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April 13, 2018

Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402

Closure and Post Closure Plan
Sluice Trench and Area East of Sluice Trench
EPA Final CCR Rule
TVA Kingston Fossil Plant
Harriman, Tennessee

1.0 PURPOSE

This letter documents AECOM's certification of the closure and post-closure plan for the TVA Kingston Fossil Plant's Sluice Trench and Area East of the Sluice Trench.

2.0 CLOSURE AND POST-CLOSURE PLAN

The Closure Plan describes the steps necessary to close the Sluice Trench and Area East of the Sluice Trench at any time during the life of the Sluice Trench and Area East of the Sluice Trench, and is subject to the requirements described in 40 CFR §257.102(b). The Post-Closure Plan describes the monitoring and maintenance activities to be performed during the post-closure period of the Sluice Trench and Area East of the Sluice Trench, and is subject to the requirements of 40 CFR §257.104(d).

3.0 SUMMARY OF FINDINGS

The attached closure and post-closure plan demonstrates compliance with the requirements set forth in 40 CFR §§ 257.102(b) and 257.104(d).

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4.0 CERTIFICATION

I, Thomas A. Kovacic PE, being a Professional Engineer in good standing in the State of Tennessee, do hereby certify, to the best of my knowledge, information, and belief:

1. that the information contained in this certification is prepared in accordance with the accepted practice of engineering;

2. that the information contained herein is accurate as of the date of my signature below;

3. that the closure plan for the TVA Kingston Fossil Plant's Sluice Trench and Area East of the Sluice Trench meet(s) the requirements described in 40 CFR 257.102(b) and

4. that the post-closure plan for the TVA Kingston Fossil Plant's Sluice Trench and Area East of the Sluice Trench meet(s) the requirements of 40 CFR 257.104(d).

SIGNATURE _____ DATE 4/13/18

ADDRESS: AECOM
1300 E. 9th Street, Suite 500,
Cleveland, OH 44114

TELEPHONE: (216)-622-2300

ATTACHMENTS: Closure (40 CFR 257.102(b)(1)) and Post-Closure Plan (40 CFR 257.104(d)(1)) for Coal Combustion Residuals (CCR)

COAL COMBUSTION PRODUCT DISPOSAL PROGRAM

Tennessee Valley Authority – Kingston Fossil Plant (KIF)
Sluice Trench and Area East of Sluice Trench
Roane County, Tennessee

CLOSURE (40 CFR 257.102(b)(1)) AND POST-CLOSURE PLAN (40 CFR 257.104(d)(1)) FOR COAL COMBUSTION RESIDUALS (CCR) INACTIVE SURFACE IMPOUNDMENT

Prepared for

Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402-2801

April 13, 2018

Prepared by

AECOM

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1.0 Introduction

This Coal Combustion Residual (CCR) Rule closure and post-closure plan is conceptual and is subject to the completion of all necessary environmental reviews. It describes the CCR closure and post-closure activities at TVA Kingston Fossil Plant (KIF) to demonstrate that the Sluice Trench is closed, the Area East of the Sluice Trench will be closed, and the entire area will be maintained in accordance with the CCR closure and post-closure requirements of 40 CFR § 257.102 and 104, respectively.

2.0 Written Closure Plan - 40 CFR § 257.102(b)(1)

40 CFR § 257.102(b)(1). *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 of how the CCR unit will be closed in accordance with this section.

(ii) If closure of the CCR unit will be accomplished through the 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 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.

(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 and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phase of CCR surface impoundment closure, or installation of the final cover system, and the estimate timeframes to complete each step or phase of CCR unit closure.*

2.1 Closure Activities- § 257.102(b)(1)(i)

The KIF Sluice Trench was closed in place. See **Exhibit 1** in **Appendix A** for the KIF Sluice Trench Closure Schematics. Closure activities included, but were not limited to, subgrade preparation, excavation, onsite disposal of excavated material, placement of structural fill, and site remediation.

Final Closure of the Sluice Trench included the following general tasks:

- Site preparation and by-pass construction,
- Over-excavation 10-ft outside the limits of the known Sluice Trench footprint,
- Sluice Trench grading,
- Final cover system placement, and
- Site grading and installation of erosion control layer.

The Area East of the Sluice Trench will be closed and capped in accordance with the requirements specified in 40 CFR § 257.100. Closure activities will included, but are not limited to, subgrade preparation, excavation, placement of structural fill, and site remediation.

Final Closure of the Area East of the Sluice Trench will include but may not be limited to the following general tasks:

- Site preparation
- Area East of the Sluice Trench grading,
- Final cover system placement, and
- Site grading and installation of erosion control layer.

2.2 Closure Type/Closure in Place - § 257.102(b)(1)(iii)

The closure of the Sluice Trench was accomplished by closure in-place. The final cover systems and closure design elements meet the CCR closure in-place performance standards described in **Section 2.8**.

The closure of the Area East of the Sluice Trench will be accomplished by closure in-place. The final cover system and closure design elements will meet the CCR closure in-place performance standards described in **Section 2.8**.

2.3 Maximum CCR Inventory - § 257.102(b)(1)(iv)

The estimated maximum inventory of CCR ever on-site for the Sluice Trench was approximately 15,000 cubic yards (CY) of accumulated solids. As of October 14, 2015, TVA began managing bottom ash from the plant by sluicing it to a series of freestanding tanks.

The estimated maximum inventory of CCR ever on-site for the Area East of the Sluice Trench was approximately 742,000 cubic yards (CY) of accumulated solids.

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

The estimated largest area requiring a final cover of the Sluice Trench is approximately 5 acres.

2.5 Schedule of Closure Activities - § 257.102(b)(1)(vi)

The following sequential steps were necessary for completing the closure activities for the Sluice Trench in accordance with 40 CFR § 257.102 and their completion dates are provided in **Table 1: Schedule of Sluice Trench Closure Activities**.

Table 1: Schedule of Sluice Trench Closure Activities

	Closure Activity	Closure Timeline
1.	Preliminary Planning, Design, and Regulatory Agency Permitting	2015- May 2016
2.	Site Preparation and By-Pass Construction	May 2016
3.	Sluice Trench Grading	September 2016
4.	Final Cover System Placement	April 2017
5.	Site Grading and Installation of Erosion Control Layer	September 2017

The following sequential steps will be necessary for completing the closure activities for the Area East of the Sluice Trench in accordance with 40 CFR § 257.102 and their completion dates are provided in **Table 2: Schedule of Area East of the Sluice Trench Closure Activities**.

Table 2: Schedule of Area East of the Sluice Trench Closure Activities

	Closure Activity	Closure Timeline
1.	Preliminary Planning, Design, and Regulatory Agency Permitting	June 2018
2.	Site Preparation and By-Pass Construction	August 2018
3.	Sluice Trench Grading	September 2018
4.	Final Cover System Placement	October 2018
5.	Site Grading and Installation of Erosion Control Layer	October 2018

2.6 Estimated Year of Closure Completion- § 257.102(b)(1)(vi)

The closure of the KIF Sluice Trench was completed in September 2017.

The closure design of the Area East of the Sluice Trench are currently underway, closure construction is planned to be completed by October 17, 2018.

2.7 Request for Time Extension

The KIF Sluice Trench closure was completed within the specified time frame and will not require a time extension.

If it is estimated that the time required to complete closure of the Area East of the Sluice Trench will exceed the regulatory timeframes, a demonstration for a time extension under 257.102(f)(2)(i) will be prepared and placed in the operating record. This request will include site-specific information, factors and consideration will be provided to support any time extensions.

2.8 Performance Standards: CCR Closure In-Place - 40 CFR §257.102(d)(1)

40 CFR § 257.102(d)(1). *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 to 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 the closure and post-closure care 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.

2.8.1 Control of Infiltration and Releases - § 257.102(d)(1)(i)

TVA will 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, through the following measures:

1) Installation of a final cover system that minimizes infiltration. Design specifications of the final cover system are described in **Section 2.10.2**.
2) Using appropriate erosion and sediment control.
3) Surface grading described in **Section 2.8.2.**

2.8.2 Prevention of Future Impoundment of Water, Sediment, or Slurry - §257.102(d)(1)(ii)

TVA will preclude the probability of future impoundment of water, sediment, or slurry within the Sluice Trench through the following measures:

1) Final Cover System: The final cover system was designed to minimize post-closure infiltration. The cover system will provide positive separation between the Non-CCR Process Water Basin and the CCR unit preventing percolation, the buildup of hydraulic pressure, and reducing infiltration. See **Section 2.10.1**.
2) Surface Grading: The final cover grading of the Sluice Trench outside of the Non-CCR Process Water Basin is designed to promote the conveyance of stormwater off the surface of the impoundment cap. This is accomplished by use of 0.2 to 0.4% grades. The final cap system of the Sluice Trench was graded to the subgrade elevation of the Non-CCR Process Water Basin that was built above the area of closure.
3) Stormwater: Stormwater was temporarily diverted during closure of the Sluice Trench through the By-Pass Ditch and discharge into Ditch 11.

TVA will preclude the probability of future impoundment of water, sediment, or slurry within the Area East of the Sluice Trench through the following measures:

1) Final Cover System: The final cover system will be designed to minimize post-closure infiltration. See **Section 2.10.1**.
2) Surface Grading: The final cover grading of the Area East of the Sluice Trench will be designed to promote the conveyance of stormwater off the surface of the impoundment cap.

2.8.3 Slope Stability Measures - § 257.102(d)(1)(iii)

TVA will include measures that reduce risk of sloughing or movement of the final cover system during the closure and post-closure period, including:

1) The impoundment will be decanted sufficiently to remove free liquids.
2) Stabilization of the subgrade will be performed utilizing aggregate to provide a stable and competent base for the construction of the final cover system prior to final cover installation.

2.8.4 CCR Unit Maintenance - § 257.102(d)(1)(iv)

TVA designed and constructed the final system to minimize the need for further maintenance of the Sluice Trench. The area encompassing the Sluice Trench consisted of two separate cap systems that will require minimal maintenance.

TVA will design and construct the final system to minimize the need for further maintenance of the Area East of the Sluice Trench. The Area encompassing the Area East of the Sluice Trench will consist of a cap system that meets the requirements of 40 CFR § 257.100 that will require minimal maintenance.

2.8.5 Completion of Closure - § 257.102(d)(1)(v)

Closure of the Sluice Trench was completed in the shortest amount of time practical, consistent with recognized and generally accepted engineering practices.

Closure of the Area East of the Sluice Trench will be completed in the shortest amount of time practical, consistent with recognized and generally accepted engineering practices.

2.9 Drainage and Stabilization of Surface Impoundments - § 257.102(d)(2)

40 CFR § 257.102(d)(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) Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residues.

(ii) Remaining wastes must be stabilized sufficient to support the final cover system.

2.9.1 Drainage and Stabilization Measure - § 257.102(d)(2)

Prior to installation of a final cover system to a CCR surface impoundment:

- Free liquids will be/were eliminated by removal or by-passing the closure drainage area through the constructed by-pass ditch; and
- Remaining wastes will be/were stabilized sufficient to support the final cover system.

2.10 Final Cover System Design (or Alternative) - § 257.102(d)(3)

40 CFR § 257.102(d)(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 closed 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.

(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 (d)(3)(ii)(A) through (C) 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 design of the final cover system must include an infiltration layer that provides an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (d)(3)(i)(A) and (B) of this section.

(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.

(C) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

2.10.1 Final Cover System Design Standards - § 257.102(d)(3)(i)

Two alternative final cover systems were utilized for the closure of the Sluice Trench. Additional information on the alternative final cover systems utilized during the Sluice Trench closure are included in section 2.10.2.

A final cover system will be utilized for the closure of the Area East of the Sluice Trench. This cover system will be designed in accordance with 40 CFR § 257.102(d)(3).

2.10.2 Alternative Final Cover System Design - § 257.102(d)(3)(ii)

Two alternative final cover systems were used for the closure of the Sluice Trench. The final cover system constructed outside the Non-CCR Process Water Basin limits consists of

structural fill and the regrading of the existing Sluice Trench (Figure 1). Both alternative cover systems meet the requirements of 40 CFR § 257.102(d)(3)(ii).

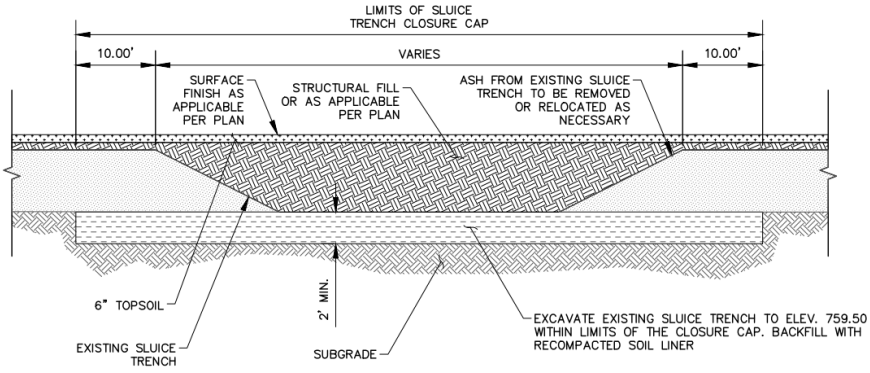


Figure 1. Existing Sluice Trench Closure Cap outside the Non-CCR Process Water Basin Limit

Figure 2 provides an illustration of Final Cover of the Sluice Trench within the Non-CCR Process Water Basin footprint.

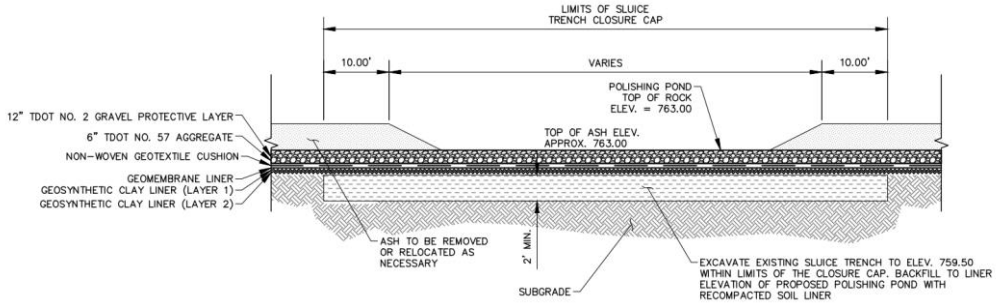


Figure 2: Existing Sluice Trench Closure Cap within the Non-CCR Process Water Basin Limit

2.10.3 Methods and Procedures for Installation of Final Cover - § 257.102(b)(1)(iii)

As required by 40 CFR § 257.102(b)(1)(iii), the following methods and procedures were used in the installation of the final cover for the Sluice Trench.

After the completion of decanting, drying, and placement of structural fill, the existing subgrade was graded and compacted to provide a stable and competent base for the placement of the final cover system in the Sluice Trench and Area East of the Sluice Trench. CCR materials within the footprint of the Sluice Trench and extending 10 feet in all directions were removed as part of closure construction.

Upon reaching design subgrades of the Non-CCR Process Water Basin, the final cover system of the Sluice Trench was installed. The final grades can be found in **Exhibit 1** located in **Appendix A**.

A final cover system will be utilized and installed for the closure of the Area East of the Sluice Trench. This cover system will be designed in accordance with 40 CFR § 257.102(d)(3) and installed in accordance with the requirements of 40 CFR § 257.102(b)(1)(iii).

2.10.4 Professional Engineer Certification - § 257.102(d)(3)(iii)

40 CFR § 257.102(d)(3)(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.*

A professional engineer will provide a written certification stating that the design of the final cover system for the Area East of the Sluice Trench meets the requirements of 40 CFR 257.102. The certification for the Sluice Trench is included in the facility's Notification of Intent to Close the Sluice Trench, as per 40 CFR 257.102(g).

3.0 Written Post-Closure Plan - 40 CFR § 257.104(d)(1)

40 CFR § 257.104(d)(1). *Written Post-Closure Care Plan. (1) Content of the plan. The owner or operator of a CCR unit must prepare a written post-closure plan that includes at a minimum, the information specified in paragraph (d)(1)(i) through (iii) of this section.*

(i) A description of the monitoring and maintenance activities required in paragraph (b) of this section for the CCR unit, and the frequency at which these activities will be performed;

(ii) The name, address, telephone number, and email address of the person or office to contact about the facility during the post-closure care period;

(iii) A description of the planned uses of the property during the post-closure period. Post-closure use of the property shall not disturb the integrity of the final cover, liner(s), or any other component of the containment system, or the function of the monitoring system unless necessary to comply with the requirements in this subpart. Any other disturbance is allowed if the owner or operator of the CCR unit demonstrates that disturbance of the final cover, liner, or other component of the containment system, including any removal of CCR, will not increase the potential threat to human health or the environment. The demonstration must be certified by a qualified professional engineer, and notification shall be provided to the State Director that the demonstration has been placed in the operating record and on the owner's or operator's publicly accessible internet site.

3.1 Monitoring and Maintenance Activities - § 257.104(d)(1)(i)

40 CFR § 257.104(b). *Post-closure care maintenance requirements. Following closure of the CCR unit, the owner or operator must conduct post-closure care for the CCR unit, which must consist of at least the following:*

(1) Maintaining the integrity and effectiveness of the final cover system, including making repairs to the final cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover;

(2) If the CCR unit is subject to the design criteria under 40 CFR §257.70, maintaining the integrity and effectiveness of the leachate collection and removal system and operating the leachate collection and removal system in accordance with the requirements of 40 CFR §257.70; and

(3) Maintaining the groundwater monitoring system and monitoring the groundwater in accordance with the requirements of 40 CFR § 257.90 through § 257.98.

In accordance with 40 CFR § 257.104(d)(1)(i), post-closure care for the closed Sluice Trench and Area East of the Sluice Trench will address the following systems as required under 40 CFR § 257.104(b), along with the frequencies for the identified monitoring and maintenance activities:

- Facility Wide Monitoring
- Final cover system

3.1.1 Final Cover System - § 257.104(b)(1)

TVA will maintain the integrity and effectiveness of the final cover systems, and make repairs as necessary to correct the effects of settlement, subsidence, erosion, and other events, and prevent run-on and run-off from eroding or otherwise damaging the final covers. The final cover systems will be maintained by inspection and corrective measures in accordance with 40 CFR § 257.104.

3.1.2 Leachate Collection and Removal System - § 257.104(b)(2)

No leachate collection and removal system is associated with the closure of the Sluice Trench and the Area East of the Sluice Trench.

3.1.3 Groundwater Monitoring System - § 257.104(b)(3).

No groundwater monitoring system is associated with the closure of the Sluice Trench and Area East of the Sluice Trench.

All existing monitoring devices, including groundwater wells, will be maintained throughout the active life and post-closure period of the Sluice Trench and Area East of the Sluice Trench.

3.2 Contact Information - § 257.104(d)(1)(ii)

The following contact information is provided for the Kingston Fossil Plant for the post-closure period:

Owner: Tennessee Valley Authority, as agent for the United States of America

Contact: Civil Projects & CCP Management, Strategy and Engineering
1101 Market Street
Chattanooga, TN 37402-2801

Phone: 844-342-0012

Email: tvainfo@tva.com

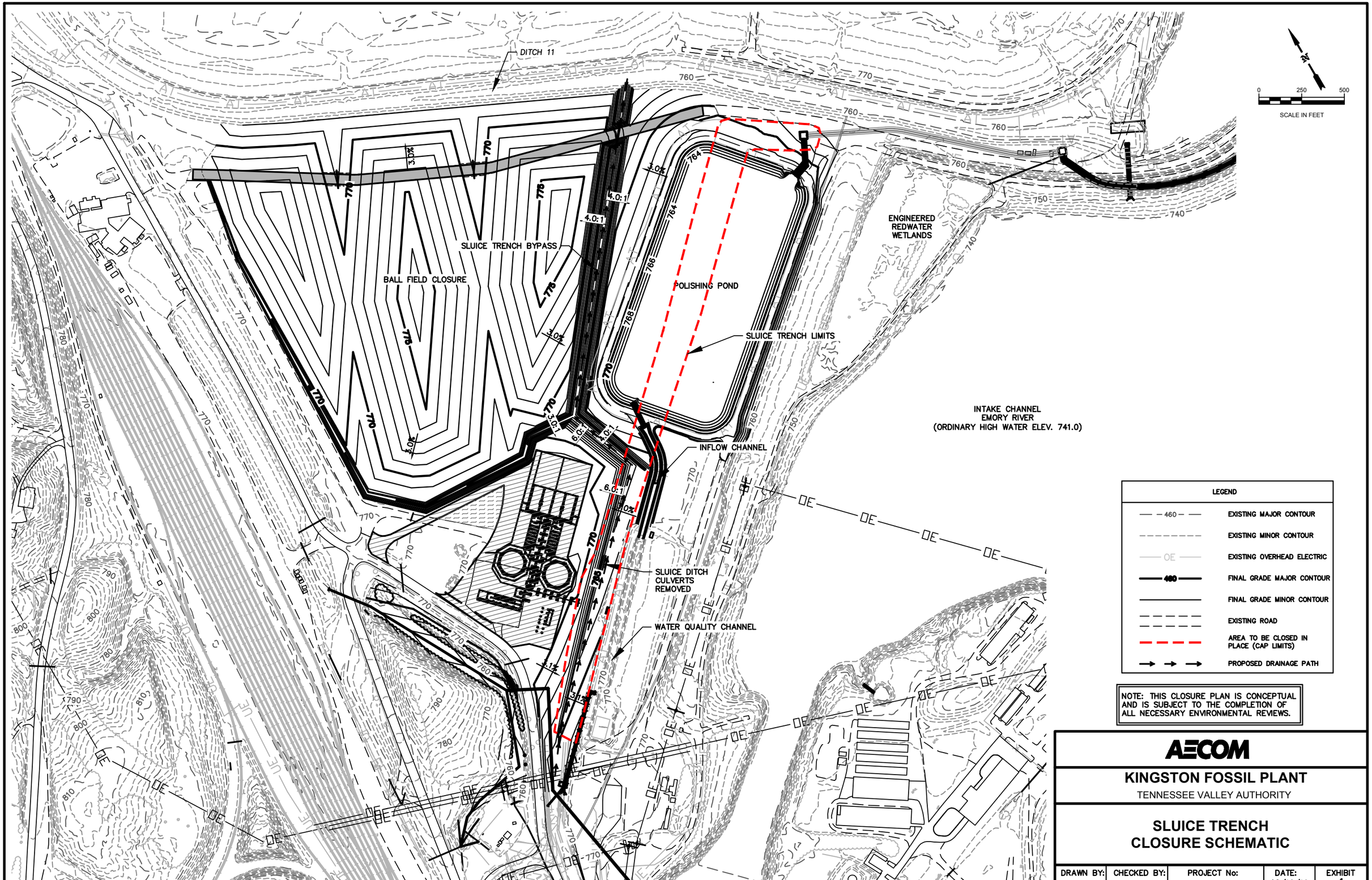
3.3 Planned Uses - § 257.104(d)(1)(iii)

Since closure, portions of the Sluice Trench are now utilized as the subgrade of the Non-CCR Process Water Basin.

Post-closure use of the property will not disturb the integrity of the final cover, liner(s), or any other component of the containment system, the function of the monitoring systems, or the Non-CCR Process Water Basin unless necessary to comply with the requirements of the CCR Rule under 40 CFR Part § 257.

Any other disturbance is allowed if the owner or operator of the CCR unit demonstrates that disturbance of the final cover, liner, or other component of the containment system, including any removal of CCR, will not increase the potential threat to human health or the environment. The demonstration must be certified by a qualified professional engineer, and notification shall be provided to the State Director that the demonstration has been placed in the operating record and on the owner's or operator's publicly accessible internet site.

APPENDIX A



NOTE: THIS CLOSURE PLAN IS CONCEPTUAL AND IS SUBJECT TO THE COMPLETION OF ALL NECESSARY ENVIRONMENTAL REVIEWS.

AECOM

KINGSTON FOSSIL PLANT

TENNESSEE VALLEY AUTHORITY

SLUICE TRENCH CLOSURE SCHEMATIC

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	EXHIBIT
APM	CAB		08/12/16	1