TVA 64 (OS-9-65)

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

B65 '85 0711 006

TO : C. C. Schonhoff, Director of Fossil and Hydro Power, 716 EB-C

FROM : R. G. Domer, Director of Engineering Projects, W12A5 C-K

DATE JUL 11 1985

SUBJECT: KINGSTON STEAM PLANT - ANNUAL JOINT INSPECTION OF THE ASH DISPOSAL AREAS BY OE AND F&H PR

Attached is a report from R. D. Powell to R. E. Harris dated July 9, 1985 (B41 850709 004), concerning the joint inspections of the Kingston Steam Plant ash disposal areas. This report includes recommendations for corrective work. I concur with these recommendations.

R. G. Domer

RDP OPT:RDP:EFS
KWB Attachment
REH cc (Attachment):
9/8 RIMS, SL26 C-K (w/o drawings)
R. O. Barnett, W9D224 C-K
C. Bonine, 12-108 SB-K
O. P. Thornton, W3D224 C-K
F. Van Meter, 10-103 SB-K (3)

Principally Prepared By: R. D. Powell, Extension 4347

BC/PM: _____

MO: _____

S65186.01

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TENNESSEE VALLEY AUTHORITY

OFFICE OF ENGINEERING

OFFERING EXCELLENCE

CIVIL ENGINEERING BRANCH

KINGSTON STEAM PLANT

ASH DISPOSAL AREAS

JOINT OE - F&H PR

INSPECTION

TVA 10752 (OE11-84)

CEB REPORT

TITLE	REPORT NO.
KINGSTON STEAM PLANT - ANNUAL JOINT INSPECTION OF THE ASH DISPOSAL AREAS BY OE AND F&H PR	85-20
	PLANT/UNIT
	SAR SECTIONS

VENDOR	CONTRACT NO.	KEY NOUNS	UNID SYSTEM(S)

APPLICABLE DESIGN DOCUMENTS / REFERENCES	REV	(FOR MEDS USE)	MEDS ACCESSION NUMBER
	R0		B41 850709 004
	R1		
	R2		
	R3		
	R4		

TENNESSEE VALLEY AUTHORITY

OFFICE OF ENGINEERING

CIVIL ENGINEERING BRANCH

	REVISION 0	R1	R2	R3	R4
DATE	JUL 9 1985				
PREPARED	R. D. Powell				
CHECKED	K. W. Burnett				
SUBMITTED	K. W. Burnett				
REVIEWED					
RECOMMENDED	L. E. Harris				
APPROVED	K. O. Burnett H				

Executive Summary

On April 17, 1985, the annual joint inspection of the ash disposal areas was conducted by representatives of OE and F&H PR. This was a visual inspection to appraise the general condition of the ash disposal areas and their associated dikes. The action taken on recommendations of the last annual inspection was evaluated and additional recommendations for corrective work were made. These ash disposal areas are in generally satisfactory condition with exceptions being noted within the report.

TVA 64 (OS-9-65)

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

TO : R. E. Harris, Civil Project Engineer, Civil Engineering Branch, W2D220 C-K

FROM : R. D. Powell, Civil Engineer, Civil Engineering Branch, W2D208 C-K

DATE : JUL 9 1985

SUBJECT: KINGSTON STEAM PLANT - ANNUAL ASH DISPOSAL AREA INSPECTION

1.0 General

1.1 This joint OE - F&H PR inspection of the ash disposal areas was conducted on April 17, 1985, by the following personnel:

D. R. Galloway - OE (FEP)
R. D. Powell - OE (FEP)
Virgil Hutchinson - F&H PR

1.2 We were not accompanied on the inspection by plant personnel; however, Virgil Hutchinson has been stationed at the plant for approximately six months and is thoroughly familiar with the ash disposal areas. Findings of the inspection were conveyed to plant personnel by Mr. Hutchinson.

1.3 The last annual inspection was made on August 8, 1984 (FEP 840912 003).

1.4 The different areas referenced in the report are designated on the attached print of drawing 10N420.

1.5 The ash disposal areas are in generally satisfactory condition; however, some recommendations for corrective work are made.

2.0 Change in Dikes Since Last Inspection

2.1 There have been no significant changes in the perimeter dikes since the last annual inspection. These dikes are generally in good condition and appear to be structurally stable. There is a good vegetative cover on both the interior and exterior slopes of the dikes. However, the berm between the toe of the dike and the intake channel, that extends from the south corner of dike "C" to the headwall of the discharge pipes, is void of vegetation and has developed erosion gullies (see recommendation No. 6.1). The perimeter dikes have a good crushed stone surface and are sloped to the inside.

R. E. Harris

JUL 9 1985

KINGSTON STEAM PLANT - ANNUAL ASH DISPOSAL AREA INSPECTION

2.2 The two previously noted areas of wetness along the toe of dike "C" are still very evident (pictures 1 and 2). These areas are indicated on the attached drawing 10N420 (see recommendations No. 6.2 and No. 6.3). A repair scheme for the area at the south end of dike "C" has been proposed by OE and a cost estimate prepared. This cost estimate has been transmitted to F&H PR (B65 850524 001).

2.3 After the failure of an internal dredge dike on August 8, 1984, another dredge area was formed in the northwestern portion of the ash disposal area by extending the deflector dike, constructed of bottom ash, to intersect with the raised ash dike adjacent to Swan Pond Pike. This area has been filled to completion. The exterior slope of the raised ash dike adjacent to Swan Pond Pike has been covered with one foot ± of earth, fertilized, and seeded, and has established an excellent vegetative cover (picture 3).

2.4 Plant personnel have excavated a trench along the exterior toe of the ash embankment within the original southeast dike to serve as a collection basin for the redwater seepage emanating from the bottom ash discharge channel (picture 4). The redwater is then pumped across the dike back into the bottom ash discharge channel. This is a temporary procedure to alleviate the problem of redwater seepage into the intake channel and will be utilized until a permanent and more effective repair scheme can be designed and implemented (see recommendation No. 6.4). This procedure is partially effective, as a lesser amount of redwater seepage was observed from surface runoff into the intake channel than has been previously observed.

2.5 The divider dike appears to be structurally stable; however, some erosion of the side slopes was observed. Due to its bottom ash construction, this is a continuing maintenance condition requiring periodic repairs (see recommendation No. 6.5).

2.6 After the failure of the internal dredge dike, plant personnel raised the top of the divider dike approximately two feet to elevation 765±. This is the same elevation as the top of the earth perimeter dikes (see recommendation No. 6.6).

3

R. E. Harris

JUL 9 1985

KINGSTON STEAM PLANT - ANNUAL ASH DISPOSAL AREA INSPECTION

3.0 Change in Pond Operation Since Last Inspection

3.1 There has been no change in pond operation since the last annual inspection. Virgil Hutchinson of F&H PR, stated that he plans to have plant personnel construct a finger dike of bottom ash extending northward from the south side of the bottom ash discharge channel outlet in order to direct the flow around the north end of the ash pond.

3.2 The rubber-lined fly ash discharge trench installed by F&H PR last year is in good condition and functioning properly (picture 5).

4.0 Condition of Spillways, Skimmers, and Outlets

4.1 Five of the six standard spillways and skimmers in the stilling pool area appear to be in good condition and functioning properly. The spillway on the west end has been raised one section higher than the other spillways and is not discharging. The outlet area for these spillways has a good riprap cover, and the concrete headwall appears to be in good condition (picture 6). There is no sign of loss of ash into the plant intake channel.

4.2 The plant constructed spillways and skimmers, discharging water from the pond area into the stilling pool area, appear to be in good condition and functioning properly. Some floating ash was observed on the surface of the stilling pool area (see recommendation No. 6.7); however, this condition is due to the failure of the internal dredge dike which caused the pond water to overflow the spillway skimmers and divider dike.

5.0 Action on Recommendations of Last Inspection

5.1 Plant personnel have continued to monitor the seepage at the indicated locations on dike "C." No changes were observed.

5.2 All small trees and brush have been removed from the exterior dike slopes.

5.3 OE has completed a soils investigation and engineering analysis for dike "C." For the results and recommendations of this study, see the memorandum from R. G. Domer, Director of Engineering Projects, to C. C. Schonhoff, Director of Fossil and Hydro Power, dated April 3, 1985 (B65 850403 001).

R. E. Harris

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KINGSTON STEAM PLANT - ANNUAL ASH DISPOSAL AREA INSPECTION

5.4 The ditch between Swan Pond Pike and the interior ash dike appears to be draining adequately. The ditch between dike "C" and the interior ash dike was observed to be holding water in some areas.

5.5 Vegetation has been removed from within the standard spillways and skimmers.

6.0 Recommendations

6.1 Repair the existing erosion gullies and seed, fertilize, and mulch the berm between the toe of the dike and the intake channel that extends from the south corner of dike "C" to the headwall of the discharge pipes.

6.2 OE has proposed a repair scheme for the wet area at the south end of dike "C" and a cost estimate prepared. If repairs to this area are not constructed during this summer, then plant personnel should fertilize, seed, and mulch the areas damaged by the soils exploration equipment.

6.3 F&H PR should formally request that OE study and develop a repair scheme for the wet area at the north end of dike "C."

6.4 A permanent repair scheme should be developed by OE to either halt or contain and pump the redwater seepage through the original southeast dike.

6.5 Plant personnel should continue to repair erosion and perform general maintenance on the divider dike and the plant constructed spillways through it.

6.6 In order to reduce the potential for ash pond water to overflow the perimeter dikes, plant personnel should lower the top of the divider dike by two feet to elevation 763 for a length of 200 feet along the dike. The recommended location of and a section taken through the portion of the dike to be lowered is shown on the attached print of drawing 10N420.

R. E. Harris

JUL 9 1985

KINGSTON STEAM PLANT - ANNUAL ASH DISPOSAL AREA INSPECTION

6.7 Plant personnel should remove the floating ash from the surface of the stilling pool area.

R. D. Powell

Concur

R. E. Harris

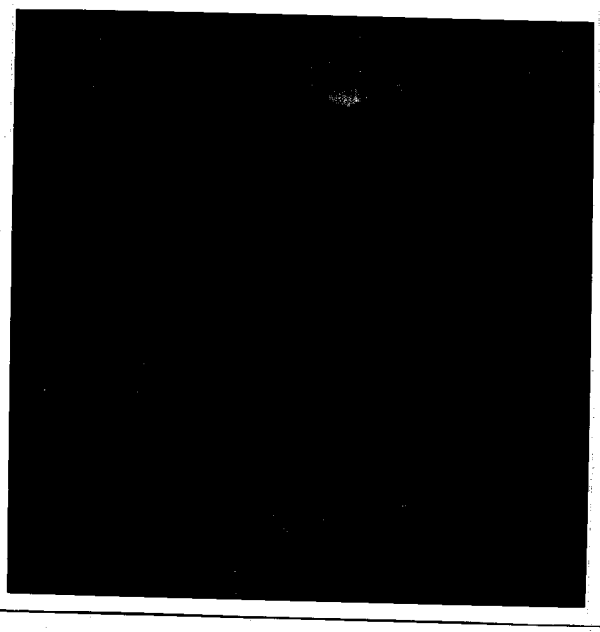
O. P. Thornton

KWB RDP:JAG
Attachments
cc (Attachments):
RIMS, SL26 C-K (w/o drawings)
R. O. Barnett, W9D224 C-K
O. P. Thornton, W3D224 C-K

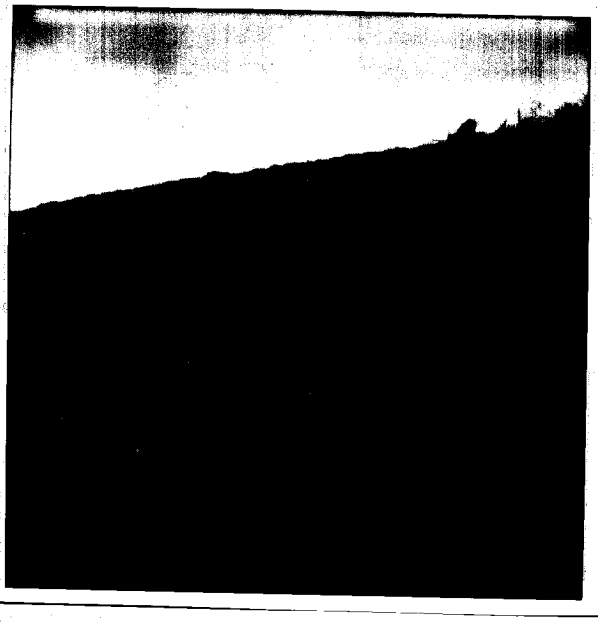
Principally Prepared By: R. D. Powell, Extension 4347

S75171.02

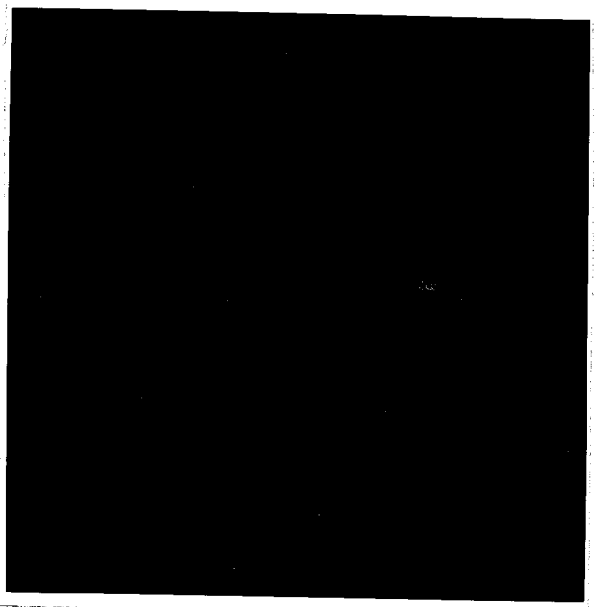
KINGSTON STEAM PLANT
APRIL 1985



(1) WET AREA ALONG TOE OF SLOPE AT SOUTH END OF DIKE "C".

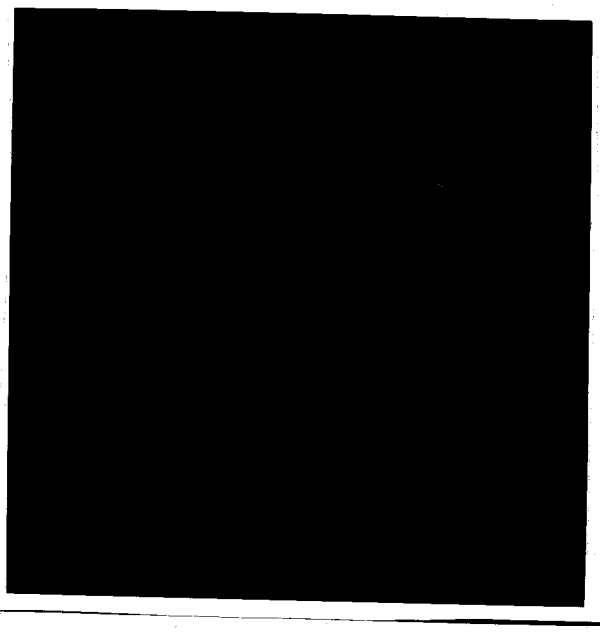


(2) WET AREA ALONG TOE OF SLOPE AT NORTH END OF DIKE "C".

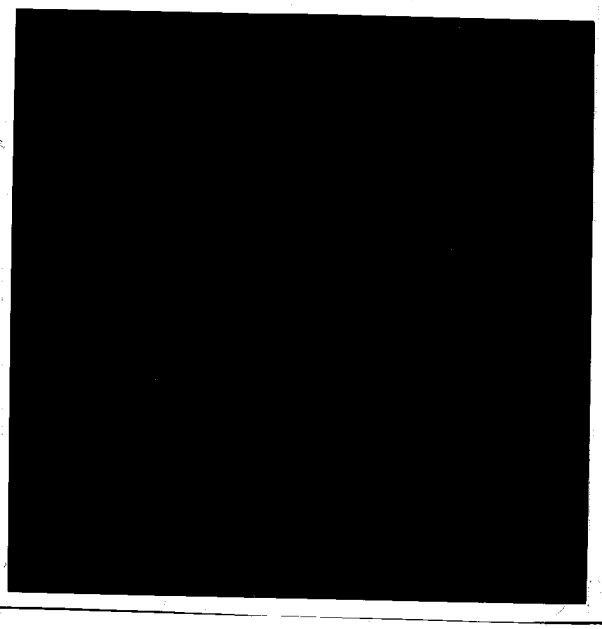


(3) INTERIOR ASH DIKE ADJACENT TO SWAN POND PIKE. NOTE: EARTH COVER AND VEGETATION ON EXTERIOR SLOPE.

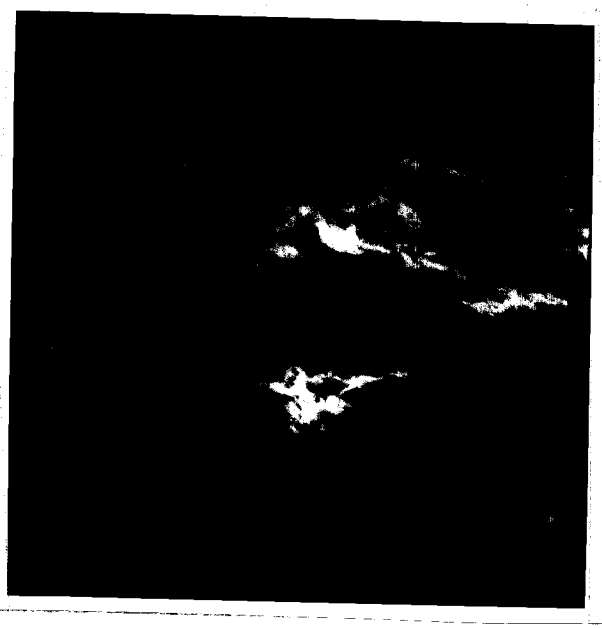
KINGSTON STEAM PLANT
APRIL 1985



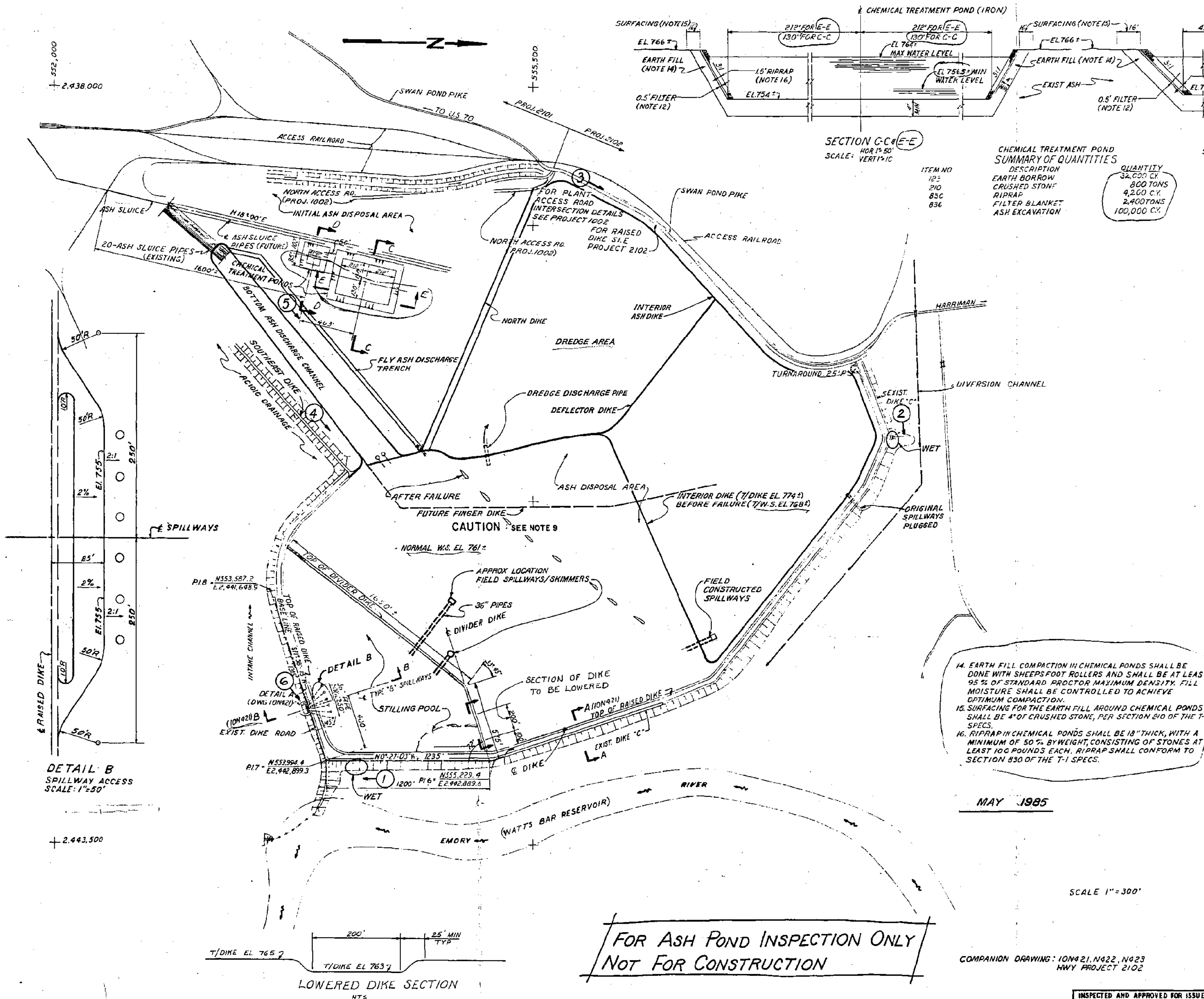
(4) REDWATER COLLECTION BASIN BETWEEN SOUTHEAST DIKE AND INTERIOR ASH EMBANKMENT.



(5) RUBBER-LINED FLY ASH DISCHARGE TRENCH.



(6) HEADWALL AND OUTLET AREA OF DISCHARGE PIPES.



CHEMICAL TREATMENT POND SUMMARY OF QUANTITIES

ITEM NO	DESCRIPTION	QUANTITY
125	EARTH BORROW	32,000 C.Y.
210	CRUSHED STONE	800 TONS
830	RIPRAP	4,200 C.Y.
836	FILTER BLANKET	2,400 TONS
	ASH EXCAVATION	100,000 C.Y.

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-1 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 B (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-1 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-1 SPECS.

○ PHOTOGRAPH TAKEN AT THIS POINT IN THIS DIRECTION

MAY 1985

FOR ASH POND INSPECTION ONLY
NOT FOR CONSTRUCTION

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

INSPECTED AND APPROVED FOR ISSUE

REV NO.	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUBM	RECM	APPR
3											
OPEN REVISION.											
2		5-6-77	RWS	RWS	JLG	JLG	KWB		RJB		GLB
Rev iron chem. ponds summary of quantities. RA 3076.											
1		2-11-77	GPO	GPO	RWS	JLG	KWB		RJB		GLB
Added chemical treatment ponds, detail B RA 3076. Add Proj 1002.											

DSGN D.R. GALLOWAY
DRWN J.R.L. & ORG
CHKD D.R. GALLOWAY
SUPV C.P.H. STIXERS
INSP S.D. STONE JR Fox
ENGINEER E B[illegible]

ASH POND DIKE

PLAN-RAISING ASH DISPOSAL AREA DIKE

KINGSTON STEAM PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
Robert J. Bowman	[signature]	[signature]

KNOXVILLE 5-20-76 | 36 | C | 10N420 R3

RECORD DRAWING AS CONSTRUCTED 8-31-79