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

March 26, 2018
File: rpt_let_175665013_Rev_0
Revision 0

Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402

RE: Liner Design Demonstration
Stilling Pond
EPA Final Coal Combustion Residual (CCR) Rule
TVA Kingston Fossil Plant
Roane County, Tennessee

1.0 PURPOSE

This letter documents Stantec's certification of the existing liner assessment for the TVA Kingston Fossil Plant's Stilling Pond. Based on the assessment, the Stilling 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

On April 17, 2015, the Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) from Electric Utilities (RIN-2050AE81; FRL-9149-4) (EPA Final CCR Rule) was published in the Federal Register. The Stilling Pond is considered an inactive surface impoundment based on the definitions in the EPA Final CCR Rule. 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 a Notice of Intent (NOI) that complied with §257.105(i)(1), §257.106(i)(1) and §257.107(i)(1).

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 Stilling Pond at the Kingston 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:

RE: Liner Design Demonstration
Stilling Pond
EPA Final Coal Combustion Residual (CCR) Rule
TVA Kingston Fossil Plant
Roane County, Tennessee

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

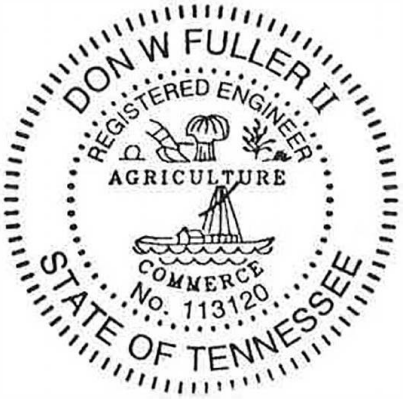
3. that the TVA Kingston Fossil Plant's Stilling Pond is considered an unlined CCR surface impoundment as described in 40 CFR 257.71(a)(3).

SIGNATURE _____ DATE 03/26/18

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

TELEPHONE: (859) 422-3000

ATTACHMENTS: KIF Stilling Pond Liner Design Demonstration



Liner Design Demonstration

Kingston Fossil Plant
Stilling Pond
Roane County, Tennessee

Prepared for:
Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:
Stantec Consulting Services Inc.

March 26, 2018
Revision 0

Table of Contents

LIST OF FIGURES

LIST OF APPENDICES

1.0 BACKGROUND

1.1 INTRODUCTION

On April 17, 2015, the Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) 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 a Notice of Intent (NOI) that complied with §257.105(i)(1), §257.106(i)(1) and §257.107(i)(1). The Stilling Pond at the Kingston Fossil Plant (KIF) 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 Stilling Pond at KIF meets the liner design criteria for existing CCR surface impoundments as defined in §257.71 of the Environmental Protection Agency (EPA) Final CCR Rule.

KIF is a coal-fired, electric generating plant located in Roane County, Tennessee, approximately 2.5 miles southeast of Harriman, Tennessee. The plant was constructed adjacent to Watts Bar Lake of the Emory River. Historically, the Stilling Pond was the final collection point for stormwater and process water for the site prior to discharging to the Emory River.

As part of the Stilling Pond Closure Project, the pond was drawn down, ash subgrade was stabilized, structural fill was placed, and construction of a geosynthetic cap system was completed. The Stilling Pond Closure Project is expected to be completed by May 2018 and the closure limits are shown as Figure 1.

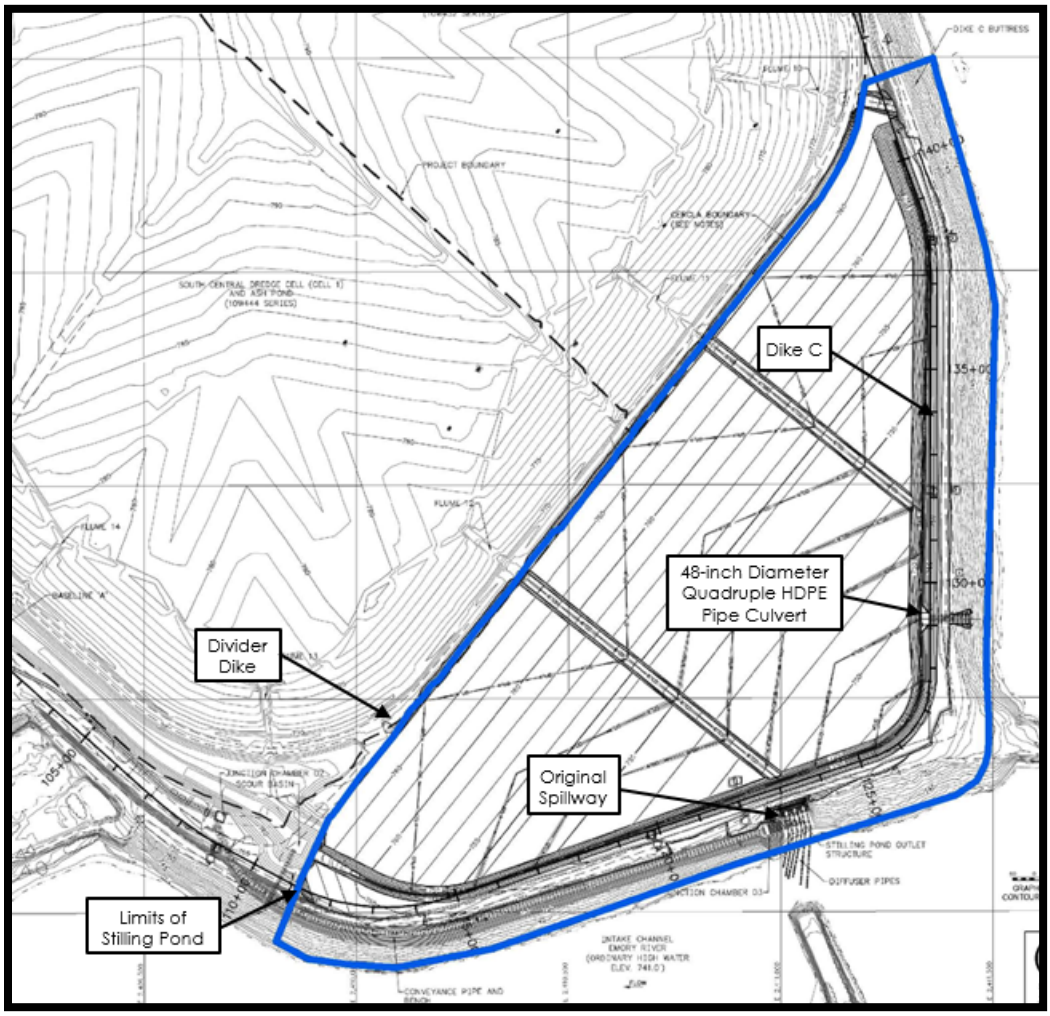


Figure 1. Stilling Pond Closure Limits

1.2 OBJECTIVE

The objective of this demonstration is to evaluate compliance related to §257.71, specifically whether the Stilling 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).

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

1.3 SUMMARY OF HISTORICAL INFORMATION

In 1958, the northern 275-acre ash pond containment dike was completed with the construction of Dike C, which was constructed of residual clay and bottom ash to an elevation of 748 feet. Between 1976 and 1978, Dike C was raised using upstream construction methodology to an elevation of 765 feet to provide additional freeboard. The Stilling Pond was also created in the southeastern portion of the ash pond, with construction of the (ash) divider dike. Applicable design plans are included in Appendix A.

The following reports have been reviewed:

- Gene Farmer. 1975. Ash Disposal Area Dikes Raising and Soils Investigation Report. Prepared for Tennessee Valley Authority. November 3, 1975.
- Stantec Consulting Services Inc. 2009. Report of Geotechnical Exploration and Slope Stability for Dike C. Prepared for Tennessee Valley Authority. August 3, 2009.

Review of these reports and any other available information could not conclude that a mechanical compacted liner was placed across the extent of the Stilling Pond.

2.0 FIELD EXPLORATION

There have been no additional field explorations performed in support of this study. A new field exploration of the Stilling Pond at the Kingston Fossil Plant was not undertaken because there was not enough evidence of a mechanically compacted clay liner underneath the Stilling Pond from the historical information to warrant additional study.

3.0 CONCLUSION

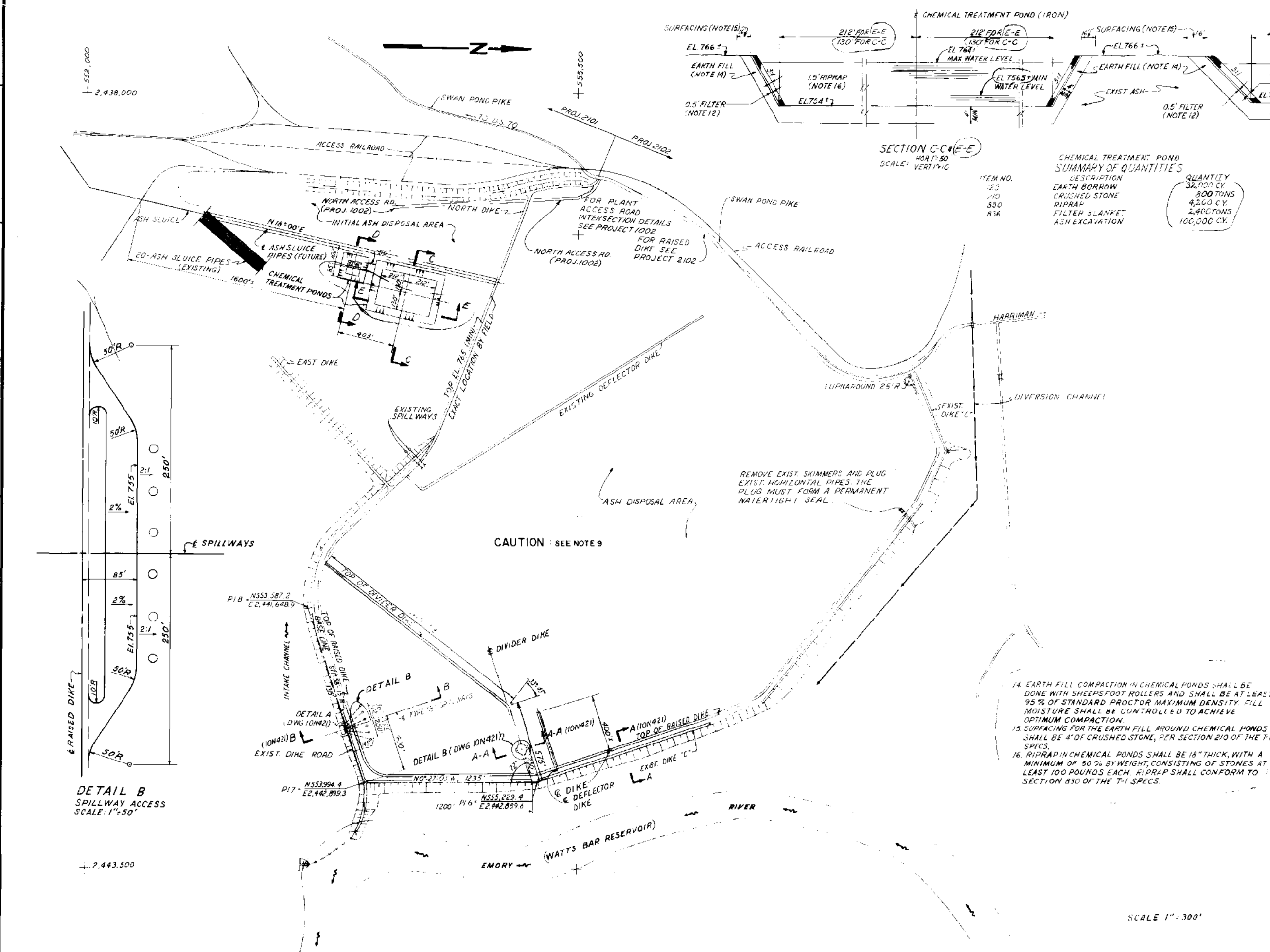
Historical documents were reviewed in order to evaluate status relative to the EPA Final CCR Rule criteria. Based on our review, it is Stantec's opinion that the Stilling Pond at Kingston Fossil Plant was not constructed with a liner that complies with the requirements of §257.71 of the EPA Final CCR Rule. Therefore, this unit is considered an unlined surface impoundment in accordance to the EPA Final CCR Rule.

4.0 REFERENCES

Gene Farmer. 1975. Ash Disposal Area Dikes Raising and Soils Investigation Report. Prepared for Tennessee Valley Authority. November 3, 1975.

Stantec Consulting Services Inc. 2009. Report of Geotechnical Exploration and Slope Stability for Dike C. Prepared for Tennessee Valley Authority. August 3, 2009.

APPENDIX A
HISTORICAL DRAWINGS



NOTES:

1. SOIL EXPLORATION AND LABORATORY TESTING IS RECORDED IN MEMORANDUM REPORT FROM GENE FARMER TO G.L. BUCHANAN, DATED NOVEMBER 3, 1975.
2. CIRCULAR-ARC STABILITY ANALYSIS SAFETY FACTORS FOR THE NEW DIKES BASED UPON AN EVALUATION OF THE SOILS INVESTIGATION REPORT ARE AS FOLLOWS:
   A. INITIAL CONSTRUCTION, EXTERIOR SLOPE: SAFETY FACTOR = 2.6
   B. INITIAL CONSTRUCTION, INTERIOR SLOPE: SAFETY FACTOR = 1.9
   C. OPERATING CONDITION WITH ASH AND WATER TO EL. 761, EXTERIOR SLOPE: SAFETY FACTOR = 2.7
   D. OPERATING CONDITION WITH ASH AND WATER TO EL. 761, INTERIOR SLOPE: SAFETY FACTOR = 1.6
3. ALL WORK TO BE IN ACCORDANCE WITH T-I SPECIFICATIONS UNLESS NOTED.
4. ALL DIKE CONSTRUCTION SHALL BE IN ACCORDANCE WITH GENERAL CONSTRUCTION SPECIFICATION NO. G-9 FOR ROLLED EARTHFILL FOR DAMS AND POWER PLANTS. FILL COMPACTION SHALL BE AT LEAST 95% OF STANDARD MAXIMUM DENSITY AND FILL MOISTURE CONTENT SHALL BE WITHIN ±3% OF OPTIMUM MOISTURE CONTENT, AS DETERMINED BY THE CENTRAL SOILS LABORATORY.
5. FOUNDATION PREPARATION FOR EARTH EMBANKMENTS SHALL CONSIST OF REMOVING ORGANIC TOPSOIL, TO A DEPTH THAT WILL REMOVE ALL ROOTS, AND ALL PERVIOUS MATERIAL, (RIPRAP, GRAVEL, CRUSHED STONE, COARSE ASH, ETC.), AND EXCAVATION SHALL CONTINUE TO A DEPTH THAT WILL SUPPORT HEAVY EARTH MOVING EQUIPMENT WITHOUT RUTTING INTO THE GROUND AND WITHOUT HEAVING THE GROUND SO AS TO REDUCE ITS STABILITY.
6. PIPE BACKFILL SHALL CONSIST OF IMPERVIOUS SOIL, FREE OF DEBRIS, WITH NO HARD LUMPS OR CLODS LARGER THAN 3" IN DIAMETER. COMPACTION SHALL BE BY HAND-HELD COMPACTORS TO A MINIMUM OF 1' ABOVE THE TOP OF THE PIPE. THE SOIL SHALL BE PLACED IN 6" LAYERS AND COMPACTED TO AT LEAST 95% OF STANDARD MAXIMUM DENSITY AS ESTABLISHED BY THE CENTRAL SOILS LABORATORY. BACKFILL MOISTURE SHALL BE CONTROLLED TO OBTAIN THE MAXIMUM PRACTICABLE DENSITY. THE BACKFILL SHALL BE PLACED SO AS TO MAINTAIN THE SAME ELEVATION ON BOTH SIDES OF THE PIPE.
7. THE DIVIDER DIKE SHALL BE CONSTRUCTED OF BOTTOM ASH. 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 ASH FILL. BOTTOM ASH FOR THAT PORTION OF THE DIVIDER DIKE ABOVE WATER SHALL BE PLACED IN NOT MORE THAN 9-INCH LAYERS, AND SHALL BE WELL COMPACTED WITH RUBBER TIRED HAULING EQUIPMENT.
8. CUT SLOPES ADJACENT TO EXISTING OR PROPOSED DIKES SHALL NOT BE EXCAVATED STEEPER THAN 3:1 AND TOP OF CUT SHALL BE A MINIMUM OF 20' FROM THE TOE OF ANY DIKE.
9. WHEN CONNECTING THE NEW DIKE TO THE OLD DIKE, EXTREME CARE SHALL BE USED TO INSURE AN IMPERVIOUS AND STABLE CONNECTION. THE EXISTING DIKES SHALL BE STRIPPED OF ALL VEGETATION, RIPRAP, GRAVEL, CRUSHED STONE, COARSE ASH AND OTHER PERVIOUS MATERIAL, BENCHED, AND SCARIFIED TO A MINIMUM DEPTH OF 6" AND COMPACTED SO AS TO FORM A BOND WITH THE NEW FILL. THE UTMOST CAUTION SHALL BE USED IN BENCHING THE EXISTING DIKE SLOPES SO AS NOT TO CREATE AN UNSTABLE CONDITION. SMALL BENCHES OF MINIMUM DEPTH SHALL BE USED.
10. GRASSING: CUT AND FILL SLOPES, AND DISTURBED AREAS SHALL BE SEEDED WITH TYPE 6E MIXTURE (SPRING SEEDING) OR TYPE 8 (FALL SEEDING). IF COVER IS NEEDED PRIOR TO SEEDING DATES USE TYPE 9 FOR WINTER SEEDING AND TYPE 10A FOR SUMMER SEEDING. ALL AREAS ARE TO BE SEEDED, FERTILIZED, AND MULCHED IN ACCORDANCE WITH SECTIONS 180 AND 182.
11. RIPRAP IS TO BE PLACED AT THE LOCATIONS AS SHOWN. AT LEAST 50% OF THE RIPRAP SHALL CONSIST OF STONE OF A WEIGHT EQUAL TO OR GREATER THAN 150 LBS., AND IN ACCORDANCE WITH SECTION 830.
12. FILTER BLANKET SHALL BE 6" THICK AND IN ACCORDANCE WITH SECTION 836.
13. SUMMARY OF QUANTITIES SEE DWG. 2102H101
14. EARTH FILL COMPACTION IN CHEMICAL PONDS SHALL BE DONE WITH SHEEPSFOOT ROLLERS AND SHALL BE AT LEAST 95% OF STANDARD PROCTOR MAXIMUM DENSITY. FILL MOISTURE SHALL BE CONTROLLED TO ACHIEVE OPTIMUM COMPACTION.
15. SURFACING FOR THE EARTH FILL AROUND CHEMICAL PONDS SHALL BE 4" OF CRUSHED STONE, PER SECTION 210 OF THE T-I SPECS.
16. RIPRAP IN CHEMICAL PONDS SHALL BE 18" THICK, WITH A MINIMUM OF 50% BY WEIGHT, CONSISTING OF STONES AT LEAST 100 POUNDS EACH. RIPRAP SHALL CONFORM TO SECTION 830 OF THE T-I SPECS.

COMPANION DRAWING: 10N421, N422, N423 HWY PROJECT 2102

REV NO.	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUBM	RECM	APPR
2		5-6-77	RWS	RWS	JLG	JLG	KWB		RJB	JDB	GLB
Rev iron chem pond & summary of quantities. PA 3076.											
1		2-16-77	GRO	GRO	PWS	JLG	KWB		RJB	JDB	GLB
Added chemical treatment ponds, detail B PA 3076. Add Proj 1002.											

DSGN D.R. GALLOWAY
DRWN J.B.L. & D.R.G.
CHKD D.R. GALLOWAY
SUPV J.P.H. Stivers
INSP S.D. STONE J.P. Fox
ENGINEER E.B. Logan

ASH POND DIKE

PLAN-RAISING ASH DISPOSAL AREA DIKE

KINGSTON STEAM PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED / RECOMMENDED / APPROVED

INSPECTED AND APPROVED FOR ISSUE

KNOXVILLE 5-20-76 | 36 | C | 10N420 R2

R-2 8-31-79