Stantec Consulting Services Inc.
3052 Beaumont Centre Circle, Lexington, KY 40513

March 26, 2018
File: rpt_001_let_175655041_Rev_0
Revision 0

Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402

RE: Liner Design Demonstration
Bottom Ash Pond
EPA Final Coal Combustion Residual (CCR) Rule
TVA John Sevier Fossil Plant
Hawkins County, Tennessee

1.0 PURPOSE

This letter documents Stantec's certification of the existing liner assessment for the TVA John Sevier Fossil Plant's Bottom Ash Pond. Based on the assessment, the Bottom Ash Pond is considered an unlined CCR surface impoundment as described in the Final CCR Rule at 40 CFR 257.71(a)(3).

2.0 EXISTING LINER ASSESSMENT

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. The report concludes that the Bottom Ash Pond at the John Sevier Fossil Plant was not constructed with a liner that complies with the requirements of §257.71 of the EPA Final CCR Rule. Therefore, this unit is considered an unlined surface impoundment in accordance to the EPA Final CCR Rule.

4.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Don W. Fuller II, 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; and

RE: Liner Design Demonstration
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TVA John Sevier Fossil Plant
Hawkins County, Tennessee

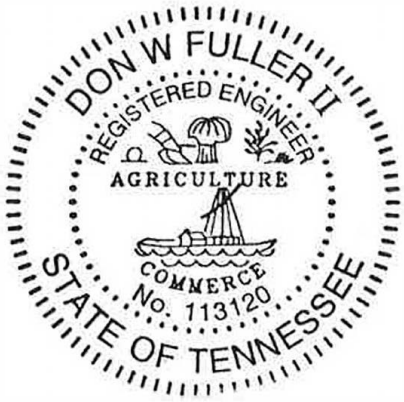
3. that the TVA John Sevier Fossil Plant's Bottom Ash Pond is considered an unlined CCR surface impoundment as described in 40 CFR 257.71(a)(3).

SIGNATURE _____ DATE 03/26/18

ADDRESS: Stantec Consulting Services Inc.
3052 Beaumont Centre Circle
Lexington, KY 40513

TELEPHONE: (859) 422-3000

ATTACHMENTS: JSF Bottom Ash Pond Liner Design Demonstration



Liner Design Demonstration

John Sevier Fossil Plant
Bottom Ash Pond
Hawkins County, Tennessee

Prepared for:
Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:
Stantec Consulting Services Inc.
Lexington, Kentucky

March 26, 2018
Revision 0

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1.0 BACKGROUND

1.1 INTRODUCTION

On April 17, 2015, the Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities (RIN-2050AE81; FRL-9149-4) (EPA Final CCR Rule) was published in the Federal Register. A Direct Final Rule in response to a partial vacatur became effective on October 4, 2016. This revision eliminated the exemption for inactive surface impoundments to meet the same requirements as active surface impoundments. An extended timeline was given to inactive surface impoundments with an NOI that complied with §257.105(i)(1), §257.106(i)(1) and §257.107(i)(1). The Bottom Ash Pond at John Sevier Fossil Plant (JSF) is an Inactive CCR Surface Impoundment as defined by the EPA Final CCR Rule that meets the requirements for an extended timeline under the Direct Final Rule and has completed closure activities. The Tennessee Valley Authority (TVA) contracted Stantec Consulting Services Inc. (Stantec) to determine whether the Bottom Ash Pond at JSF meets the liner design criteria for existing CCR surface impoundments as defined in §257.71 of the Environmental Protection Agency (EPA) Final CCR Rule.

JSF is a former coal-fired, electric generating plant located in Hawkins County, Tennessee, approximately 30 miles west of Kingsport, Tennessee. The plant was constructed along the southern bank of the Holston River in the headwaters of Cherokee Lake. TVA ceased operations at JSF at the end of calendar year 2012 and the facility retired its four coal-combustion generating units as of December 31, 2013.

As part of the Final Closure Project, ash has been removed from the west end of the Bottom Ash Pond and stacked in the east end. An earthen berm was also constructed to serve as the western boundary of the Stacking Area. A geosynthetic cap system was completed in July 2017. This project has reduced the ash footprint within the Bottom Ash Pond facility to approximately 20 acres. The Bottom Ash Pond closure limits are shown as Figure 1.

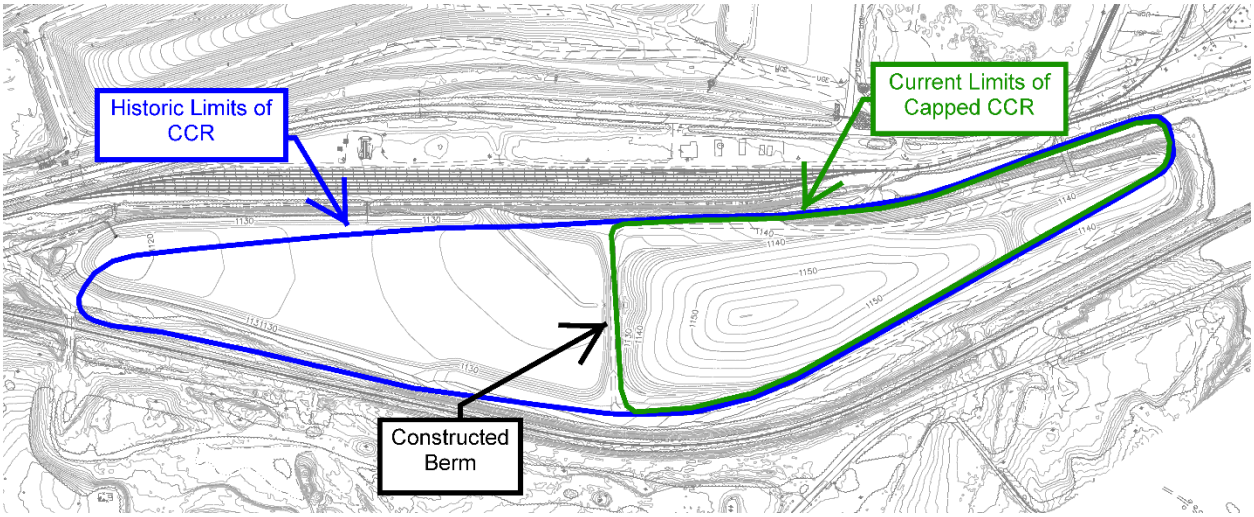

Figure 1. Bottom Ash Pond Limits

1.2 OBJECTIVE

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

- A liner consisting of a minimum of 2 feet of compacted soil with a hydraulic conductivity of no greater than 1 x 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).

Based on the EPA presentation dated April 15, 2015 and titled, "Top 20 Questions on EPA's CCR Final Rule", compacted soil means soil that is *mechanically* compacted in lifts.

1.3 SUMMARY OF HISTORICAL INFORMATION

The Bottom Ash Pond, previously referred to as the Bottom Ash Disposal Area 2, was completed in 1979. The perimeter dike was built to Elevation 1045 feet. The material used was excavated from within the interior of the diked area. The material was reportedly placed in compacted lifts. Applicable Record Drawings are included in Appendix A.

LINER DESIGN DEMONSTRATION

Background
March 26, 2018

The following reports have been reviewed:

- Stantec Consulting Services Inc. 2010. Report of Geotechnical Exploration – Dry Fly Ash Stack, Bottom Ash Disposal Area 2, Ash Disposal Area J. Prepared for Tennessee Valley Authority. February 8, 2010.
- Stantec Consulting Services Inc. 2016. Basis of Design Report – Bottom Ash Pond Final Closure. Prepared for Tennessee Valley Authority. December 22, 2016.

These reports include soil borings drilled along the perimeter dike and interior of the Bottom Ash Pond. Additionally, soil borings were drilled in 2011 to estimate ash volumes for closure purposes. Review of these reports and boring logs could not conclude whether a mechanically compacted clay liner was placed across the extent of the Bottom Ash Pond.

2.0 FIELD EXPLORATION

There have been no additional field explorations performed in support of this study.

3.0 CONCLUSION

Based on a review of existing reports and boring logs, the Bottom Ash Pond at the John Sevier Fossil Plant was not constructed with a liner that complies with the requirements of §257.71 of the EPA Final CCR Rule. Therefore, this unit is considered an unlined surface impoundment in accordance to the EPA Final CCR Rule.

4.0 REFERENCES

Stantec Consulting Services Inc. 2010. Report of Geotechnical Exploration – Dry Fly Ash Stack, Bottom Ash Disposal Area 2, Ash Disposal Area J. Prepared for Tennessee Valley Authority. February 8, 2010.

Stantec Consulting Services Inc. 2016. Basis of Design Report – Bottom Ash Pond Final Closure. Prepared for Tennessee Valley Authority. December 22, 2016.

APPENDIX A
HISTORICAL DRAWINGS

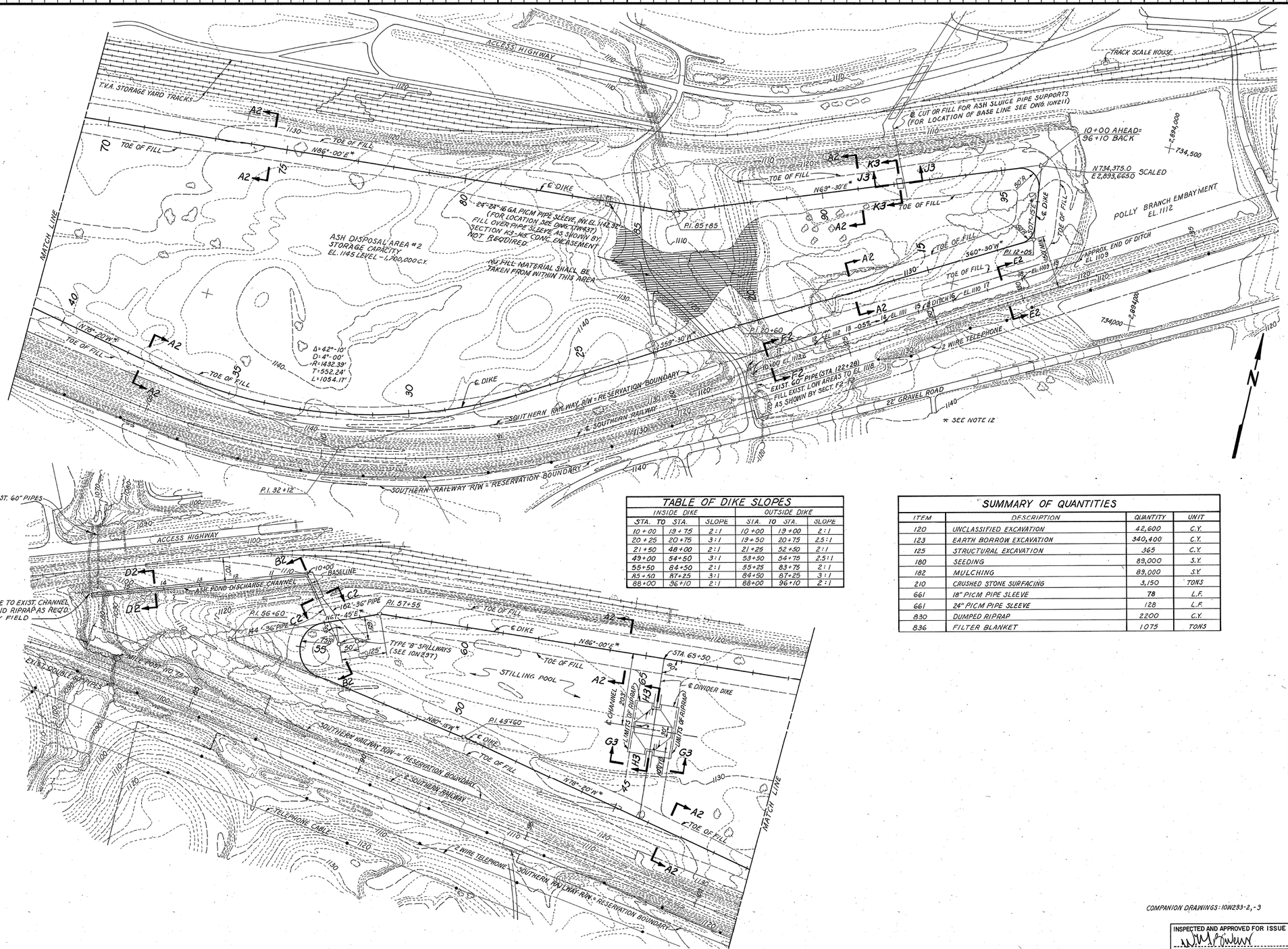

TABLE OF DIKE SLOPES

INSIDE DIKE			OUTSIDE DIKE		
STA. TO	STA.	SLOPE	STA. TO	STA.	SLOPE
10+00	19+75	2:1	10+00	19+00	2:1
20+25	20+75	3:1	19+50	20+75	2.5:1
21+50	48+00	2:1	21+25	52+50	2:1
49+00	54+50	3:1	53+50	54+75	2.5:1
55+50	84+50	2:1	55+25	83+75	2:1
85+50	87+25	3:1	84+50	87+25	3:1
88+00	96+10	2:1	88+00	96+10	2:1

SUMMARY OF QUANTITIES

ITEM	DESCRIPTION	QUANTITY	UNIT
120	UNCLASSIFIED EXCAVATION	42,600	C.Y.
123	EARTH BORROW EXCAVATION	340,400	C.Y.
125	STRUCTURAL EXCAVATION	365	C.Y.
180	SEEDING	89,000	S.Y.
182	MULCHING	89,000	S.Y.
210	CRUSHED STONE SURFACING	3,150	TONS
661	18" PICM PIPE SLEEVE	78	L.F.
661	24" PICM PIPE SLEEVE	128	L.F.
830	DUMPED RIPRAP	2200	C.Y.
836	FILTER BLANKET	1075	TONS

NOTES:

1. ALL CONSTRUCTION, EXCEPT ROLLED EARTHFILL, SHALL BE IN ACCORDANCE WITH T-1 SPEC.
2. THE RESULTS OF THE SOIL INVESTIGATION FOR THE CONSTRUCTION OF THE ASH DISPOSAL AREA DIKES ARE REPORTED IN A MEMO FROM GENE FARMER TO G.L. BUCHANAN DATED DECEMBER 10, 1976, JOHN SEVIER STEAM PLANT - NEW ASH DISPOSAL AREA - SOILS INVESTIGATION, EN DES SOIL SCHEDULE NO. 6.
3. ALL ROLLED EARTHFILL SHALL BE IN ACCORDANCE WITH CONSTRUCTION SPEC. G-9, ROLLED EARTHFILL FOR DAMS AND POWER PLANTS. ROLLED EARTHFILL SHALL CONSIST OF SOIL PLACED IN LAYERS NOT EXCEEDING 6" AFTER COMPACTION AND SHALL BE UNIFORMLY COMPACTED TO AT LEAST 95% OF STD. MAX. DRY DENSITY AS DETERMINED BY ASTM D-698 PROCEDURES (STANDARD PROCTOR). MOISTURE CONTENT OF EARTHFILL SHALL BE WITHIN ±3% OF OPTIMUM MOISTURE CONTENT.
4. FROM STA. 19+50 TO STA. 21+50 AND FROM STA. 84+00 TO STA. 88+00 (APPROXIMATELY BETWEEN EL 1125 CONTOURS), A NARROW INSPECTION TRENCH SHALL BE EXCAVATED TO A DEPTH OF 10'. IN ANY AREA WHERE GRAVEL STRATUM IS EXPOSED, A CUTOFF TRENCH IS TO BE EXCAVATED THROUGH THE PERVIOUS STRATUM AND BACKFILLED WITH COMPACTED IMPERVIOUS EARTHFILL MATERIAL AS SHOWN BY SEC. I - A2 - A2. WHERE A CUTOFF TRENCH IS NOT REQUIRED, THE INSPECTION TRENCH IS TO BE IMMEDIATELY BACKFILLED, AFTER INSPECTION, WITH THE EXCAVATED MATERIALS AND THOROUGHLY COMPACTED.
5. BORROW MATERIAL SHALL BE EXCAVATED TO A DEPTH OF 10' BENEATH THE EXISTING GROUND SURFACE OR 2' MINIMUM BENEATH GRAVEL STRATUM WHERE ENCOUNTERED, EXCEPT AT LOCATIONS WHERE INSPECTION TRENCH IS REQUIRED. WHERE GRAVEL STRATUM IS EXPOSED, THE EXCAVATED SLOPE SHALL BE BLANKETED WITH COMPACTED IMPERVIOUS EARTHFILL MATERIAL AS SHOWN BY SECTION A2-A2.
6. WHERE A CUTOFF TRENCH IS REQUIRED ADJACENT TO BLANKETED EXCAVATION SLOPE, THE CUTOFF TRENCH SHALL BE EXTENDED ACROSS THE WIDTH OF THE DIKE TO TIE INTO THE BLANKETED EXCAVATION SLOPE.
7. EARTHFILL FOR DIKE CONSTRUCTION SHALL CONSIST OF MATERIAL EXCAVATED FROM INSIDE ASH DISPOSAL AREA NO. 2. PERVIOUS GRANULAR SOILS COMPARABLE TO BORROW SOIL CLASS VII, AS DEFINED BY THE MEMO PER NOTE 2, SHALL NOT BE USED AS EARTHFILL FOR DIKE CONSTRUCTION. CUT SLOPES FOR BORROW MATERIAL ADJACENT TO THE DIKE SHALL BE 3:1 OR FLATTER, AND THE TOP OF CUT SHALL BE A MINIMUM OF 25' FROM THE TOE OF DIKE SLOPE.
8. THE MINIMUM FACTOR OF SAFETY FOR ALL LOADING CONDITIONS INVESTIGATED BY STABILITY ANALYSIS FOR THE ASH DISPOSAL DIKES IS 1.21. THIS FACTOR OF SAFETY IS FOR THE SUDDEN DRAWDOWN CONDITION.
9. CRUSHED STONE OR GRAVEL SURFACING, 4" THICK, SHALL BE APPLIED FOR THE FULL WIDTH OF THE TOP OF DIKE IN ACCORDANCE WITH SECTION 210.
10. ALL CUT AND FILL SLOPES AND OTHER DISTURBED AREAS SHALL BE SEEDED WITH TYPE 6, MIXTURE E, IN ACCORDANCE WITH SECTION 180. DEPENDING ON THE TIME OF CONSTRUCTION, IT MAY BE NECESSARY TO PROVIDE A TEMPORARY COVER ON THE DIKE SLOPES. ALL GRASSED AREAS SHALL BE FERTILIZED AND MULCHED IN ACCORDANCE WITH SECTIONS 180 AND 182 RESPECTIVELY.
11. RIPRAP SHALL BE PLACED AS SHOWN ON THE DRAWINGS WITH A MINIMUM OF 50%, BY WEIGHT, CONSISTING OF STONES OF AT LEAST 150 LB. EACH. RIPRAP SHALL CONFORM TO SECTION 830.
12. FILTER SHALL CONFORM TO SECTION 836.
13. ALL CENTERLINE BEARINGS ARE APPROXIMATE SCALED BEARINGS.

COMPANION DRAWINGS: 10W233-2, -3

INSPECTED AND APPROVED FOR ISSUE
W.W. Bivens
8-18-77

REV NO.	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUBM	RECM	APPD
2		8-20-80	GRD	TAC	JLG	JLG	WHB	RJB	RJB	FDS	GLB
1		4-25-78	VDO	BSH	DOD	DOD	WHB	RJB	JMD	GLB	

RECORD AS CONSTRUCTED; PA 3312.
REV. NOTES, TABLE OF DIKE SLOPES, & EXCAV. QUANTITIES; MINOR REVISIONS; PA 3312.

DSGN R.O. POWELL
DRWN B.S. RAYCASTER
CHKD R.O. POWELL
SUPV J. L. GLOVER
INSP
ENGINEER W. W. Burnett

SCALE: 1" = 100' EXCEPT AS NOTED

MAIN PLANT

ASH DISPOSAL AREA NO. 2
PLAN

JOHN SEVIER STEAM PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
Robert G. Powell	[illegible]	[illegible]

KNOXVILLE | 8-18-77 | 41 | C | 10W293-1 R2

RECORD DRAWING AS CONSTRUCTED
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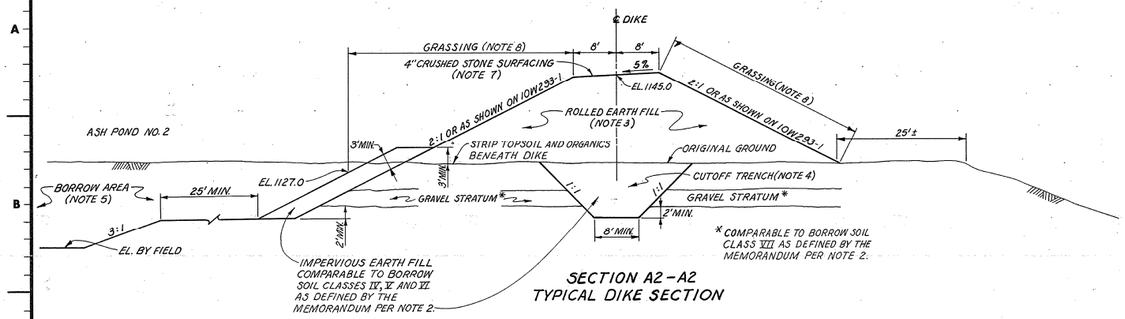
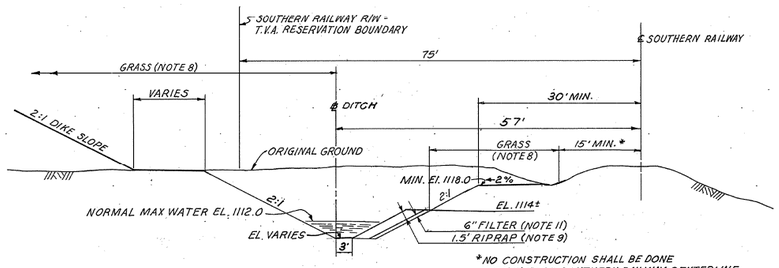
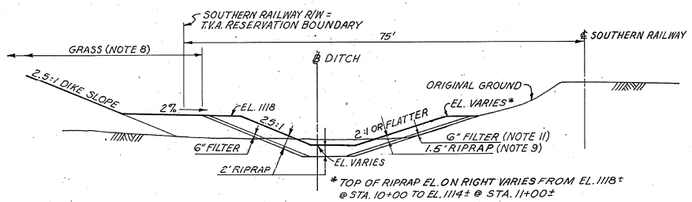


SECTION A2 – A2
TYPICAL DIKE SECTION

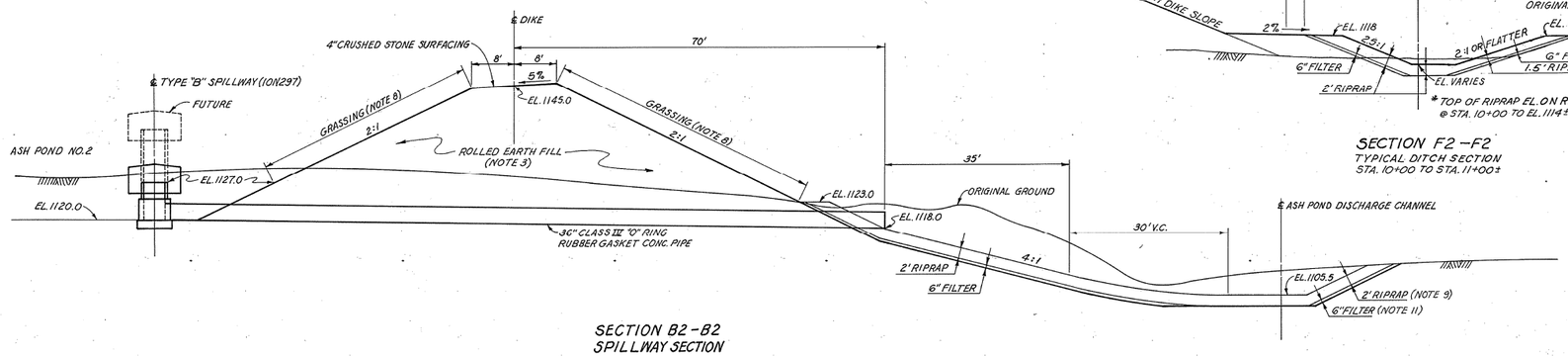


SECTION E2-E2
TYPICAL DITCH SECTION
STA. 11+00± TO STA. 19+50±

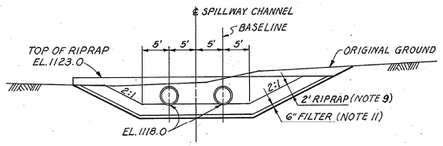
* NO CONSTRUCTION SHALL BE DONE WITHIN 15' OF SOUTHERN RAILWAY CENTERLINE



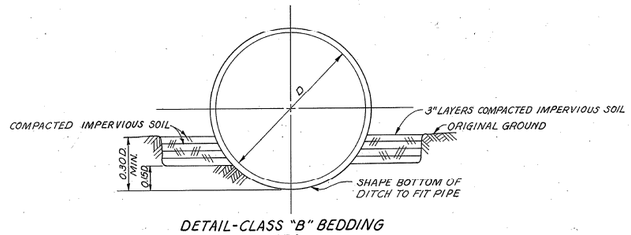
SECTION F2 – F2
TYPICAL DITCH SECTION
STA. 10+00 TO STA. 11+00±



SECTION B2 – B2
SPILLWAY SECTION



SECTION C2 – C2
SPILLWAY DISCHARGE



DETAIL-CLASS "B" BEDDING
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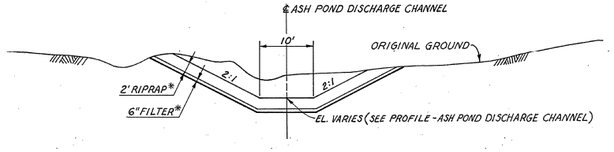
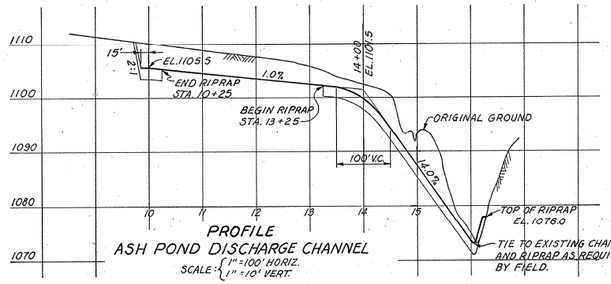


SECTION D2 – D2
* FOR LOCATION OF AREAS REQUIRING RIPRAP AND FILTER SEE PROFILE – ASH POND DISCHARGE CHANNEL



PROFILE
ASH POND DISCHARGE CHANNEL
SCALE: 1" = 100' HORIZ. / 1" = 10' VERT.

NOTES:
1. FOR GENERAL NOTES SEE 10W293-1.

COMPANION DRAWINGS: 10W293-1, -3

INSPECTED AND APPROVED FOR ISSUE
W. M. McDowell

REV. NO.	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUBM	RECM	APPR
1		4-25-78	RPA	HS	AEH	AEH	KGB				

REVISED SECTIONS A2-A2 AND F2-F2. P.A. 8312

DSGN A.P. POWELL
DRWN A.S. HAYCASTER
CHKD R.D. POWELL
SUPV J.L. GLOVER
INSP
ENGINEER R. W. Burnett

SCALE 1"=10' EXCEPT AS NOTED

MAIN PLANT

ASH DISPOSAL AREA NO. 2
SECTIONS AND DETAILS

JOHN SEVIER STEAM PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
Robert J. Bowman	R. D. Powell	Rich Bynum

KNOXVILLE 8-18-77 | 41 | C | 10W293-2 RI

RECORD DRAWING AS CONSTRUCTED RI
Frank Van Voltenburg 1-2-80

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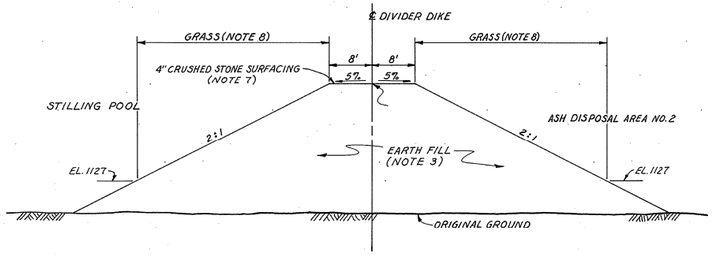
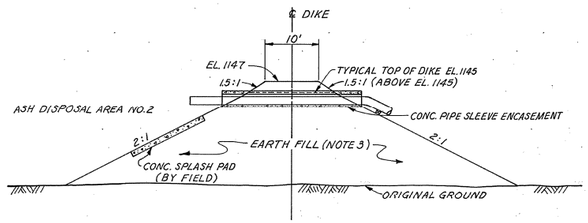
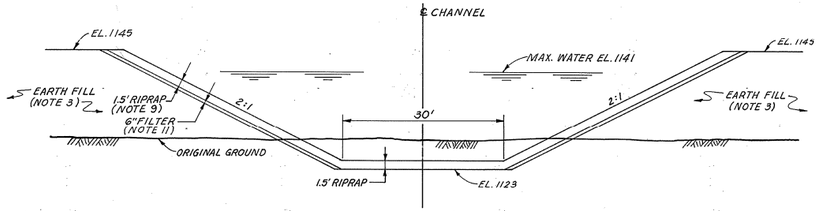


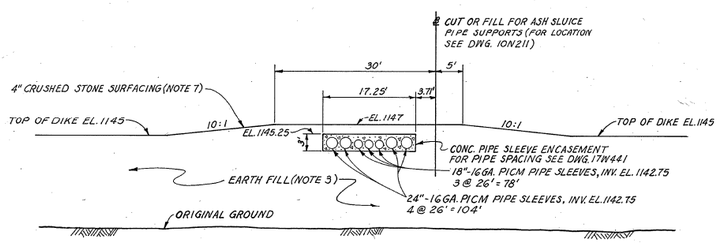
SECTION G3 - G3
TYPICAL DIVIDER DIKE SECTION



SECTION K3 - K3



SECTION H3 - H3



SECTION J3 - J3

NOTES:
1. FOR GENERAL NOTES SEE 10W293-1.

COMPANION DRAWINGS: 10W293-1, -2

INSPECTED AND APPROVED FOR ISSUE
W.M.P. Dewey

REV NO.	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUBM	RECM	APPD

DSGN R.O. POWELL
DRWN D.S. MAYCASTER
CHKD R.O. POWELL
SUPV L.L. GLOVER
INSP
ENGINEER W. W. Burnett

SCALE 1" = 10' EXCEPT AS NOTED

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SECTIONS AND DETAILS

JOHN SEVIER STEAM PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
Robert J. Bowman	R. D. Smith	A. R. Beck

KNOXVILLE 8-18-77 | 41 | C | 10W293-3 RO
RECORD DRAWING AS CONSTRUCTED

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