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October 12, 2016

Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402

Existing Liner Assessment
Peabody Ash Pond
EPA Final CCR Rule
TVA Paradise Fossil Plant
Drakesborow, Kentucky

1.0 PURPOSE

This letter documents AECOM's certification of the existing liner assessment for the TVA Paradise Fossil Plant's Peabody Ash Pond.

2.0 EXISTING LINER ASSESSMENT

As required in 40 CFR 257.71, an existing surface impoundment must be evaluated as to whether or not it was constructed with a liner as described in 40 CFR 257.71(a)(1)(i)-(iii).

3.0 SUMMARY OF FINDINGS

The attached report presents the analysis for the existing liner assessment. Based on the assessment, there is insufficient data to support the Peabody Ash Pond being constructed with a liner that meets the requirements in the Final CCR Rule at 40 CFR 257.71(a)(1). Following the review of historical subsurface information on the Peabody Ash Pond impoundment, it was determained that any underlying clayey soil layers do not meet EPA's interpretation of a mechanically place soil liner. Additional information regarding these soils is described in the attached report.

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AECOM

4.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Nicholas S Golden PE, being a Professional Engineer in good standing in the State of Kentucky, 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; and

3. that the TVA Paradise Fossil Plant's Peabody Ash Pond was not constructed with a liner system as described in 40 CFR 257.71(a)(1).

SIGNATURE _____ DATE 10/12/16

ADDRESS: AECOM
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ATTACHMENTS: Liner Design Demonstration 40 CFR §257.71 for Coal Combustion Residuals (CCR)

COAL COMBUSTION PRODUCT DISPOSAL PROGRAM

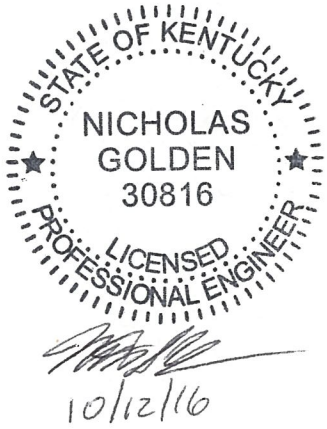
TENNESSEE VALLEY AUTHORITY – PEABODY ASH POND
DRAKESBORO, KENTUCKY

LINER DESIGN DEMONSTRATION (40 CFR §257.71) FOR COAL COMBUSTION RESIDUALS (CCR)

EXISTING SURFACE IMPOUNDMENTS - PARADISE FOSSIL PLANT

Prepared for

TVA



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1101 Market Street
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October 12, 2016

Prepared by

AECOM

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APPENDICES

1.0 BACKGROUND

1.1 INTRODUCTION

On April 17, 2015 the Disposal of Coal Combustion Residuals (CCR) from Electric Utilities (EPA Final CCR Rule) was published in the Federal Register. AECOM was contracted by the Tennessee Valley Authority (TVA) to demonstrate liner design criteria for the Paradise Fossil Plant (PAF) Peabody Ash Pond, which is an existing CCR surface impoundment, and evaluate compliance relative to §257.71 of the EPA Final CCR Rule.

The PAF facility is located at 13246 Kentucky 176 in Muhlenberg County, Kentucky on the west bank of the Green River, approximately five miles northeast of the center of the City of Drakesboro. The property occupies approximately 3,400 acres of land. The Peabody Ash Pond, which is an existing CCR surface impoundment, manages fly ash and wastewater flows from the plant.

1.2 OBJECTIVE

The objective of this demonstration is to evaluate compliance related to §257.71, specifically whether Peabody Ash Pond was constructed with one of the following:

- A liner consisting of a minimum of two feet of compacted soil with a hydraulic conductivity of no greater than 1×10^{-7} cm/sec;
- A composite liner that meets the requirements of § 257.70(b); or
- An alternative composite liner that meets the requirements of § 257.70(c).

The Rule was clarified by the EPA during a presentation on April 15, 2015 titled, "Top 20 Questions on EPA's CCR Final Rule". First, an existing natural clay layer, regardless of its hydraulic conductivity, does not meet the Rule as an acceptable clay liner. Second, "compacted soil" means soil that is mechanically compacted in lifts.

1.3 SUMMARY OF HISTORICAL INFORMATION

Prior to TVA ownership, the area had been strip mined and reclaimed. Previous mining operations left earth dikes which would later became Peabody Ash Pond's south and east perimeter dikes. These dikes were built with mine spoils to a crest elevation of approximately 400 feet.

After purchasing the land, TVA developed the area for fly ash disposal. In 1997, the existing dikes were raised to an elevation of 408 feet. A divider dike and spillway structures were also constructed at this time, creating the Peabody Stilling Pond. Historical Drawings of the raised dikes and splitter dike are shown in **Appendix A**.

2.0 FIELD INVESTIGATION

Historical geotechnical explorations have revealed that the dikes were constructed with clayey minespoil material and additional clayey minespoil material serves as the foundation beneath the impoundment dikes and the pond itself. This clayey minespoil has variable thickness, rock fragment content, and permeability. Additional field explorations were not performed as part of this evaluation.

3.0 CONCLUSION

Historical construction documents were reviewed in order to evaluate status relative to the EPA Final CCR Rule criteria. Based on our review, the impoundment dikes were constructed using clayey minespoils and the pond is predominately underlain by clayey minespoil. However, Peabody Ash Pond at Paradise Fossil Plant was not constructed with a liner that complies with the requirements of §257.71 of the EPA Final CCR Rule. This unit is therefore an unlined surface impoundment in accordance to the EPA Final CCR Rule and is allowed to remain in operation in compliance with the requirements of §257.101(a).

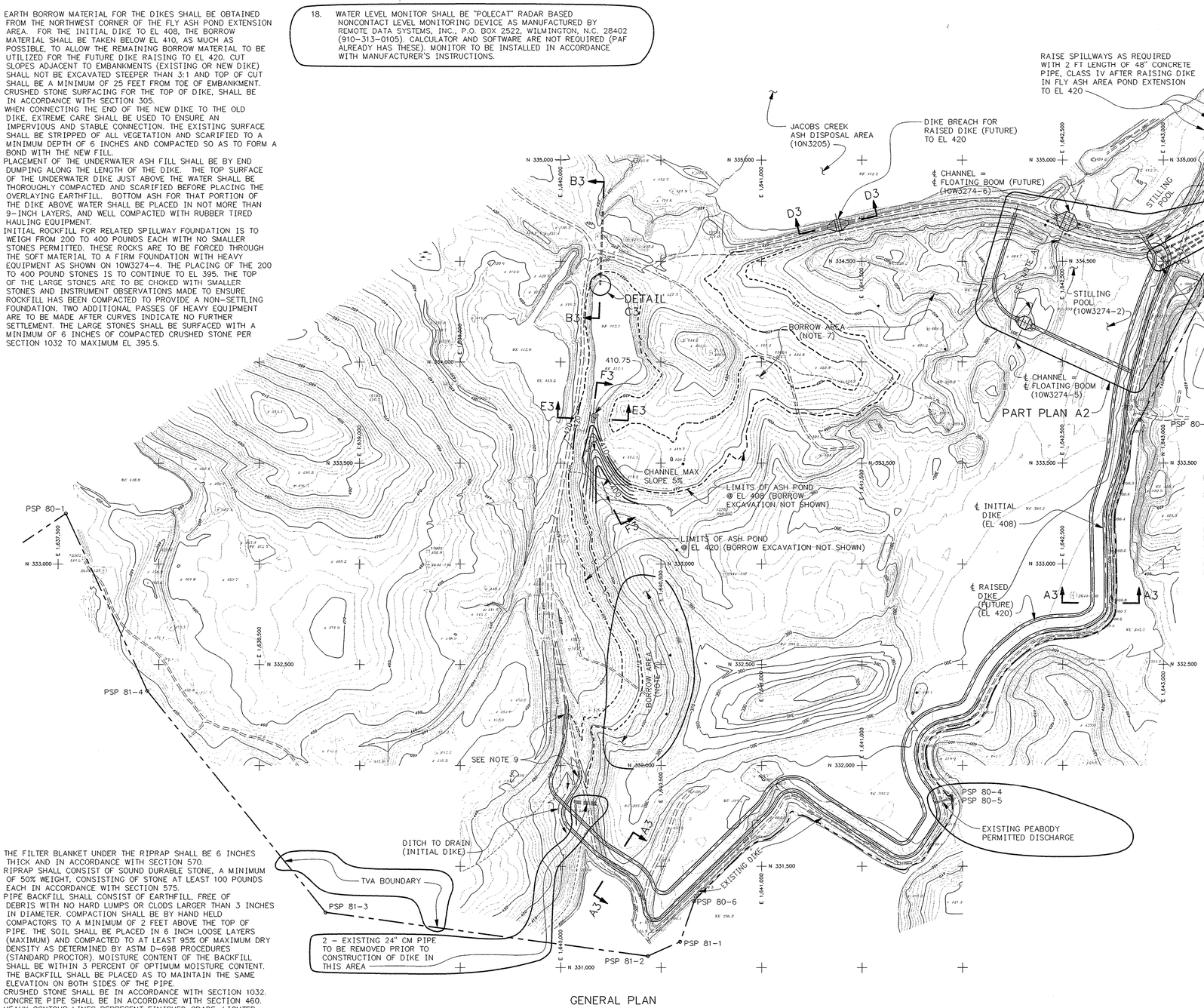
4.0 REFERENCES

AECOM, Safety Factor Assessment §257.73 prepared for CCR Certification, Peabody Ash Pond, 2016.

APPENDIX A – HISTORICAL DRAWINGS

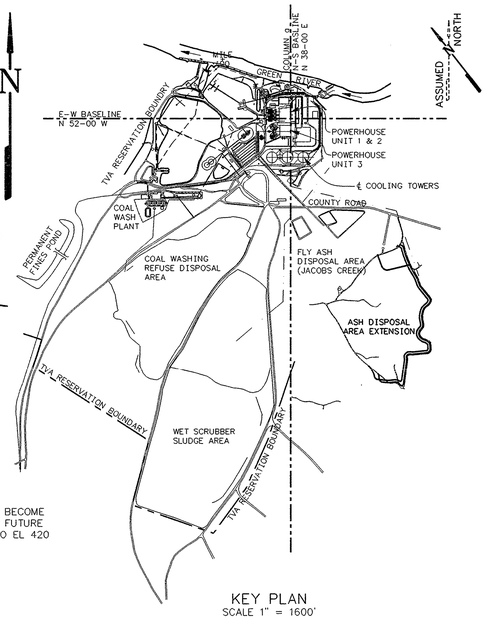
7. EARTH BORROW MATERIAL FOR THE DIKES SHALL BE OBTAINED FROM THE NORTHWEST CORNER OF THE FLY ASH POND EXTENSION AREA. FOR THE INITIAL DIKE TO EL 408, THE BORROW MATERIAL SHALL BE TAKEN BELOW EL 410, AS MUCH AS POSSIBLE, TO ALLOW THE REMAINING BORROW MATERIAL TO BE UTILIZED FOR THE FUTURE DIKE RAISING TO EL 420. CUT SLOPES ADJACENT TO EMBANKMENTS (EXISTING OR NEW DIKE) SHALL NOT BE EXCAVATED STEEPER THAN 3:1 AND TOP OF CUT SHALL BE A MINIMUM OF 25 FEET FROM TOE OF EMBANKMENT.
8. CRUSHED STONE SURFACING FOR THE TOP OF DIKE, SHALL BE IN ACCORDANCE WITH SECTION 305.
9. WHEN CONNECTING THE END OF THE NEW DIKE TO THE OLD DIKE, EXTREME CARE SHALL BE USED TO ENSURE AN IMPERVIOUS AND STABLE CONNECTION. THE EXISTING SURFACE SHALL BE STRIPPED OF ALL VEGETATION AND SCARIFIED TO A MINIMUM DEPTH OF 6 INCHES AND COMPACTED SO AS TO FORM A BOND WITH THE NEW FILL.
10. PLACEMENT OF THE UNDERWATER ASH FILL SHALL BE BY END DUMPING ALONG THE LENGTH OF THE DIKE. THE TOP SURFACE OF THE UNDERWATER DIKE JUST ABOVE THE WATER SHALL BE THOROUGHLY COMPACTED AND SCARIFIED BEFORE PLACING THE OVERLAYING EARTHFILL. BOTTOM ASH FOR THAT PORTION OF THE DIKE ABOVE WATER SHALL BE PLACED IN NOT MORE THAN 9-INCH LAYERS, AND WELL COMPACTED WITH RUBBER TIRED HAULING EQUIPMENT.
11. INITIAL ROCKFILL FOR RELATED SPILLWAY FOUNDATION IS TO WEIGH FROM 200 TO 400 POUNDS EACH WITH NO SMALLER STONES PERMITTED. THESE ROCKS ARE TO BE FORCED THROUGH THE SOFT MATERIAL TO A FIRM FOUNDATION WITH HEAVY EQUIPMENT AS SHOWN ON 10W3274-4. THE PLACING OF THE 200 TO 400 POUND STONES IS TO CONTINUE TO EL 395. THE TOP OF THE LARGE STONES ARE TO BE CHOKED WITH SMALLER STONES AND INSTRUMENT OBSERVATIONS MADE TO ENSURE ROCKFILL HAS BEEN COMPACTED TO PROVIDE A NON-SETTLING FOUNDATION. TWO ADDITIONAL PASSES OF HEAVY EQUIPMENT ARE TO BE MADE AFTER CURVES INDICATE NO FURTHER SETTLEMENT. THE LARGE STONES SHALL BE SURFACED WITH A MINIMUM OF 6 INCHES OF COMPACTED CRUSHED STONE PER SECTION 1032 TO MAXIMUM EL 395.5.

18. WATER LEVEL MONITOR SHALL BE "POLECAT" RADAR BASED NONCONTACT LEVEL MONITORING DEVICE AS MANUFACTURED BY REMOTE DATA SYSTEMS, INC., P.O. BOX 2522, WILMINGTON, N.C. 28402 (910-313-0105). CALCULATOR AND SOFTWARE ARE NOT REQUIRED (PAF ALREADY HAS THESE). MONITOR TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.



GENERAL PLAN

NOTE A:
THE SOUTHERN-MOST FLOATING BOOM WILL BE UTILIZED FOR THE INITIAL DIKE TO EL 408. THE NORTHERN-MOST CHANNEL WILL BE CONSTRUCTED FOR THE FUTURE DIKE RAISING TO EL 420. THE SOUTHERN-MOST CHANNEL WILL BE ABANDONED AND THE FLOATING BOOM SHALL BE REUSED FOR THE NORTHERN-MOST CHANNEL.



KEY PLAN
SCALE 1" = 1600'

NOTES:
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE T-1 SPECIFICATIONS UNLESS OTHERWISE NOTED.
2. DIKE SLOPES SHALL BE SEEDED WITH TYPE 8, MIXTURE 1 FOR FALL PLANTING OR TYPE 6 MIXTURE 1 FOR SPRING PLANTING. GRASSED AREAS ARE TO BE FERTILIZED AND MULCHED IN ACCORDANCE WITH SECTIONS 580 AND 582.
3. EARTHFILL SHALL CONSIST OF SOIL PLACED IN LAYERS WHOSE COMPACTED THICKNESS DOES NOT EXCEED 18 INCHES. EARTHFILL SHALL BE UNIFORMLY COMPACTED WITH A SMOOTH WHEEL VIBRATORY ROLLER TO AT LEAST 95% OF MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-698 PROCEDURES (STANDARD PROCTOR). MOISTURE CONTENT OF THE EARTHFILL SHALL BE WITHIN ±3% OF OPTIMUM MOISTURE CONTENT. NO ROCKS LARGER THAN 10 INCHES IN DIAMETER SHALL BE PLACED WITHIN THE DIKE FILL. IN-PLACE DENSITY TESTS USING THE SAND CONE (ASTM D1556) RUBBER BALLOON (ASTM D2167) OR NUCLEAR (ASTM D2922) TEST METHODS SHALL BE MADE AT A RATE OF AT LEAST ONE TEST PER EACH 5,000 CUBIC YARDS OF EARTH FILL PLACED OR A MINIMUM OF ONE TEST PER DAY THAT EARTH FILL IS PLACED. IF NUCLEAR METHODS ARE USED, SUFFICIENT NUMBERS OF SAND CONE OR RUBBER BALLOON TESTS SHALL BE PERFORMED TO CORRELATE AND VERIFY THE NUCLEAR GAUGE RESULTS.
4. BOTTOM ASH FILL SHALL BE TAKEN FROM THE WASTE STOCKPILE PRODUCED BY REED MINERALS DIVISION OF HARSCO CORPORATION. THE COARSER OF THE TWO GRADES OF WASTE MATERIAL SHALL BE USED FOR FILL.
5. BEFORE PLACING NEW FILL ON EXISTING DIKE, SURFACES SHALL BE STRIPPED OF ALL VEGETATION, CRUSHED STONE, AND LOOSE MATERIAL, SCARIFIED, AND NEW FILL ROLLED TO BOND WITH EXISTING FILL.
6. TOP OF DIKE MUST BE MAINTAINED A MINIMUM OF 4-FOOT ABOVE THE ELEVATION OF THE WATER IN THE ASH DISPOSAL AREA.

12. THE FILTER BLANKET UNDER THE RIPRAP SHALL BE 6 INCHES THICK AND IN ACCORDANCE WITH SECTION 570.
13. RIPRAP SHALL CONSIST OF SOUND DURABLE STONE, A MINIMUM OF 50% WEIGHT, CONSISTING OF STONE AT LEAST 100 POUNDS EACH IN ACCORDANCE WITH SECTION 575.
14. PIPE BACKFILL SHALL CONSIST OF EARTHFILL, FREE OF DEBRIS WITH NO HARD LUMPS OR CLODS LARGER THAN 3 INCHES IN DIAMETER. COMPACTION SHALL BE BY HAND HELD COMPACTORS TO A MINIMUM OF 2 FEET ABOVE THE TOP OF PIPE. THE SOIL SHALL BE PLACED IN 6 INCH LOOSE LAYERS (MAXIMUM) AND COMPACTED TO AT LEAST 95% OF MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-698 PROCEDURES (STANDARD PROCTOR). MOISTURE CONTENT OF THE BACKFILL SHALL BE WITHIN 3 PERCENT OF OPTIMUM MOISTURE CONTENT. THE BACKFILL SHALL BE PLACED AS TO MAINTAIN THE SAME ELEVATION ON BOTH SIDES OF THE PIPE.
15. CRUSHED STONE SHALL BE IN ACCORDANCE WITH SECTION 1032.
16. CONCRETE PIPE SHALL BE IN ACCORDANCE WITH SECTION 460.
17. HEAVY CONTOUR LINES REPRESENT FINISHED GRADE. LIGHTER CONTOUR LINES REPRESENT EXISTING GRADE (TOPOGRAPHIC DATA FROM PHOTOGRAPHY DATED FEBRUARY 22, 1995).

REV NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST
R 1	2-12-97	CMM	MGH	JDP	JLG	KWB	RGJ	WDH	423F	D
ADD TVA BOUNDARY FOR ASH POND EXPANSION; MINOR REVISIONS										
R 0	1-4-96	CLM	MGH	JDP	JLG	KWB	RGJ	WDH	423F	D
INITIAL ISSUE										

SCALE: 1" = 200' EXCEPT AS NOTED

YARD

JACOBS CREEK ASH DISPOSAL AREA EXTENSION GENERAL PLAN

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
C.L. MOUNT	M.G. HRANEK	J.D. PARIS	J.L. GLOVER	K. W. BURNETT	R.G. JOHNSON	W.D. HALL

PARADISE FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R12	DATE 1-4-96	64	C	10W3274-1	R 1

TASK COMPLETED BY: | REV NO.

PLOT FACTOR: 1:200
W_TVA
FILENAME: PF32741.DWG

C.A.D. DRAWING
DO NOT ALTER MANUALLY