructure</u> DATE: <u>October 2016</u>
TOTAL PERMITTED WASTE DISPOSAL <u>52.5</u> ACRES	Closure Plan Title: <u>Jeffrey Energy Center Bottom Ash Area 1 Landfill Closure</u> Last Revision Date: _____
TOTAL PERMITTED AREA CERTIFIED CLOSED: <u>0</u> ACRES	ACRES CURRENTLY OPEN: <u>52.5</u> (i.e., "open" means areas subject to regulation and have not been certified closed)
LARGEST ACREAGE REQUIRING FINAL COVER DURING THE RENEWAL PERIOD: <u>52.51</u>	
LANDFILL TYPE: _____ SUBTITLE D MUNICIPAL SOLID WASTE _____ SMALL ARID MUNICIPAL SOLID WASTE <input checked="" type="checkbox"/> INDUSTRIAL WASTE _____ CONSTRUCTION & DEMOLITION WASTE _____ WASTE TIRE MONOFILL	

LANDFILL CLOSURE - 2016 ANNUAL COST ESTIMATE WORKSHEET

Permit No.:

	ITEM	QUANTITY	UNITS	UNIT COST	COST	SUBTOTALS	SOURCE OF UNIT COST INFO or NA
1.0.0	PREPARING SITE FOR CONSTRUCTION OF FINAL COVER						
1.0.1	Backfill below grade areas with structural backfill	64,069	CU. YD.		\$0.00		Once pond is dewater, on-site CCR material will be used as fill to achieve approved elev. (64,069 yd3)
1.0.2	Construct sump and install pump(s) for perpetual pumping	1	Lump Sum	\$112,500.00	\$112,500.00		Est. lump sum to dewater pond area (19.8 acres) 2016 RS Means, assume 3 months to dewater (\$1250/day)
1.0.3	Other: Provide design and itemize	6000	CU. YD.	\$4.75	\$28,500.00		Excavation of drainage area in Bottom Ash Area 1. Assuming excavation to depth of 4' and width of 20', drainage channel is approximately 2,000' long. Excavated material will be placed in Bottom Ash Pond.
1.0.4	Preparing Site for Construction of Final Cover Subtotal					\$141,000.00	
2.0.0	FINAL COVER						
2.0.1	Low Permeability Soil Layer						
2.0.2	Complete soil contouring and grading for final cover	54.3	ACRE	\$2,000.00	\$108,600.00		Grade and prepare Bottom Ash Area 1 for final cap placement .
2.0.3	Clay, On-Site (excavate, transport, place, compact) (Quantity must match earthwork balance and must be guaranteed for future availability)	126,929	CU. YD.	\$4.75	\$602,912.75		18" layer of final cover for Bottom Ash Area 1 (52.5 acres); assuming \$2.25 per cubic yard for placement and compaction plus \$2.50 per cubic yard for excavation and transportation for total unit cost of \$4.75 per cubic yard
2.0.4	Clay, Off-site (excavate, transport, place, compact) (Quantity must match earthwork balance)		CU. YD.		\$0.00		NA - All protective soil will be available on site
2.0.5	Low Permeability Soil Layer Subtotal					\$711,512.75	
3.0.0	Geomembrane and Drainage Layer						
3.0.1	Drainage material--sand		CU. YD.		\$0.00		NA
3.0.2	Drainage material--geogrid		SQ. YD.		\$0.00		NA
3.0.3	Geomembrane		SQ. YD.		\$0.00		NA
3.0.4	Geomembrane and Drainage Layer Subtotal					\$0.00	
4.0.0	Protective Soil and Vegetative Layer						
4.0.1	Protective Soil, On-site (excavate, transport, place, compact) (Quantity must match earthwork balance and must be guaranteed for future availability)	0	CU. YD.	\$5.75	\$0.00		
4.0.2	Protective Soil, Off-site (excavate, transport, place, compact) (Quantity must match earthwork balance)		CU. YD.		\$0.00		NA - All protective soil will be available on site

4.0.3	Vegetative Soil (Topsoil), On-site (excavate, transport, place) (Quantity must match earthwork balance and must be guaranteed for future availability)	42,310	CU. YD.	\$4.75	\$200,972.50		6" of erosion/ vegetative layer for Bottom Ash Area 1 (52.5 acres); assuming \$2.25 per cubic yard for placement and compaction plus \$2.50 per cubic yard for excavation and transportation for total unit cost of \$4.75 per cubic yard
4.0.4	Vegetative Soil (Topsoil), Off-site (excavate, transport, place) (Quantity must match earthwork balance)		CU. YD.		\$0.00		NA
4.0.5	Seeding and mulching	54.3	ACRE	\$1,200.00	\$65,160.00		Area disturbed from new placement of final cover (52.5 acres) and drainage excavation/ rip rap ditching (1.8 acres)
4.0.6	Fertilizer	54.3	ACRE	\$272.00	\$14,769.60		Fertilize reseeded area
4.0.7	Protective Soil and Vegetative Layer Subtotal					\$280,902.10	
5.0.0	EROSION CONTROL						
5.0.1	Terraces and letdowns		Lin. FT.		\$0.00		NA
5.0.2	Checkdams and filters	12200	Lin. FT.	\$1.00	\$12,200.00		Silt fence to minimize sediment loss from disturbed area and borrow area.
5.0.3	Grass ditching/channels	3820	Lin. FT.	\$7.33	\$28,000.60		3820 linear ft of drainage channels required as part of restored conditions, 2016 RS means \$7.33/ft
5.0.4	Riprap ditching/channels	0	CU. YD.	\$19.20	\$0.00		
5.0.5	Erosion Control Subtotal					\$40,200.60	
6.0.0	GAS SYSTEM						
6.0.1	Gas vents, _____ # of vents, _____ average depth		Lin. FT.		\$0.00		NA
6.0.2	Passive System						
6.0.3	Passive well head flare		EACH		\$0.00		NA
6.0.4	Active System						
6.0.5	Flare, _____ BTU/hour		EACH		\$0.00		NA
6.0.6	Additional Well Installation		EACH		\$0.00		NA
6.0.7	Ancillary gas equipment (piping, blowers, condensate collection)	1	Lump Sum		\$0.00		NA
6.0.8	Gas System Subtotal					\$0.00	
7.0.0	GROUNDWATER MONITORING SYSTEM (applies to municipal solid waste, industrial, and some construction & demolition landfills; see instructions)						
7.0.1	Well installation		EACH		\$0.00		NA - to be addressed in Post-Closure Plan
7.0.2	Abandon & plug wells		EACH		\$0.00		NA
7.0.3	Upgrade or repair existing wells		EACH		\$0.00		NA
7.0.4	Dedicated pump/sampling system installation/upgrade		EACH		\$0.00		NA
7.0.5	Sample collection (2 events per year, <u>4</u> wells sampled per event)		EVENT		\$0.00		NA
7.0.6	Sample analysis and reporting (2 events per year, <u>4</u> wells sampled per event))		EVENT		\$0.00		NA
7.0.7	Groundwater Monitoring System Subtotal					\$0.00	
8.0.0	LEACHATE COLLECTION SYSTEM						
8.0.1	Additional/upgrades for collection piping		Lin. FT		\$0.00		NA
8.0.2	Additional/upgrades to pumps		EACH		\$0.00		NA
8.0.3	Additional/upgrades to storage containers		EACH		\$0.00		NA
8.0.4	Baseline sample collection		EACH		\$0.00		NA
8.0.5	Baseline sample analysis and reporting		EACH		\$0.00		NA
8.0.6	Leachate Collection System Subtotal					\$0.00	
9.0.0	OPERATIONS AND INVENTORY REMOVAL						
9.0.1	Excess solid waste		CU. YD.		\$0.00		NA
9.0.2	Mobile equipment/machinery (e.g., containers, tanks, etc...)	1	Lump Sum		\$0.00		NA
9.0.3	Stored leachate		GAL.		\$0.00		NA
9.0.4	Contaminated soils		CU. YD.		\$0.00		NA
9.0.5	Operations and Inventory Removal Subtotal					\$0.00	
10.0.0	DEMOLITION/REMOVAL SITE IMPROVEMENTS						
10.0.1	Office/shop/maintenance and other ancillary buildings	1	Lump Sum		\$0.00		NA

10.0.2	Equipment to be decommissioned (e.g., weigh scales, bulking/solidification pits, collection pits/sumps, piping, etc...)	1	Lump Sum		\$0.00		NA
10.0.3	Site Utilities	1	Lump Sum		\$0.00		NA
10.0.4	Demolition/Removal Site Improvements Subtotal					\$0.00	
11.0.0	REPLACE/REBUILD SITE ACCESS CONTROLS						
11.0.1	Fencing		Lin. FT.		\$0.00		NA
11.0.2	Gates		EACH		\$0.00		NA
11.0.3	Access barriers		EACH		\$0.00		NA
11.0.4	Other security equipment	1	Lump Sum		\$0.00		NA
11.0.5	Replace/Rebuild Site Access Controls Subtotal					\$0.00	
12.0.0	BORROW AREA RECLAMATION						
12.0.1	Grading and site preparation	6	ACRE	\$2,000.00	\$12,000.00		Assume 20' of excavation, required area for borrow material is approximately 6 acres
12.0.2	Soil, On-site (excavate, transport, place, compact)		CU.YD.		\$0.00		NA
12.0.3	Soil, Off-site (excavate, transport, place, compact)		CU. YD.		\$0.00		NA
12.0.4	Seeding and mulching	6	ACRE	\$1,200.00	\$7,200.00		Area disturbed from material excavation, 2016 RS Means
12.0.5	Fertilizer	6	ACRE	\$272.00	\$1,632.00		Fertilize reseeded area, 2016 RS Means
12.0.6	Borrow Area Reclamation Subtotal					\$20,832.00	
13.0.0	Closure Cost Subtotal					\$1,194,447.45	
14.0.0	PROFESSIONAL SERVICES [Closure cost subtotal (13.0.0) X 12% or enter costs provided by third party with sources listed in line items below]						
14.0.1	Professional Services (12% of Closure Cost Subtotal)				\$143,333.69		
14.0.2	Topographic and Boundary Survey	1	Lump Sum	\$52,500.00	\$52,500.00		Topo survey of final cover placement area; assuming \$1000 per acre for 52.5 acres in Bottom Ash Area 1, 2016 RS Means
14.0.3	Engineering (Design, Bid Documents, Procurement, Construction Contract Management)	1	Lump Sum		\$0.00		
14.0.4	Engineering Services, (Construction Oversight, Testing, Reporting, Certification)	1	Lump Sum		\$0.00		
14.0.5	Professional Services Subtotal					\$195,833.69	
15.0.0	ADMINISTRATION AND CONTINGENCY						
15.0.1	Administration Services (Closure Cost Subtotal [13.0.0] x 10%)				\$119,444.75		
15.0.2	Contingency (Closure Cost Subtotal [13.0.0] x 20%)				\$238,889.49		20% Contingency Cost
15.0.3	Administration and Contingency Subtotal					\$358,334.24	
(2016) TOTAL CURRENT CLOSURE COST						\$1,748,615.38	
(2017) TOTAL CURRENT CLOSURE COST						\$1,801,073.84	2016 Total Closure Cost plus 3% per KDHE Guidance

Estimator: Michelle Spruth on behalf of CB&I for Westar Energy
(Printed Name)

(Signature)

Date: _____