



SOUTHEAST REGION

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September 30, 2015
Project No. 14-5232

Mr. Ronnie Miller
Manager of Production
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Crisp County Power Commission
961 Power Dam Road
Warwick, GA 31796

**DAM SAFETY INSPECTION REPORT
PLANT CRISP CCW IMPOUNDMENT
CRISP COUNTY POWER COMMISSION
PROJECT NO. 14-5232**

Dear Mr. Miller:

This Letter Report summarizes the observations and resulting recommendations from our dam safety inspection of the Plant Crisp Coal Combustion Waste (CCW) Impoundment performed on Thursday, September 24, 2015. RIZZO Associates (RIZZO) services for this Project were performed in accordance with our August 20, 2015, Proposal submitted to Crisp County Power Commission (CCPC).

1.0 PROJECT UNDERSTANDING

Plant Crisp is a combined cycle coal and gas power plant located adjacent to Lake Blackshear Dam and Reservoir. The site is located in Worth County, Georgia, near the border of Lee and Crisp Counties. When operating, Plant Crisp discharges wastewater containing CCW materials into a small impoundment west of the plant. The plant is operated infrequently and typically uses gas rather than coal when in operation. This CCW Impoundment and discharge from the pond is subject to Environmental Protection Division (EPD) regulation by permit. The permit requires that the impoundment be inspected by a Georgia registered professional engineer and an associated report be submitted to EPD annually.

In 2014, RIZZO performed a similar inspection as part of a comprehensive evaluation of the CCW Impoundment which included a site survey and drawings, hydraulics and hydrology analyses, and stability analyses in support of CCPC’s responses to the Environmental Protection Agency (EPA).

2.0 GENERAL INFORMATION

The inspection of the CCW Impoundment was performed by Mr. Grady Adkins, a licensed professional engineer in the state of Georgia, and Mr. Conrad Ginther from RIZZO with Mr. Gene Ford and Mr. Ronnie Miller of CCPC attending. The inspection was performed starting from the East Embankment and proceeding in a counter clockwise direction to the North, West, and South Embankments, respectively. The weather was partly cloudy with occasional light rain and temperatures in the low 70’s. The pool elevation was approximately elevation (EL) 239 feet (ft) (about five feet below the spillway riser) at the time of inspection.

The CCW Impoundment at Plant Crisp is located west of the plant and southwest of the Lake Blackshear Hydroelectric Project. The trapezoidal impoundment consists of built-up earthen embankments on all sides, ranging from 2 ft to 5 ft high (East and South Embankments) to approximately 22 ft high (West and North Embankments). The bottom of the impoundment generally slopes down from east to west. The West Embankment runs against the CCPC property line, with a sand-clay road along its toe on the adjacent property. *Table 2-1* summarizes the general details of the CCW Impoundment.

**TABLE 2-1
CCW IMPOUNDMENT DETAILS**

ITEM	INFORMATION
Geographical Location:	Worth County, GA Latitude: 31° 50' 40.81' N Longitude: 83° 56' 28.74" W
GA Safe Dams Program Size Classification:	Small
EPA-Recommended Hazard Classification:	Low Hazard
Drainage Area:	6.5 Acres
Dam Type:	Earthen Embankment
Maximum Dam Height:	22 ft



**TABLE 2-2
CCW IMPOUNDMENT DETAILS
(CONTINUED)**

ITEM	INFORMATION
Dam Length (Approximate):	Total Embankment: 2,222 ft North Embankment: 720 ft East Embankment: 570 ft South Embankment: 448 ft West Embankment: 484 ft
Design Slopes: (Upstream and Downstream)	2H:1V
Crest Elevation:	245 ft
Normal Pool Elevation:	< 240.95 ft
Reservoir Area:	6.5 Acres
Normal Storage Capacity:	29 ac-ft
Primary Spillway Type	Corrugated metal pipe drop inlet
Primary Spillway Diameter	12" inlet with 24" diameter screen 12" discharge
Primary Spillway Inlet Elevation	240.95 ft
Required Spillway Design Flood (SDF)	0.25 PMP (Based on Georgia Safe Dams Program Criteria)
Primary Spillway Capacity	> 3.2 cfs
Auxiliary Spillway Type	Earth chute at NE corner
Auxiliary Spillway Dimensions	Approximately 6" deep by 80' long

Two discharge lines empty into the CCW Impoundment: a ductile iron pipe that carries water and CCW byproducts from the fossil plant during plant operations and a Polyvinyl chloride (PVC) line that carries miscellaneous runoff and process water from the bag house sump. Plant Crisp is rarely operated, thus, the deposition and accumulation of CCW materials is very limited. A site plan and sections are attached in *Appendix A* and photos from our site inspection are included in *Appendix C*.

3.0 FINDINGS

Based on our visual safety inspection and review of available documents the Plant Crisp CCW Impoundment with a suggested hazard classification of "Low Hazard", was found in fair overall condition. No signs of slope instability or embankment distress such as sloughs, tension cracks, bulges at the toe of slopes, or excessive crest settlement were noted.



The *Dam Safety Inspection Check List* included in **Appendix B** provides comprehensive listing of the items checked and photograph references. The following findings are of high importance:

1. The slopes of the North and West Embankments were somewhat overgrown at the time of inspection. In general the growth consists of low ground cover vines and grasses, but a few small trees 1 inch to 2 inch in diameter were noted at some locations.
2. The exterior slopes of the West Embankment are irregular, with hummocky areas and some vertical surfaces near the crest, and lack sufficient vegetal cover to prevent surface erosion at several locations. The condition of the West Embankment does not appear to have changed since the 2014 inspection.
3. In the 2014 inspection, an area of ponded water and soft material was noted along the toe near the midpoint of the North Embankment. This area was found to be dry and unyielding during the 2015 inspection.
4. The recent (2014) improvements to the downstream discharge of the spillway appeared to be in good condition. The flared end section and small stilling basin appear to be operating properly. At the time of inspection, no flow was occurring and a small pool of stagnant water was observed at the low point of the stilling basin.
5. The vertical riser of the primary spillway was completely exposed at the time of inspection and appeared to be in good condition, with no signs of excessive corrosion or deflection noted.

4.0 RECOMMENDATIONS

We offer the following recommendations and comments to assist CCPC in maintaining safe long- term performance of the dam structure and its appurtenant works.

- **Recommendation 1** – The exterior slopes of the West Embankment should be stripped and restored to a consistent section with compacted engineered fill. After the section is restored, the area should be seeded or sodded as appropriate to prevent further erosion in the area.
- **Recommendation 2** – Visual inspection of the spillway outlet is included in the existing weekly inspection performed by plant personnel. The results of the weekly inspection are documented on a form which is archived at the site. We recommend that Line 10, “Spillway Integrity” be modified with a place to record the depth of water at the discharge, a descriptive estimate of flow rate (none, low, high), and a description of the color/turbidity of the water. Changes to the volume and turbidity of the discharge should be recorded to provide a record of performance of the spillway over time. Such changes may be indicative of deterioration of the corrugated metal pipe spillway and may



make additional activities such as camera inspection with a remotely operated vehicle necessary.

- **Recommendation 3** – The slopes of the North and West Embankments are overgrown and should be mowed or cleared. In particular, small trees should be removed from the slope to prevent negative impacts on the embankments caused by extending root systems.

5.0 CONCLUSION

Overall, the CCW Impoundment is in fair to good condition, with adequate vegetal cover and no signs of active slope instability nor other conditions that require immediate action so that the impoundment can continue to operate safely. Spillway capacity has been determined in a previous study to be adequate for the design flood event, and the spillway outlet has been maintained to ensure that flow will not be obstructed when needed. All work performed in connection with this Report conforms to generally accepted engineering practices. All conclusions and recommendations in this Report have been made independent of the Owner, its Employees, and its Representatives.

If you have any questions or require any additional information, please contact me at (803) 351-3657 or via email at conrad.ginther@rizzoassoc.com.

Sincerely yours,
RIZZO Associates

Conrad H. Ginther, P.E.
Engineering Supervisor
SE Region Manager

H. Grady Adkins, P.E.
Engineering Director
GA P.E. No. 032154

CHG/HGA/kam/lk

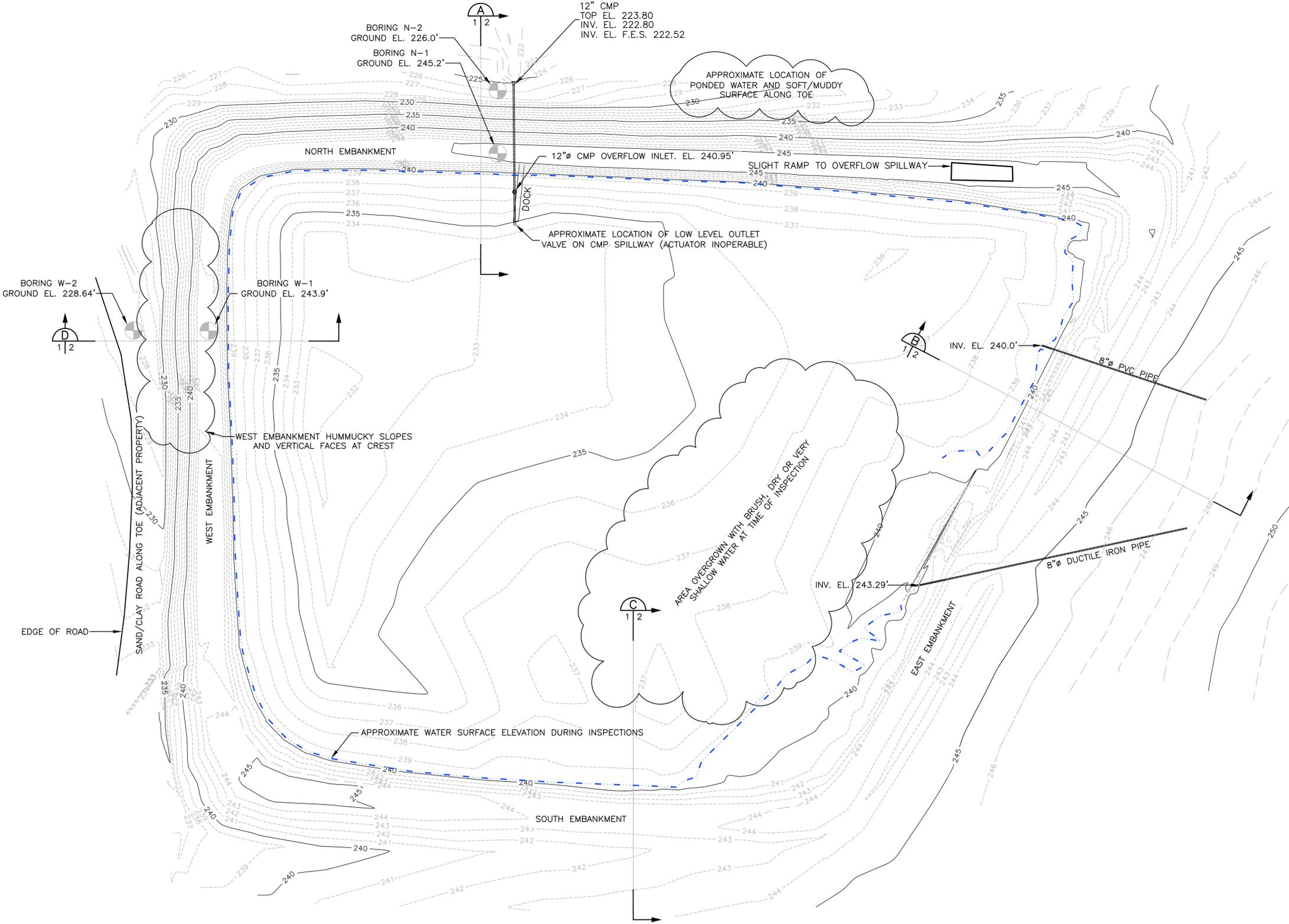
APPENDICES



APPENDIX A

DRAWINGS





NOTE:
POOL ELEVATION AS OF THE DATE OF THIS SURVEY MAY 2 & MAY 5, 2014 = APPROX. ELEVATION 239'

BORING LOCATION

ASH POND PLAN
SCALE: 1"= 40'-0"
SCALE

40 0 40 80 FEET

APPROXIMATE STORAGE CAPACITY IS 181 AC-FT

NO.	DESCRIPTIONS	DATE	CHG	APPROVED
	REVISIONS			

PROJECT:	PLANT CRISP CCW IMPOUNDMENT WARWICK, GEORGIA
DRAWING TITLE:	EXISTING CONDITIONS PLAN
PREPARED FOR:	CRISP COUNTY POWER COMMISSION CORDELE, GA

"DO NOT SCALE THIS DRAWING"

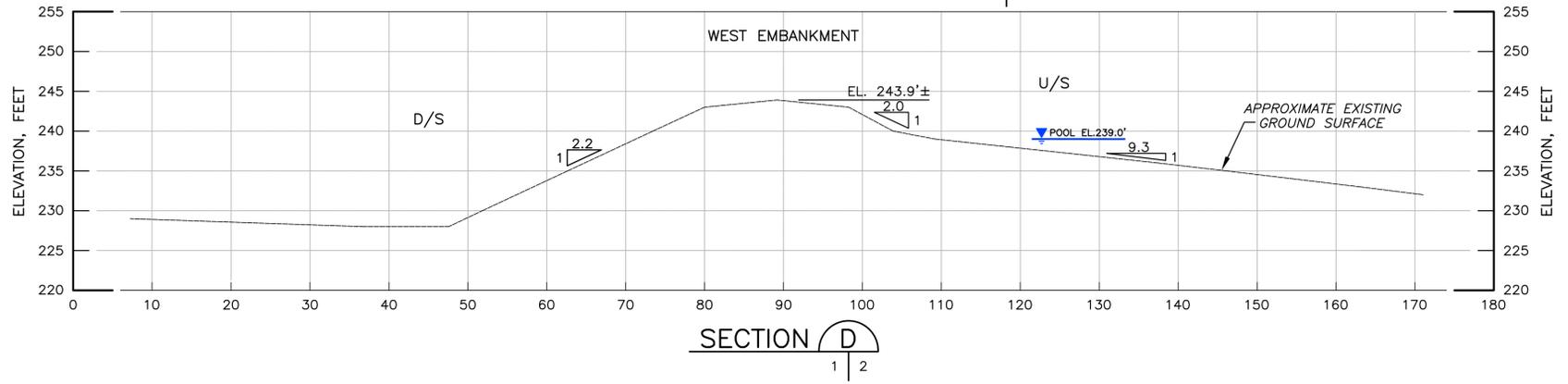
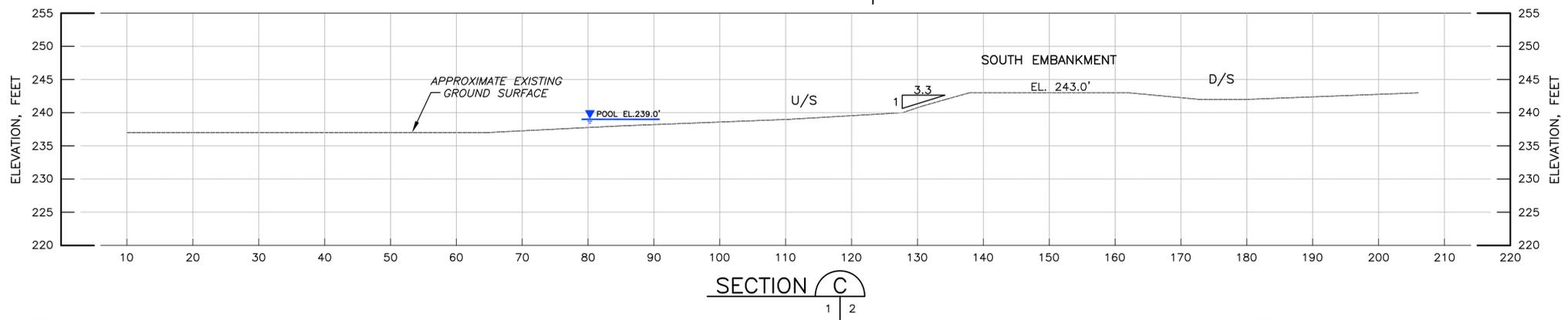
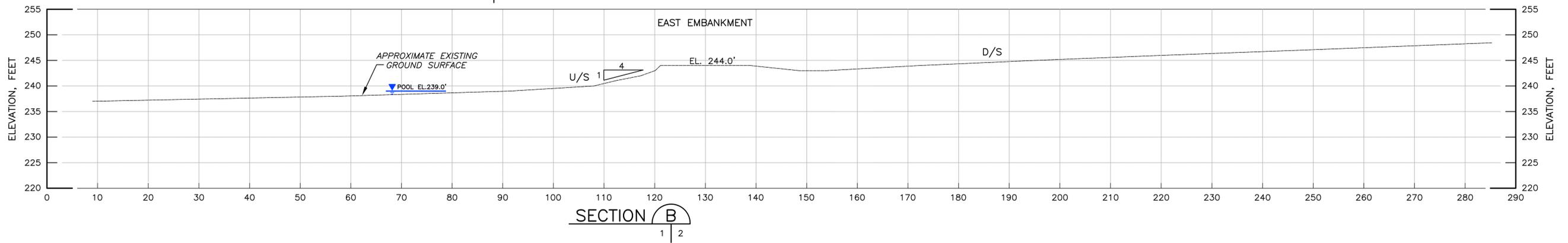
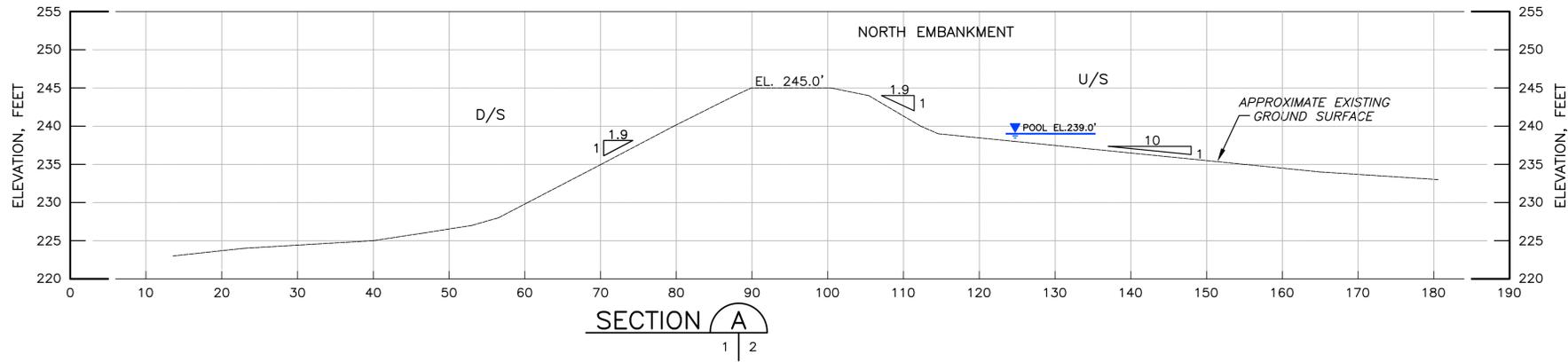
REFERENCE:
A DRAWING ENTITLED "TOPOGRAPHIC SURVEY OF ASH POND" BY J.B. FAIRCLOTH & ASSOCIATES. DATED: MAY 2, & MAY 5, 2014 AND REVISED MAY 26, 2014.

DRAWN	GPB	CHECKED BY	CHG	4/2/15
DATE	5/23/14	APPROVED BY	CHG	4/2/15



CAD FILE NUMBER 14-5232-D401(M)

DRAWING NO. 1



NOTE:

POOL ELEVATION AS OF THE DATE OF THIS SURVEY MAY 2 & MAY 5, 2014 = APPROX. ELEVATION 239'

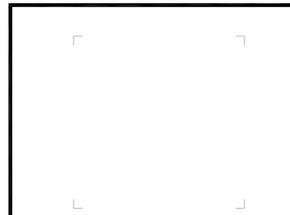
NO.	PRELIMINARY DESIGN	4/2/15	CHG
	DESCRIPTIONS	DATE	APPROVED
	REVISIONS		

PROJECT:
PLANT CRISP CCW IMPOUNDMENT
WARWICK, GEORGIA

DRAWING TITLE:
EXISTING CONDITIONS SECTIONS A-D

PREPARED FOR:
CRISP COUNTY POWER COMMISSION
CORDELE, GA

"DO NOT SCALE THIS DRAWING"



SCALE: 1" = 10'-0"
SCALE



DRAWN	GPB	CHECKED BY	CHG	4/2/15
DATE	5/23/14	APPROVED BY	CHG	4/2/15



CAD FILE NUMBER 14-5232-D401(M)

DRAWING NO. 2

APPENDIX B

INSPECTION CHECKLISTS



**DAM SAFETY INSPECTION CHECKLIST
PLANT CRISP CCW IMPOUNDMENT**

RESERVOIR AREA			
ITEMS	YES	NO	REMARKS
1. Signs of shoreline instability?		X	
2. Sedimentation?	X		<p>Due to operation of the impoundment as a CCW Impoundment. Rate of sedimentation is very slow due to very limited operation of fossil plant. An automatic level control device pumps all runoff, wash and process water, etc. from a sump at the plant. Under current operating conditions, the majority of discharge is stormwater runoff delivered via an 8-inch diameter PVC pipe on the northern side of the East Embankment of the impoundment.</p> <p>CCW is sluiced into the impoundment via an 8-inch ductile iron pipe on the southern side of the East Embankment. CCW solids (bottom ash, other larger granular waste products) are periodically deposited in the impoundment from the east side.</p>
3. Debris?		X	
4. Ice related problems?		X	
5. Operating constraints?		X	
6. Environmental concerns?		X	
7. Rim stability?		X	No issues. Some areas of poor vegetal cover.
8. Other?	X		Scrub vegetation grows in impoundment. Inside slopes generally free of brush or tree growth.



**DAM SAFETY INSPECTION CHECKLIST
PLANT CRISP CCW IMPOUNDMENT**

SERVICE SPILLWAY			
12-Inch Corrugated Metal Pipe (CMP) Drop Inlet with 24-Inch Mesh and CMP Trash Rack			
ITEMS	YES	NO	REMARKS
1. CMP Drop Inlet	X		
a. Settlements?		X	None apparent, original installation elevation not available.
b. Displacements?		X	Foundation of inlet unknown but appears to be plumb.
c. Cracking?		X	
d. Deterioration?		X	Galvanized CMP and strainer appear to be in good condition with very little corrosion. A valved/gated opening into the reservoir was included in original construction; however the actuator has since been cut off due to corrosion. Condition of the valve/gate is unknown; however there is zero flow through outlet with pool level below riser inlet elevation. Condition of outlet pipe through embankment not observed. Discharge of outlet pipe was found to be in good condition.
e. Exposed Reinforcement?			N/A
f. Boils Downstream?		X	
g. Springs?		X	None noted, existing ponds/swamp to N and W of impoundment
7. Discharge Channel		X	No discharge channel was provided for the outlet pipe, contributing to the discharge being covered and plugged. Discharge channel should be established.
a. Deterioration?		X	
b. Undercutting?		X	
c. Erosion?		X	
d. Obstruction?		X	



**DAM SAFETY INSPECTION CHECKLIST
PLANT CRISP CCW IMPOUNDMENT**

EARTHEN EMBANKMENTS			
ITEMS	YES	NO	REMARKS
1. Alignment			
a. Alignment?		X	Crest and toe alignments appear uniform.
b. Displacement?		X	
c. Settlement?		X	
2. Deterioration			
a. Erosion?			Some minor surface erosion at locations of concentrated runoff or missing vegetal cover.
b. Sloughs or Slumps?	X		West Embankment – 1 to 1.5 ft high vertical faces along crest on outside slope at several locations. Exterior slopes on W. Embankment are somewhat irregular/hummocky. No circular slip surfaces or cracks observed. Based on conversations with site personnel, irregular surface may be due to removal of extra material during past brush clearing operations.
c. Riprap?		X	None
d. Damage from nuisance wildlife?		X	No burrows or undercuts along the bank noted.
3. Seepage		X	2014 inspection noted wet area on toe of North Embankment. This area was dry and unyielding at the time of inspection.
a. Where?			
b. Quantity?			
4. Abutment Contacts			
a. Abutment instability?		X	
b. Erosion?		X	
c. Undercutting?		X	
d. Visible Displacement?		X	
e. Seepage from Contact?		X	
f. Boils Downstream?		X	
g. Springs?		X	
h. Abutment Shoreline Freeboard?			>8 feet at NE and SE corner
e. Seepage from Contact?		X	
5. Instrumentation		X	There is no monitoring instrumentation at this dam.



Other Comments:

- The outside slope of the West Embankment has several short vertical faces near the crest and hummocky areas. While no signs of active slope movement were noted, these slopes should be regraded to even slopes and reseeded or sodded to provide adequate vegetal cover.
- Minor bare areas and a few vertical faces were observed on the outside slope of the North Embankment. Small trees have grown up in a few places and should be removed.



APPENDIX C

PHOTOGRAPHS



LIST OF PHOTOGRAPHS

PHOTOGRAPH NO.	TITLE
PHOTOGRAPH 1	SOUTHERN END OF EAST EMBANKMENT (LOOKING W)
PHOTOGRAPH 2	CCW SLUICE DISCHARGE AT EAST EMBANKMENT (BLACK IRON PIPE)
PHOTOGRAPH 3	ASH TRANSPORT DISCHARGE MARKER
PHOTOGRAPH 4	WASTE WATER DISCHARGE AT EAST EMBANKMENT (PVC PIPE)
PHOTOGRAPH 5	NORTH EMBANKMENT DOWNSTREAM SLOPE (LOOKING W)
PHOTOGRAPH 6	NORTH EMBANKMENT UPSTREAM SLOPE AND CREST (LOOKING W)
PHOTOGRAPH 7	NORTH EMBANKMENT DOWNSTREAM TOE (LOOKING W)
PHOTOGRAPH 8	SPILLWAY DISCHARGE (NEAR MIDPOINT OF N EMBANKMENT)
PHOTOGRAPH 9	SPILLWAY DROP INLET
PHOTOGRAPH 10	INBOARD SLOPES OF N AND W EMBANKMENTS AT NW CORNER
PHOTOGRAPH 11	WEST EMBANKMENT INBOARD SLOPE (LOOKING S)
PHOTOGRAPH 12	WEST EMBANKMENT DOWNSTREAM SLOPE (LOOKING S)
PHOTOGRAPH 13	WEST EMBANKMENT DOWNSTREAM SLOPE (LOOKING N)
PHOTOGRAPH 14	IMPOUNDMENT AREA AND SPILLWAY INLET (LOOKING NE)
PHOTOGRAPH 15	INBOARD SLOPES OF WEST AND SOUTH EMBANKMENTS (LOOKING W)
PHOTOGRAPH 16	IMPOUNDMENT AREA FROM SOUTH EMBANKMENT (LOOKING N)
PHOTOGRAPH 17	SOUTH EMBANKMENT DOWNSTREAM SLOPE AND CREST (LOOKING W)
PHOTOGRAPH 18	INBOARD SLOPES AT SE CORNER (LOOKING N)



EAST EMBANKMENT



**PHOTOGRAPH 1
SOUTHERN END OF EAST EMBANKMENT (LOOKING W)**



**PHOTOGRAPH 2
CCW SLUICE DISCHARGE AT EAST EMBANKMENT (BLACK IRON PIPE)**



EAST EMBANKMENT



**PHOTOGRAPH 3
ASH TRANSPORT DISCHARGE MARKER**



**PHOTOGRAPH 4
WASTE WATER DISCHARGE AT EAST EMBANKMENT (PVC PIPE)**



NORTH EMBANKMENT



**PHOTOGRAPH 5
NORTH EMBANKMENT DOWNSTREAM SLOPE (LOOKING W)**



**PHOTOGRAPH 6
NORTH EMBANKMENT UPSTREAM SLOPE AND CREST (LOOKING W)**



NORTH EMBANKMENT



**PHOTOGRAPH 7
NORTH EMBANKMENT DOWNSTREAM TOE (LOOKING W)**



**PHOTOGRAPH 8
SPILLWAY DISCHARGE (NEAR MIDPOINT OF N EMBANKMENT)**



NORTH EMBANKMENT



**PHOTOGRAPH 9
SPILLWAY DROP INLET**



**PHOTOGRAPH 10
INBOARD SLOPES OF N AND W EMBANKMENTS AT NW CORNER**



WEST EMBANKMENT



**PHOTOGRAPH 11
WEST EMBANKMENT INBOARD SLOPE (LOOKING S)**



**PHOTOGRAPH 12
WEST EMBANKMENT DOWNSTREAM SLOPE (LOOKING S)**



WEST EMBANKMENT



**PHOTOGRAPH 13
WEST EMBANKMENT DOWNSTREAM SLOPE (LOOKING N)**



**PHOTOGRAPH 14
IMPOUNDMENT AREA AND SPILLWAY INLET (LOOKING NE)**



SOUTH EMBANKMENT



**PHOTOGRAPH 15
INBOARD SLOPES OF WEST AND SOUTH EMBANKMENTS (LOOKING W)**



**PHOTOGRAPH 16
IMPOUNDMENT AREA FROM SOUTH EMBANKMENT (LOOKING N)**



SOUTH EMBANKMENT



PHOTOGRAPH 17
SOUTH EMBANKMENT DOWNSTREAM SLOPE AND CREST (LOOKING W)



PHOTOGRAPH 18
INBOARD SLOPES AT SE CORNER (LOOKING N)

