Report of Phase 1 Facility Assessment

Coal Combustion Product Impoundments and Disposal Facilities
Various Locations, Kentucky

Prepared for:
Tennessee Valley Authority
Chattanooga, Tennessee

June 24, 2009

Stantec Consulting Services Inc.
One Team. Infinite Solutions

Stantec Consulting Services Inc.
1409 North Forbes Road
Lexington KY 40511-2050
Tel: (859) 422-3000
Fax: (859) 422-3100

June 24, 2009 171468118R03_KY

John C. Kammeyer, Vice President
Coal Combustion Products
Projects & Engineering
Tennessee Valley Authority
1101 Market Street, LP 5D-C
Chattanooga, TN 37402

Re: Report of Phase 1 Facility Assessment
Coal Combustion Product
Impoundments and Disposal Facilities
Various Locations, Kentucky

Dear Mr. Kammeyer:

Stantec Consulting Services Inc. (Stantec) is pleased to provide this report of Phase 1 facility assessments for the Coal Combustion Product (CCP) impoundments and disposal facilities. This report summarizes our Phase 1 activities at TVA's fossil plants in Kentucky. It also includes our recommendations for Phase 2 studies, engineering designs, maintenance and other activities at TVA's CCP disposal facilities.

Stantec appreciates the opportunity to provide TVA with these engineering and dam safety services. We hope the information contained in this report assists you and the Fossil Power Group with future planning and operational decisions. Please call us if you have questions.

Sincerely,

STANTEC CONSULTING SERVICES INC.

John S. Montgomery, PE
Senior Principal

/ddb

Report of Phase 1 Facility Assessment

Coal Combustion Product Impoundments and Disposal Facilities
Various Locations, Kentucky

Prepared for:
Tennessee Valley Authority
Chattanooga, Tennessee

June 24, 2009

Table of Contents

Section **Page No.**

List of Tables

Table **Page No.**

List of Figures

Figure **Page No.**

List of Appendixes

Appendix

Report of Phase 1 Facility Assessment

Coal Combustion Product Impoundments and Disposal Facilities Various Locations, Kentucky

1. Introduction

1.1. Purpose of Disposal Facility Assessments

The Tennessee Valley Authority (TVA) has requested that Stantec Consulting Services Inc. (Stantec) perform Phase 1 assessments of coal combustion product (CCP) impoundments and disposal facilities at eleven active fossil plants and at one closed fossil plant. These facilities are located in the states of Kentucky, Tennessee and Alabama.

This report presents the results of the assessments for the two plants located in Kentucky. The purpose of this first phase is to:

- Identify conditions that may affect the stability and functionality of the facilities reviewed.
- Determine the need for short term corrective actions and further Phase 2 engineering evaluations.
- Prioritize and schedule disposal facilities for future Phase 2 engineering evaluations.

1.2. TVA Fossil Plants and Facilities Assessed

TVA's Fossil Power Group currently operates two coal-fired electric generating plants that are located in the Commonwealth of Kentucky. These active plants contain a total of 13 separate coal-fired generation units with a combined capacity of approximately 4,300 MW. In the process of burning coal, the two plants produce, on an annual basis, approximately 830,000 tons of fly ash, 380,000 tons of bottom ash and boiler slag, and 900,000 tons of gypsum.

Although some of these CCP's are recycled for a variety of beneficial uses, the plants must operate various types of impoundments and disposal facilities in order to properly handle, manage, and dispose of CCP's. These facilities generally include: ash ponds, dredge cells, dry ash or gypsum stacks, and wet gypsum stacks. While the majority of the disposal facilities are actively receiving CCP's, some are closed or inactive. Table 1 includes a summary of the plants and the associated disposal facilities that were assessed in this Phase 1 study. Following Table 1 is a map that depicts the locations of TVA's coal-fired plants in Kentucky.

Table 1. Summary of Fossil Plants and Facilities Assessed

Fossil Plant	City, State	Year Construction Began	Observed Facilities
Paradise (PAF)	Drakesboro, KY	1959	Scrubber Sluge Complex – Gypsum Stack Scrubber Sludge Stilling Pond East and West Dredge Cells Jacob's Creek Ash and Stilling Pond Peabody Ash and Stilling Pond Slag Mountain Slag Mountain Pond 1 Slag Mountain Pond 2 Slag Pond 2A Slag Pond 2B Slag Stilling Pond
Shawnee (SHF)	Paducah, KY	1951	Consolidated Waste Dry Stack Active Ash Pond No. 2 Inactive Dredge Cell

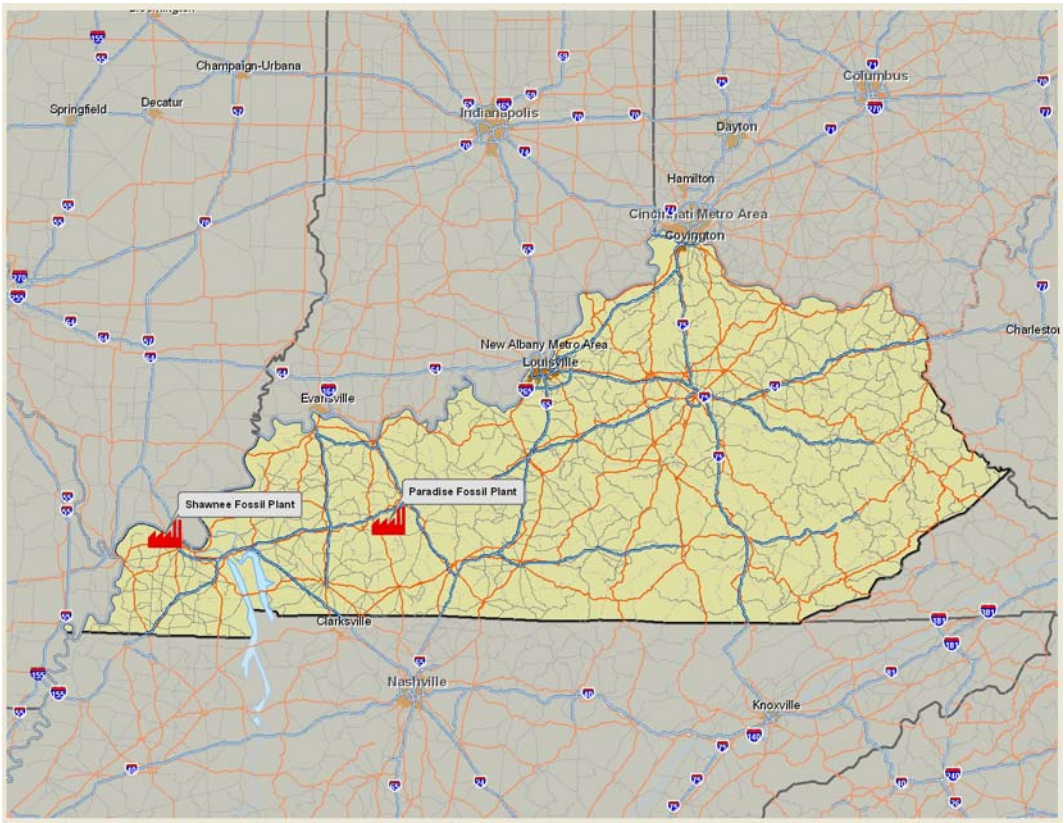


Figure 1. TVA Fossil Plants Located in Kentucky

1.3. Scope of Services and Limitations

Stantec's scope of services for the Phase 1 assessment was divided into two sub-phases; Phase 1a and Phase 1b. This report presents the results of both phases. It is important to understand that Phase 1 is judgment-based, non-invasive, and limited to features and concerns that have been observed in the field or discovered in reviews of historical documents. Phase 1 does not constitute a complete engineering evaluation of the facilities reviewed. The following paragraphs describe the specific tasks performed for each phase.

1.3.1. Phase 1a Tasks

Tasks performed for Phase 1a included:

- Review of most recent TVA Dike Stability Inspection Report for each plant.
- Visits to fossil plants by Stantec assessment teams to interview plant personnel and to perform initial walk-over of disposal facilities and ponds. Photographs and field notes were taken. The assessment teams consisted of two engineers; one of which was a licensed professional engineer (PE) with experience in dam design and dam safety.

The Phase 1a work was completed in one week and the results used to identify those facilities that potentially represented the most risk from a structural perspective. These observations were also used to provide TVA with preliminary recommendations for initiating geotechnical explorations and short term improvements at those facilities, prior to completion of the Phase 1 scope. The information gathered during Phase 1a was presented to TVA during a meeting held in their Chattanooga office on January 20, 2009.

1.3.2. Phase 1b Tasks

Tasks performed for Phase 1b included:

- Review of documents and records provided by TVA. TVA provided Stantec with electronic copies of reports, drawings, data, memorandums, etc., pertinent to the characterization, design, construction, operation, and maintenance of its CCP disposal facilities and other ponds. Stantec engineers also visited TVA's Chattanooga office to review documents compiled by TVA and to assist TVA with prioritizing the copying/scanning process.
- Further site reconnaissance of disposal facilities and ponds by Stantec assessment teams including measurement of embankment slopes and crest widths, freeboard, extent of observed seepage, and slope instabilities. The teams again interviewed plant personnel to gain additional information, and recorded observations/measurements using a dam safety inspection checklist customized for the types of CCP management units encountered. Additional follow-up visits were also made to some plants, as conditions warranted.
- At the completion of field efforts and document review, the Stantec teams prepared facility assessment forms, assembled photographs, and prepared aerial photograph exhibits to present the results. These assessment forms also contain recommendations for Phase 2 engineering activities and for

maintenance items. This information is included in the appendices of this report, with a separate appendix for each plant.

- Based on the field observations and records review, Stantec assisted TVA with prioritizing the disposal facilities for Phase 2 explorations and analyses.

- Communications with TVA throughout the Phase 1 efforts included submittal of weekly status reports and attendance at bi-weekly progress meetings in Chattanooga.

1.3.3. Future Scope Phases

Future phases for continuation of facility assessments, repairs, and CCP management will include the following:

Phase 2 – As a result of Phase 1 assessments, Phase 2 engineering work scopes will be developed and executed. Phase 2 engineering evaluations will include initial recommendations/designs for temporary corrective measures, geotechnical explorations, hydraulic and hydrologic evaluations, conceptual designs for improvements, and general engineering support. Rather than delay action until the completion of Phase 1 activities, TVA proactively initiated Phase 2 work for selected structures that have been identified as having primary concerns. These structures include the Paradise Scrubber Sludge Complex – due to inadequate freeboard, observed seepage, and slumps.

Phase 3 – Phase 3 work will include a variety of engineering tasks including planning assistance for short and long term CCP management, final design of conceptual repairs as identified in Phase 2, preparation of construction plans/specifications, cost opinions, and permitting assistance. No scopes have been developed for Phase 3 work at this time.

Phase 4 – This phase will involve assisting TVA with improving its dam safety program within the fossil power group, dam safety training for appropriate TVA CCP staff, and annual facility inspections. This work has been initiated in parallel with Phase 1.

1.3.4. Report Organization

The remainder of this report is organized as follows: Section 2 describes the observations and findings of the document review and site reconnaissance tasks; Section 3 presents the conclusions and recommendations; and Section 4 discusses Phase 2 scheduling and prioritization.

The report includes one appendix for each fossil plant located in Kentucky. Each plant's appendix contains the following:

- Phase 1 CCP Disposal Facility Summary Form for each individual facility reviewed. This form contains pertinent information relative to the Phase 1 assessments, lists noted observations, and offers recommendations for both maintenance and Phase 2 evaluations.

- Photographs and photo log for each facility reviewed.

- Aerial photographs illustrating the plant and facility general layout.

- Log of reviewed TVA documents.

2. Phase 1 Observations and Findings

2.1. Document and Records Review

TVA provided Stantec with electronic copies of reports, drawings, data, and correspondence, etc.; pertinent to the history, characterization, design, construction, operation, maintenance, and closure of its CCP disposal facilities at the Kentucky fossil plants included in this work scope. Stantec engineers also visited TVA's Chattanooga office to review documents compiled by TVA and to assist them with prioritizing the copying/scanning process. Review of this information helped Stantec understand the history, construction methods, design, operation, and maintenance practices of the CCP facilities and ponds. Over 8,000 documents were provided by TVA for all twelve fossil plants, including the two in Kentucky. The following sections describe in general terms, the available information and highlight a few notable findings and trends.

With construction of TVA's fossil plants in Kentucky having begun in the 1950's, the CCP impoundments and disposal facilities have undergone a continual process of new construction, expansion, rehabilitation, repair, modification, and closure (for the older or initial disposal facilities). The TVA-provided documentation of these efforts varies in terms of quantity and detail. Original construction documents for the older facilities are sparse or often were not located during this effort. For newer facilities, the trend of documentation seemed to become more common with increasing detail.

The following list summarizes the general types of documentation provided by TVA. It is not intended to be a comprehensive list, but rather to convey the general categories of the various types of documents that TVA provided.

- Annual inspection reports on dike stability and seepage inspection.
- Quarterly inspection reports of ash pond dikes and toe areas for seepage.
- Geotechnical reports, geologic reports, geophysical reports, geotechnical data, laboratory testing data, and stability analyses.
- Design and construction drawings.
- Design, feasibility, CCP management reports.
- Permit documents.
- Design calculations.
- Aerial photography.
- Various other correspondence and documentation (sketches, e-mails, letters, contractor work orders, meeting notes, etc.).

- Water quality testing data.

A complete list of documents provided by TVA is presented within each plant's appendix.

In addition to document review, Stantec assessment teams also conducted interviews with plant personnel during site visits and in subsequent meetings/phone discussions to gain additional historical information regarding plants and CCP disposal facilities.

2.2. Field Observations

For Phase 1 field observations, Stantec assembled six assessment teams. Teams consisted of at least two engineers; one of which was a licensed professional engineer with experience in dam design, dam safety, and geotechnical engineering. The licensed engineer assumed the role as team lead. Teams often provided field and/or office assistance to one another, depending on work loads, schedules and project needs.

As described previously, Phase 1a field observations consisted of on-site interviews with TVA plant personnel followed by initial facility walk-over's. Photographs and field notes were taken. The intent of the initial facility walk-over was specifically to look for visible or obvious signs of distress or concerns that may require short term corrective action and to prioritize initial Phase 2 activities. Items of primary concern included: active seepage areas and their appearance and flow conditions, evidence of slope instability (cracking, sloughing, hummocky ground surface), sinkholes and depressions, insufficient freeboard, steepness and height of dike slopes, and condition/adequacy of spillways and pipes through dikes. If time permitted during initial walk-over's, items considered to be of a maintenance nature were also noted, such as erosion, sparse or lack of vegetation, trees on dike slopes, animal burrows, and standing water/poor drainage. Phase 1a field assessments were performed the week of January 12 - 16, 2009.

Return visits to the plants were made at various times during the remainder of January and through February, 2009 for Phase 1b field observations. These site visits were made after Stantec had reviewed historical documents provided by TVA, which allowed the teams to become more familiar with facility history and TVA practices prior to returning. The Phase 1b field activities consisted of further discussions with plant personnel to gain additional information relative to the history, maintenance, operations, and issues of each facility. Further site reconnaissance of disposal facilities and ponds was then conducted, which included limited measurements of embankment slopes, crest widths and freeboard; and further noted the extent of seepage, slope instability, erosion, sparse vegetation, trees, animal burrows, poor surface drainage, and other relevant features. Measurements and observations were then recorded using dam safety checklists customized for CCP impoundments and disposal facilities.

2.3. Notable Findings

Certain findings and trends were directly useful in helping Stantec to understand TVA's system-wide historical CCP disposal philosophies and practices. Some notable system-wide concerns gleaned from Stantec's historical research and document review are described below.

2.3.1. Limited Record Drawings and Construction Testing/Observation Records

Stantec found relatively few as-built construction records or construction testing records for the disposal facilities. These records are important to illustrate how facilities were actually constructed, compliance with project plans and specifications, and to show adjustments that may have been necessary to deal with changes or unexpected conditions that may differ from the original plans.

2.3.2. Construction of Stacks over Ash Ponds and the Operation of Fly Ash Dredge Cells

Hydraulically-placed fly ash in ponds and dredge cells is generally very soft in terms of consistency and loose in terms of density, porosity and void ratio. This condition can sometimes result in significant and sudden loss of shear strength within the sluiced ash at low strains due to embankment loading. TVA has several active facilities that have been constructed over ash ponds, including the dry ash stack at the Shawnee Plant. Operating CCP disposal facilities on top of ash that has been sluiced into ponds, is a common practice in the industry. While this practice represents greater risk than constructing over natural earth materials, the risk is typically managed by ensuring appropriate geotechnical analyses have been completed to support design and operation, and that operation includes instrumentation to monitor pore pressures, settlement and slope movement. Load rates must also be controlled to minimize the build-up of excess pore pressures.

There were no active permanent ash dredge cells observed at either of the Kentucky plants.

2.3.3. Tall, Unsupported Weir Structures

A number of the facilities have weir structures that are tall and unsupported. System-wide, weir structures are typically vertical, push-together, reinforced concrete pipe or manhole sections. This type of weir system presents a concern from the standpoint of developing leaking joints and leaning. In addition, outlet pipes from the weir structures are constructed of reinforced concrete culvert pipe. This type of pipe does not employ a restrained joint system and is also susceptible to developing leaking joints. Some past inspection reports have documented these problems.

2.3.4. Conduit and Weir Abandonment Procedures

As various disposal facilities have been raised in the past to increase CCP storage capacity, process water conduits and weirs have been abandoned in place. Apparently, the abandonment procedures have varied from site to site over the years and are not documented. Improper abandonment can lead to internal piping and loss of materials through joint separation in the conduits.

2.3.5. Maintenance

Annual dike inspection reports appear to be adequate in identifying items for maintenance, but there is a trend of not executing all of the maintenance recommendations provided in these reports. In many instances, the same maintenance recommendations were made repeatedly in the annual reports from year to year. Tree and other vegetation removal from dikes and surface drainage ditches is an example of one of the typical recurring items.

2.3.6. Limited Operation and Maintenance Manuals (OM) and Emergency Action Plans (EAP)

During the historical research/document review phase, Stantec found a general lack of Emergency Action Plans (EAP) for the disposal facilities. These items are important for the safe operation of a dam/impoundment, and for the protection of downstream communities, as well as plant personnel.

2.3.7. Limited Geotechnical Instrumentation

Dam safety management of significant impoundments should include an instrumentation program to monitor performance and condition changes during operation of the facility. In general, instrumentation may consist of piezometers to monitor pore pressures within embankments and foundations, slope inclinometers and surface monuments to monitor movement, and plates for monitoring settlement. The type of instrumentation installed will depend on the type and function of the facility and design/operation concerns. Limited geotechnical instrumentation was observed at a majority of the facilities during Phase 1 reviews and the presence of a program to routinely obtain measurements was not witnessed.

Facility specific findings are presented in each appendix.

3. Phase 1 Conclusions and Recommendations

3.1 Due to limited record drawings and construction QA/QC documentation at any of the facilities, Stantec is unable to render opinions relative to overall structural integrity. Therefore, Stantec recommends that all significant impounding facilities be subjected to a Phase 2 engineering evaluation. For the purposes of this recommendation, the term “significant impoundment” is defined as a surface impoundment having been created by a dike or dam having a height of 25 feet or taller, or an impounding capacity of 50 acre-feet or greater. The facilities meeting these conditions are identified in Table A.1 of Appendix A. These facilities generally include all ash ponds, wet stacks, and gypsum stacks. In some instances, additional surveys will have to be performed to confirm the size of the facility relative to the criteria stated herein.

The Phase 2 evaluations should include a geotechnical exploration and hydrologic/hydraulic assessment. The geotechnical exploration scope should include field explorations, laboratory testing, and engineering analysis. Field explorations should include drilling soil borings to characterize subsurface conditions and obtain samples for laboratory testing. Both conventional and cone penetration methods may be needed depending on the data required and subsurface conditions anticipated. Field CCP and soil sampling should consist of standard penetration testing (ASTM D 1586), thin-walled Shelby tube (ASTM D 1587) sampling and grab bulk samples. Drilling should be supervised by a geotechnical engineer or geologist.

Cone penetration testing may be useful at some sites. Data collected will include tip resistance, skin resistance and pore pressure dissipation.

Instrumentation should be installed as needed to characterize subsurface conditions and measure performance. Piezometers should be installed to record phreatic conditions and pore pressure conditions. Piezometers should generally be installed using conventional drilling methods and will consist of slotted PVC screens and tubing, 1-inch diameter or greater. Zones selected for monitoring should be based on field conditions encountered. Slope inclinometer casing should be installed using conventional drilling methods where current ground movement is suspected, loading is increasing over hydraulically placed fly ash, or where it is desirable to monitor conditions in the future.

Laboratory testing should be performed in accordance with ASTM standards. Testing should include engineering classification (ASTM D 422, D 4318 and D 854), natural moisture content (ASTM D 2216), triaxial compression (ASTM D 2850 and D 4767), permeability (ASTM D 5084), unit weight determination, moisture/density relationship (ASTM D 698), and unconfined compression (ASTM D 2166) tests.

Geotechnical engineering analysis should include slope stability and seepage calculations. The calculations should be performed using recognized industry methods and software packages such as Geo-Slope, Slope-W and Seep W. For facilities that will be raised in the future, the engineering analysis should include a time rate of construction and pore pressure dissipation analysis.

Hydraulic and hydrologic analysis should include characterization of process flow rates, hydrographic surveys and storm routings to evaluate freeboard. Criteria used to evaluate freeboard should generally follow federal dam safety guidelines as appropriate.

3.2 During Phase 2, it is recommended that TVA review and update the dam safety hazard classification of each impoundment. Hazard classifications should be assigned in accordance with appropriate state and federal dam safety guidelines and should consider the size, design characteristics and consequences of failure. Further, based upon updated hazard classification, appropriate design criteria for proposed modifications and improvements should be determined.

3.3 Hydraulically placed fly ash represents significantly increased operational hazards due to the erodibility and liquefaction potential of saturated ash. In general, fly ash would be characterized as a low-strength, erodible silt and easily susceptible to piping, erosion, and liquefaction. Therefore, Stantec recommends that all dry and wet stacks operating on top of ash ponds be subjected to Phase 2 geotechnical explorations as described in Paragraph 3.1. Facilities meeting this are identified in Table A.1 of Appendix A.

3.4 In general, the outlet weir structures serving CCP impoundments are constructed of stacked concrete manhole or pipe sections. These tall, unsupported weir structures represent a risk from the standpoint of unplanned joint separation, resulting in uncontrolled releases and potential loss of pool. During routine management of the pond, such as making pool adjustments or ash dredging, it is possible to inadvertently dislodge the weir structure below the pool level. Therefore, Stantec recommends that these weir structures and outlet pipes be retrofitted or prioritized, inspected, and replaced as necessary, with a more reliable structure for pool level regulation.

3.5 Stantec recommends that TVA assemble the "best available" record drawings for each facility. This may require field surveys to confirm location, size and orientation of structures, and ancillary features. In addition, it is recommended that TVA implement a program to ensure record drawings are maintained for each facility. Modifications, expansions and improvements should be properly noted and identified with dates. Record drawings should reflect field conformance surveys of all constructed items including excavations, embankments and structures.

Further, TVA should require and retain construction quality assurance/quality control (QA/QC) plans, specifications, and documentation for all significant improvement or modification projects. QA/QC plans should address material specifications, construction execution, and QA/QC documentation.

3.6 As various disposal facilities have been raised or operated in the past, process water conduits and weirs have been abandoned in place. Based on Stantec's observations and review, abandonment procedures have varied over the years and also from site to site. Stantec understands that at times, these procedures have been inadequate and have led to uncontrolled releases. Therefore, Stantec recommends that Phase 2 explorations include an inventory of existing and abandoned conduits, and assessments of the abandonment procedures employed. This review should result in action plans to properly remediate these features. In general, abandoned conduits should be grouted full or removed.

3.7 Based on observations during the Phase 1 reconnaissance, Stantec developed recommendations for short term improvements at various facilities. These improvements include installing seepage collection systems; regrading slopes; abandoning conduits/spillways; installing stability buttresses and berms; and lowering pool elevations. At the time of this report, TVA is aggressively addressing these recommendations and many of the proposed improvements are complete. Table A.2 of Appendix A summarizes these recommendations and current status/schedule for implementation. By implementing these recommendations, TVA has improved the integrity of its facilities.

3.8 TVA performs annual inspections of its CCP impoundments and disposal facilities. However, based on Stantec observations, there does not appear to be a system in place that tracks recommendations and ensures issues are addressed in a timely manner. In addition, there are inconsistency in inspections and reporting depending on staff assigned and level of understanding of dam safety operations.

Therefore, Stantec recommends TVA review its current dam safety program and include the appropriate elements within its CCP facility management program. The program should address all organizational elements responsible for planning, design, construction, operation, maintenance and regulation of facility impoundments. The program should address on-going training of staff in appropriate dam safety inspection and management procedures.

3.9 Currently, TVA maintains operations manuals for CCP's at each of its plants. In general, these plans address: key dates, CCP handling contracts, construction planning, design drawings, permit requirements, survey data, management procedures, emergency contacts lists, work packages, capital projects and marketing. At the conclusion of future phases of work, as appropriate, it is

recommended that these operation manuals be reviewed and updated to address dam safety and maintenance aspects. Additional topics or sections to be added may include dam safety inspection requirements, instrumentation monitoring, management of QA/QC documentation and record drawings, routine maintenance activities, TVA staff responsibilities, and reporting.

3.10 It is recommended that TVA develop Emergency Action Plans for all impoundments determined to be "High Hazard from a dam safety perspective." Emergency Action Plans should consider the following elements: Notification Flowchart; Responsibilities; Preparedness; and where applicable, Inundation Maps. Emergency Action Plans should be patterned after the "Federal Guidelines for Dam Safety," as appropriate.

3.11 Stantec observed woody vegetation and trees growing on embankment slopes at many of TVA's CCP impoundments. Tree roots can penetrate embankments, creating preferential flow paths. Excessive vegetation can prevent visual observation and review of dike surfaces and provide cover and habitat for burrowing animals. In some cases, vegetation inhibited review of field conditions during Phase 1. It is recommended that all trees and excessive vegetation be removed from embankments slopes and crests. Roots larger than 2-inches in diameter should be removed and the resulting rootwad cavity be backfilled with cohesive soil and compacted. Depending on the size of tree removed, benching may be needed to achieve proper backfill and compaction. It is further recommended that removal of rootwads and subsequent treatment be performed under the direction of a geotechnical engineer. Debris should be removed and disposed of away from dam embankments.

Areas previously inaccessible due to vegetation cover should be reviewed following tree and brush removal and the Phase 1 recommendations modified as appropriate.

Further, it is recommended that TVA increase the frequency of mowing and other vegetation removal activities at the CCP facilities so that dikes, slopes, ponds, shorelines, and drainage channels are kept clear of vegetation and trees. This will improve the ability of plant personnel and others to visually assess the conditions of disposal and impounding facilities.

3.12 Stantec observed conditions requiring further maintenance. These observations generally consisted of surface erosion, animal burrows, and absence of wave wash revetment. Specific instances are identified in the appendices as appropriate for each facility reviewed. Stantec recommends that TVA implement a maintenance program to address and improve these conditions. Maintenance activities that involve excavations with embankments should be performed under the direction of a geotechnical engineer.

4. Phase 2 Scheduling

Phase 2 engineering evaluations have been underway since February 2009. The goal is to complete these evaluations for the active CCP disposal impoundments and active CCP by mid-2010. The schedule for these activities is reflected in Table A.1 of Appendix A. The

order in which the evaluations are being performed reflect Stantec's opinion of relative risk based on its observations of active seepage/slope stability concerns determined during Phase 1 and by issues reported to Stantec by TVA. However, depending on future findings or observations, adjustments to the order and schedules may be made.

Appendix A

Tables A.1 and A.2

Table A.1 Phase 1 Recommendation Summary
Coal Combustion Product Impoundments and Disposal Facilities
Various Locations, Kentucky

		Facility Data							Phase 2 Engineering Evaluation				
PLANT	FACILITY	[1]Facility Type	Active/Inactive Status	[2] Embankment Height (ft)	[2]Maximum Water Storage (ac. ft.)	[2]Surface Area (acres)	Operated Over Ash Pond	Stacked Weir Outlet Structure	Evaluation Recommended	[3]Status	[4]Estimated Start Date	[4]Estimated Completion Date	Comments
Paradise Fossil Plant	Scrubber Sludge Complex - Gypsum Stack	GS	Active	62	7000	225	N	N	X	Active	Feb-09	Jul-10	Field Geotechnical Drilling Complete April 2009
	Scrubber Sludge Stilling Pond	GS	Active	34	1100	30	N	N	X	Active	Feb-09	Jul-10	Field Geotechnical Drilling Complete April 2009
	East and West Dredge Cells	DC	Inactive	25	300	41	N	N	-	-	-	-	See Note 5
	Jacob's Creek Ash and Stilling Pond	AP	Inactive	34	2000	74	N	Y	X	Future	Sep-09	Mar-10	H&H Evaluation
	Peabody Ash and Stilling Pond	AP	Active	18	3500	137	N	Y	X	Future	Sep-09	Mar-10	Geotechnical Drilling, H&H Evaluation
	Slag Mountain	ST	Inactive	50	N/A	N/A	N	N	-	-	-	-	See Note 5
	Slag Mountain Pond 1	OT	Inactive	20	125	6	N	N	-	-	-	-	See Note 5
	Slag Mountain Pond 2	OT	Inactive	20	75	5	N	N	-	-	-	-	See Note 5
	Slag Pond 2A	AP	Active	10	350	16.5	N	N	X	Future	Jul-09	Nov-09	H&H Evaluation
	Slag Pond 2B	AP	Active	24	85	11.5	N	N	X	Future	Jul-09	Nov-09	H&H Evaluation
	Slag Stilling Pond	AP	Active	20	70	3.5	N	Y	X	Future	Jul-09	Nov-09	H&H Evaluation
Shawnee Fossil Plant	Consolidated Waste Dry Stack	ST	Active	100	N/A	110	Y	N	X	Future	Sep-09	30-Mar	A comprehensive geotechnical exploration was performed as part of recent expansion permitting. Phase 2 will be limited to supplementary explorations
	Active Ash Pond No. 2	AP	Active	25	Unknown	180	N	Y	X	Future	Sep-09	30-Mar	Anticipate completing drilling October 2009
	Inactive Dredge Cell	DC	Inactive	20	N/A	29	Y	N	-	-	-	-	Dredge cell is located within footprint of the active ash pond; See Note 5

Notes:

1. Facility Types: AP - Ash Pond ST - Dry Stack DC - Ash Dredge Cell GS - Gypsum Stack OT - Other
2. Embankment height, maximum water storage and surface area data were obtained through cursory field and office measurements, and information reviewed during Phase 1. The data are approximations only and not intended to supersede previously reported values for design or regulatory purposes. The data presented are solely for determining a facilities eligibility for Phase 2 evaluations as part of this study. Prior to initiating Phase 2 efforts, data will be reviewed and additional measurements made, if necessary. Any facility deemed as not meeting the criteria for Further Phase 2 work will be removed from the schedule and further work halted.
3. Status of Phase 2 engineering evaluations are as of June 15, 2009.
4. Estimated start and completion dates may be adjusted based on further observations and findings.
5. Recommendations for additional engineering analysis of inactive facilities are generally limited to development of Record Drawings and updating the Operations & Maintenance Manual, unless otherwise noted.

Table A.2 Short Term Improvement Recommendations and Status
Coal Combustion Product Impoundments and Disposal Facilities
Various Locations, Kentucky

Facility	Work Plan	Observation	Short Term Improvement Recommendation	Actual/Anticipated Submittal Date to TVA	Construction Status	Anticipated/Actual Construction Completion Date
Paradise Fossil Plant (PAF)	Work Plan No. 1	Seepage, sloughing, inadequate freeboard of the east and west pond of the Gypsum Stack	Re-route all sluicing to East Pond, repair sloughing on north dike of East Pond, perform geotechnical exploration, repair all saturated slope areas, cut vegetation	January 26, 2009	Complete	March 2009
	Work Plan No. 2	Apparent abandoned spillway pipes located from east and west pond of the Gypsum Stack	Grouting of pipes to properly abandon	February 11, 2009	Active	August 2009
	Work Plan No. 3	Wet and soft bench and slope areas near active decant spillway outlets between east and west ponds of the Gypsum Stack	Construct a toe buttress using rip-rap	February 24, 2009	Complete	March 2009
	Work Plan No. 4	Poor drainage and wet and soft slope conditions on east slope of west pond of the Gypsum Stack	Repair ditches using fabric and rip-rap, grout rip-rap and replace drain pipe	February 26, 2009	Complete	March 2009
	Work Plan No. 5	Poor drainage and wet and soft slope conditions on east slope of west pond of the Gypsum Stack	Minor dimension changes to Work Plan No. 4	March 3, 2009	Complete	March 2009
	Work Plan No. 6	Poor drainage and wet and soft slope conditions on east slope of west pond of the Gypsum Stack extending above and around constructed Toe Buttress	Extend ditch repairs to the extents of toe buttress and extend toe buttress to elevation of intermediate bench on east side of West Pond	March 11, 2009	Complete	March 2009
	Work Plan No. 7	Poor drainage along east pond of the Gypsum Stack east side access road ditch	Clean out and repair ditch using fabric and rip-rap, replacement of drain pipe	March 20, 2009	Complete	April 2009
	Work Plan No. 8	Poor drainage along three benches and ditches on south side of west pond of the Gypsum Stack	Clean out and repair ditches using filter fabric and rip-rap, modification of benches and regrading using soil fill and stone, and construction of connector channels	March 31, 2009	Active	July 2009
	Work Plan No. 9	Poor drainage along three benches and ditches on south side of west pond of the Gypsum Stack	Dimension modifications to Work Plan No. 8	April 2, 2009	Active	July 2009
	Work Plan No. 10	Slumping on south slope of east pond of the Gypsum Stack near the northeast corner of Stilling Pond	Construct a toe buttress using rip-rap	April 17, 2009	Complete	May 2009
	Work Plan No. 11	Poor drainage along benches and ditches on south and east sides of east pond of the Gypsum Stack	Clean out and repair ditches using filter fabric and rip-rap, modification of benches and regrading using soil fill and stone, and construction of connector channels	April 20, 2009	Active	July 2009
	Work Plan No. 12	Erosion of interior slopes on south and east sides of Peabody Ash Pond due to wave action, animal burrows present near pool level	Repair interior slopes using filter fabric and rip-rap	April 30, 2009	Active	July 2009
	Work Plan No. 13	Depressions in rim-ditch on east side of east pond of the Gypsum Stack with presumed piping channels	Excavate exploratory pit to monitor for piping channels, backfill pits with filter fabric and compacted dry gypsum	June 5, 2009	Complete	June 2009
	Work Plan No. 14	After construction of toe buttress near northeast corner of Stilling Pond additional slope movement occurring resulting in visible cracks on the slope.	Extend the previously constructed toe buttress from Work Plan No. 10	June 8, 2009	Active	July 2009
Shawnee Fossil Plant (SHF)	Work Plan No. 1	Elevated TSS levels at Rail Loop Pond outlet	Drain Pond and Install BMP's to reduce TSS levels	May 8, 2009	Active	August 2009
	Work Plan No. 2	Steep slopes, scarps, trees along Intake Channel Dredge Cell slopes	Grading Plan to Flatten slopes, remove trees, and excavate pond for added capacity	June 5, 2009	Active	August 2009

Notes:

1. Short term improvement recommendations are based on Stantec's observations as of June 15, 2009. Significant effort has been made by TVA to date to implement these recommendations and improve site conditions.
2. Table A.2 does not include system wide efforts by TVA to improve vegetation management, mitigate animal burrows/erosion, and install stone surfacing. Each of these activities improves site conditions and permits further inspection of sloped areas.

Appendix B

Paradise Fossil Plant

TVA Disposal Facility Assessment
Phase 1 Plant Summary
Paradise Fossil Plant (PAF)

Location:	Paradise Fossil Plant (PAF) 13246 State Route 176 Drakesboro, Kentucky 42337 Latitude: 37.260 N Longitude: 86.979 W
Plant Contact:	Brian Lankford Program Manager (CCBP) - Engineering Phone: (270) 476-1172 Email: BSLankford@TVA.gov
Facts and Figures:	The Paradise Fossil Plant has three coal-fired generating units with combustion turbines. The plant construction began in 1959 and was completed in 1970. The plant consumes approximately 20,000 tons of coal per day and generates approximately 14-billion kilowatt-hours of electricity annually. The winter net dependable generating capacity is about 2,273 megawatts. It is located about 4 miles northeast of Drakesboro, Kentucky on the Green River.
Coal Combustion Byproduct Disposal:	Approximately 230,000 dry tons of fly ash is wet-sluiced to Peabody Ash Pond each year. Approximately 350,000 dry tons of boiler slag is wet sluiced to Slag Pond 2A each year. Approximately 90% of the boiler slag is reclaimed and marketed to outside companies. Approximately 900,000 dry tons per year of scrubber gypsum is wet-sluiced to the Scrubber Sludge Complex (Gypsum Stack) where it is placed using a rim-ditch stacking method.
Geology and Seismicity:	The Paradise Fossil Plant is located in the central portion of western Kentucky along the west shore of the Green River just north (downstream) of the confluence of the Green River and Jacob's Creek. The region is underlain by coal rich Pennsylvanian age bedrock formations. Strip mining operations have significantly altered the topography and geology within the vicinity of the plant and, as such, portions of the site are likely underlain by mine spoils. Geologic mapping indicates the plant and surrounding areas are underlain by the Sturgis and Carbondale Formations in general order of descending geology. The Sturgis Formation is described as consisting of interlayered medium- to coarse-grained micaceous sandstone, silty and clayey shale, coal, and underclay. The Carbondale Formation generally consists of cyclic sequences of fine-grained sandstone, sandy

shale, coal, and silty underclay. Although not depicted on the geologic mapping, alluvial deposits are likely present along the banks of the Green River. The geologic mapping indicates this alluvium generally consists of gravel, sand, silt, and clay and may be as much as 90 feet thick.

Seismic events affecting the central portion of western Kentucky, and thus the plant site, primarily emanate from two zones of earthquake activity – the New Madrid Seismic Zone (NMSZ) of the central Mississippi Valley and the Wabash Valley Seismic Zone (WVSZ) located along the border between Illinois and southwestern Indiana. Although the majority of the events emanating from these zones are too small to be felt at the surface, the WVSZ has produced three earthquakes within the last 20 years with magnitudes of 5 or greater and the NMSZ produced a series of four earthquakes between December 1811 and early February 1812 each exhibiting estimated magnitudes on the order of 7.0 to 8.0.

Facilities Reviewed:

C&M Refuse Stack
East and West Dredge Cells
Jacob's Creek Ash and Stilling Ponds
Peabody Ash and Stilling Ponds
Scrubber Sludge Complex (Gypsum Stack)
Scrubber Sludge Complex Stilling Pond
Slag Mountain
Slag Mountain Pond 1
Slag Mountain Pond 2

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
Scrubber Sludge Complex - Gypsum Stack (GS)

1. General Facility Information

Facility Status:	Active	NID Identification:	KY15009
Surface Area (inside dikes)	225 Acres	Maximum Height (toe to top of dike):	62 feet
Free Water Volume:	7,000 Acre-feet	Maximum Water Storage:	7,000 Acre-feet
Estimated CCB Storage:	Unknown	Dike Length:	7,500 feet
Plant Discharge to Facility:	Unknown MGD	Current Pool Elevation:	510

2. Site Visit Information

Stantec Assessment Team:	Rob Kirkbride, PE; Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 2 - 6, 2009
Weather/Site Conditions:	Between 15 to 20 degrees F, sunny, windy, with some snow flurries

3. History/Description of Usage

History and Operation:	The Scrubber Sludge Complex (Gypsum Stack) is located in the southwest corner of the TVA facility. Scrubber sludge is sluiced into the northern end of this structure and stacked by the rim ditch method. Scrubber sludge is sluiced through a ditch formed by the exterior dike and an interior separator dike to the western corner of the area to allow that area to fill with scrubber sludge. Water is discharged from the scrubber pond to a settling pond by vertical spillways.
Past Failures/Releases:	There was a blow out noted in the southeast portion of the West Pond dike during 2008. A 15 foot high by 250 foot long section of rip-rap was placed to stabilize the slope. During our site visit a recent slough had occurred. This slough was temporarily repaired by HED as detailed by Stantec.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.
TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	Erosion was noted along drainage pipe outlets. Drainage ditches needed to be cleaned out to reduce flow over the benches. Wave erosion was noted on the inner slopes. Outlets of the chimney drains (starter dike) were observed to be blocked. A culvert on the east side was not long enough and flow through the culvert was eroding the road.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	10W4280-12R1, 10W4280-13R1, 10W4280-14R0, 10W4280-15R0, 10W4280-16R0, 10W4280-17R1, SK-1, SK-2
TVA As-Built Drawings:	10W4280-1R1, 10W4280-2R1, 10W4280-3R110W4280-4R1, 10W4280-5R1, 10W4280-6R1, 10W4280-7R1, 10W4280-8R1, 10W4280-9R1, 10W4280-10R1, 10W4280-11R1
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1985 to 2008.

Geotechnical Data:	Limited data includes lab results, but difficult to tell specific locations of soil borings. (File: Paradise Geotechnical Data.pdf). Summary of soil parameters from unknown source (File: PAF SCRUBBER SLUDGE DISPOSAL AREA SUMMARY SOIL PROPERTIES ATTACHMENT 1.pdf)

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	No vegetation is present on any interior slopes. The rim-ditch method is used to stack the scrubber sludge and raise the dikes. The interior slopes consist of bare gypsum.
Trees:	None observed.
Wave Wash Protection:	None observed.
Erosion:	Some erosion due to steep interior slopes across most of the pond. Along the north dike of the East Pond near the influent sluice lines the slopes are near vertical and portions of the interior slope have fallen or eroded into the pond. There is also some wave erosion on the south slopes.
Instabilities:	Sloughing is occurring at locations where the interior slopes are steep (sometimes near vertical) and there is no vegetative cover. The interior slopes receive little to no compactive effort as shown on the design drawings due to the rim-ditch method of construction.
Animal Burrows:	None observed.
Freeboard:	**Measured:** Varies due to rim-ditch method and constant changing of dike configuration. Measured between 3 feet to 9 feet during time of assessment. **Design:** Not shown, assumed to vary.

Encroachments:	None.	
Slope:	**Measured:**	Vertical to 1H:1V; Saddle dike 3H:1V (Estimated)
	Design:	3H:1V

6.2. Crest

Crest Cover and Slope:	The crest consists of bare gypsum, some areas were recently placed using the rim-ditch method, while other areas still had the stacked gypsum in mounds to dewater. No vegetation was established and no ground cover had been placed.	
Erosion:	There were numerous large erosion gullies on the upper exterior slopes that cut into the outside edge of the crest.	
Alignment:	The horizontal alignment seems to follow the design drawings. There are vertical differences in the crest elevation across the pond due to the crest elevation being raised in sections. This causes more freeboard to be available in some areas than others.	
Settlement/Cracking:	None observed.	
Bare Spots/Rutting:	There were some vehicular ruts on the crest. They were also some heavy construction equipment tracks due to the machinery used in the rim-ditch operation. These were especially large and ponding water after a rain or snow melting.	
Width:	**Measured:**	Typically between 20 to 30 feet. Some areas near the divider dike were wider.
	Design:	16 to 20 feet (minimum)

6.3. Exterior Slopes

Vegetation:	There is sparse vegetation consisting of grass patches on the upper slopes with mostly bare soil cover exposed. The north slope of the East Pond has no vegetative cover or cover soil, and consists entirely of exposed gypsum. The lower slopes have dense phragmites and brush and were impossible to observe. Some of these slopes have since been mowed per Stantec's request. The phragmites provide little erosion protection, and only sparse grass and weeds were present between the phragmites stalks on most of the slopes.
Trees:	There were trees sporadically located on the lower slopes of the south and east sides of the pond. They varied in size, but most were small to medium (less than 12 inch). Since the initial site visit, most of these have been removed per Stantec's request.
Erosion:	There were numerous significant erosion gullies observed on the upper slopes on all sides of the pond. They typically measured 1 to 2 feet wide and 1 to 2 feet deep, with several larger. Most extended from the crest to the upper bench, in areas with little to no vegetative cover. The north slope, which had no cover, had widespread erosion across the entire slope. Once the mowing was completed on the south slope, several significant erosion gullies could be seen on the lower slopes emanating from low points on the benches where runoff had flowed across the bench.
Instabilities:	A previous slough occurred on the upper south slope of the West Pond. The area adjacent to this slough on both sides is saturated from seepage through the dike and is a slope stability concern. The majority of the slopes have varying degrees of seepage penetrating the slope faces, causing slope stability concerns in all areas. The north dike experienced two sloughing failures which are discussed in more detail later. Both of these areas have since been temporarily repaired in accordance with Stantec recommendations. The entire north dike is experiencing uncontrolled seepage penetrating the slope face. One influence is likely its close proximity to the sluice lines which discharge the slurry in the pond at a point directly adjacent to the dike. A failure in this area

would be critical and would shut down the sluicing operations and possibly plant. The rim-ditch method of construction may not provide conditions assumed by the design of the facility and this method could lead to widespread slope instabilities and inconsistency. Several sloughs were observed on the south toe of the East Pond slope. There is thick phragmites growth along the toe, making it difficult to observe the extent of the failures.

Uniform Appearance: Each section of the dike (between benches) has a fairly uniform slope and appearance horizontally. There are different heights and distances between the benches that differ from the design drawings. Some drainage ditches have been constructed, while in other areas it appears that no ditches were constructed.

Seepage: There is uncontrolled seepage saturating the slopes on all sides of this facility. It is especially evident on the upper slopes of the West Pond, in the area near the divider dike between the ponds, and the entire north dike. The intermediate bench above the two active decant spillway pipes is saturated due to seepage and no positive drainage away from the area. Underdrain systems have been installed, but are not adequately draining the dikes. Very little if any flow was observed from most underdrain outlets. Portions of the upper south slope of the West Pond were saturated, and have already been repaired in accordance with Stantec recommendations. The lower slopes of the south dike were part of the original starter dike with a chimney drain installed, but portions of these slopes were also saturated and had water running down the slopes.

Benches: There are several benches on each side of the pond. The majority of these benches are poorly graded, retaining ponding water, experiencing severe rutting, and have no vegetation. The drainage ditches that were designed on the inside of these ditches have either filled in with sediment, or have no positive grade towards an outlet and are holding water which eventually runs over the bench at a low point and down the slope. The designed high point in the middle of the benches have not been constructed as shown on the design drawings.

Foundations, Drains, Relief Wells, Instrumentation:	Underdrain systems consisting of a slotted drainage pipe with outlets was installed somewhere between the starter dike and current crest. The outlets were corrugated plastic pipes and were located in the field, but few had any flow and the outlets discharged directly onto the slope. The plans show only one additional underdrain being installed as the dike height is raised.	
Animal Burrows:	None observed.	
Slope:	**Measured:**	Most 3H:1V, lower east slope approximately 2H:1V (estimated)
	Design:	3H:1V
Height:	**Measured:**	58 feet at midpoint of south dike of West Pond (tallest).
	Design:	Varies as rim-ditch method is used to raise crest height.

6.4. Spillway Weirs/Riser Inlets

Number:	2 (One from the east pond, one from the west pond)
Size, Type and Material:	48 inch diameter half-circle bituminous coated CMP risers with stop logs to control flow and pool elevation.
Height of Riser Inlets:	Unable to measure due to locations in pond, drawings note to be installed by field.
Access:	The back sides (opposite from stop-logs) can be accessed by a gypsum dike built from the crest to the spillway.
Joints:	Drawings show connection between riser and HDPE spillway pipe to be caulked in the field. Unable to evaluate.
Mis-Alignment:	None observed.

Closed/Abandoned Conduits:	There are two previously abandoned riser structures and spillways (one from the east and one from the west ponds.) The riser structures are no longer visible in the pond, and only one outlet pipe could be located in the field (East Pond.) The abandonment procedures are discussed in more detail below. The east pond outlet that was located was seen with flow coming from the crushed outlet end of the pipe, and undermining around the pipe into the slope.

6.5. Outlet Pipes

Number:	2 (One from each riser structure)
Size, Type and Material:	18 inch white HDPE pipes.
Headwall:	The pipes exit from the lower slopes and discharge directly into the stilling pond. The drawings show a rip-rap outlet ditch, but it was not located in the field.
Joint Separations:	Unable to observe.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	Outlet pipes associated with the two abandoned risers mentioned above will be discussed in more detail below.

7. Notable Observations and Concerns

- There is uncontrolled seepage surfacing on the exterior slopes on most sides and at different elevations of the dike. The dike exterior slopes appear to have been constructed in accordance with a typical cross-section (E16-E16) shown on design drawing 10W4280-16. The dike exterior configuration consists of 3H:1V slopes and 15-foot wide intermediate benches at varying height intervals. The plan view on the design drawings show the location of underdrains within the perimeter dike and also make reference to Section E16-E16. This section view shows the general location of the underdrains, one near the toe of the lowest stack (approximate elevation 484') and a second one 240 feet away located near the toe of the third stack (approximately at the level of the second intermediate bench). A note next to the section that reads "One additional under drain around the stack @ 240' horizontal interval and 20' below stack surface", appears to confirm what the section shows.
- Some underdrains have reportedly been installed on both the East and West Pond dikes, but it is apparent they are not adequately controlling the seepage. This has lead to saturated conditions on several areas of the slopes; most notably the upper and lower south slopes of the West Pond, the entire exterior slope area near the

active decant structures, and the north slope of the East Pond. The 2008 TVA annual report noted that a section of the West Pond dike experienced a blow-out this past year and a 250 feet long by 15 feet high section of the dike received rip-rap protection. (Photo GS-4)

- According to the design drawings (10W4280-12 Rev 1 and 10W4280-13 Rev 1) the intermediate benches are to have high points around the middle of the embankment on each side of the dike. The benches should then have a 1% grade to low points on either side to facilitate drainage and allow for collection of seepage and runoff to route the water to the stilling pond or a drainage ditch. Standing water flowing over the bench and generally poor drainage conditions indicate that the benches have not been constructed in accordance with the design. Vehicular traffic is causing significant rutting along the benches due to the wet and soft conditions. (Photos GS-2 and GS-7)
- The design of the dike assumed that stack walls of well compacted gypsum and a certain geometrical configuration would be constructed. Although there is no documentation indicating that stability analyses of the dike slopes were performed or what assumptions were made relative to the stack wall characteristics (geometrical configuration and material mechanical properties), using the rim-ditch method of upstream construction on top of sluiced gypsum as observed at the PAF gypsum stack makes it very difficult to properly construct the stack walls and provide adequate seepage control.
- There are no records showing that quality control measures were implemented to confirm that design assumptions were being met. Furthermore, the sluiced product into the pond consists of co-mingled gypsum and fly ash. This co-mingling causes the characteristics of the stacked material to change significantly, which would significantly complicate implementing quality control measures.
- Design drawings show the general horizontal location of spillway pipes (with the East Pond and West Pond each served by a separate spillway) to be constructed at different elevations as the gypsum stack is raised. According to design drawings SK-1 and SK-2 the spillways are to be abandoned by filling the bottom 4 feet of the riser pipe with concrete and cutting the end of the pipe near the outlet and filling the end with concrete. TVA personnel reported the following relative to the abandonment of two spillway pipes serving the gypsum stack: “On the east pond old weir- closed out 24" discharge pipe smashed the end of pipe in stilling pond-wadded up fabric put it in weir- put approximately 5 buckets of rip rap in weir and 4 cubic yards of concrete and removed old weir”. The presumed outlet of the abandoned East Pond spillway was located in the field. The outlet section of the pipe appeared to be partially smashed, partially covered with concrete slabs and discharging some water that eroded some of the surrounding ground. The abandoned West Pond spillway outlet could not be located in the field. Active seepage (water boils) was observed emerging at the surface of the intermediate bench area above the spillway pipe crossings. The seepage had a strong odor and contained gypsum fines as

sediment. The area around the boils was saturated, but it is not known if the source is seepage through the dike wall and/or leakage from a spillway pipe. Abandoned spillway pipes are a concern in that they can cause loss of pool water and gypsum slurry if improperly abandoned.

- Five inactive 12" cast iron sluice lines were noted coming from the east lower exterior slope of the West Pond into the Stilling Pond. These pipes extend approximately 10 to15 feet into the Stilling Pond. Some of the pipes had frozen water at their outlet, suggesting that some water flows out of the sluice lines. (Photo GS-6)
- There is minimal available freeboard throughout most of the pond areas. The saddle dike constructed on the western edge of the West Pond has less than five feet of available freeboard. As the rim-ditch method of stacking raises the crest it continually creates new freeboard. In some areas, the uncompacted stacked material on the crest is the only barrier between the pool level and the crest elevation. (Photo GS-1)
- There are steep (near vertical) interior slopes near the three influent sluice lines on the north dike of the East Pond. The inflow of sluice water is eroding the interior banks in the area and the outlet ends of the pipes are only a few feet into the pond from the dike. One sluice line is also exposed near the toe of the exterior slope, and a noticeable patch was installed at an apparent breach in the pipe. (Photos GS-13 and GS-18)
- Two separate slope sloughs were noted during the initial site visit on the north exterior dike of the East Pond. One slough was to the east of the sluice lines, and the other slough was to the west of the sluice lines. Both sloughs occurred in the bottom half of the slope which was saturated. The western slough was approximately 210 feet in length and the eastern slough was approximately 130 feet in length. Pool water seeping through the dike was considered to be the cause of the slope slough. The north dike contains no vegetation and surface erosion is widespread on the slope of the dike. Since the initial assessments, the two failed areas mentioned above have been temporarily stabilized in accordance with Stantec recommendations. (Photos GS-14, GS-15, GS-16 and GS-17) It is possible the rest of the slope will eventually become unstable even if it is covered with soil and vegetation. These areas will need to be buttressed by placing filter fabric and crushed stone.
- The lower portion of the south slope of the East Pond is experiencing sloughing in the bottom several feet along major portions of the slope. Due to the thick phragmites growth, it is difficult to observe the extent of these failures. It appears that portions of the toe of the slope have sloughed into the pond. Recommendations have been provided to HED to clear the vegetation in this area so a more detailed evaluation can be performed.

- Dense phragmites growth on the lower portion of the exterior slopes makes it difficult to observe the slopes. Some trees were also observed on the slopes. HED has begun mowing some of the dense vegetation to facilitate the Phase 1B assessments, but some areas cannot be accessed by the mowing equipment due to wet conditions and/or steep slopes. HED has also removed the majority of the trees from the slopes. While evaluating the south dike of the East Pond in the phragmites a red-water seep was observed near the toe. (Photos GS-9 and GS-11)
- Multiple erosion channels were noted on the upper exterior slopes of both the East and West Pond dikes. These channels extended from the outer edge of the crest down to the first bench. The upper slope level on both ponds contains sparse vegetative cover, providing little to no erosion protection. (Photos GS-3 and GS-8)
- It appears that most or all of the Scrubber Sludge Complex was constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, as-built drawings and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- A Phase 2 Geotechnical Study is already underway at the Scrubber Sludge Complex to evaluate the stability of the dike slopes, perform a seepage analysis, and evaluate construction design and methods. Further recommendations will be submitted pertaining to grading of benches, drainage plans, and additional slope repairs to saturated areas as needed.
- Recommendations have been submitted and completed to repair the slope failures to the north dike. These recommendations also included repairs which were completed to areas on the south dike of the West Pond on either side of the recent dike blow-out. These were included in mem_001_paf_171468118. Stantec engineers were present in the field to monitor and consult with HED personnel as the repair work was performed.
- Recommendations have been submitted pertaining to the apparent abandoned spillway pipes in the document mem_002_paf_171468118. TVA is currently considering the recommendations to grout and properly abandon the spillway pipes. If TVA decides to proceed with these recommendations for the two spillway pipes, further recommendations can be developed regarding the proper abandonment of the 5 inactive sluice lines located near the active decant outlet area.
- Recommendations have been submitted to construct a toe buttress on the exterior slope area above the active decant spillway pipe outlets. This area is saturated on the slopes and intermediate bench and critical in nature due to its location between

the East and West Ponds. The recommendations and drawing were submitted in the document mem_005_paf_171468118. HED personnel are currently completing the work with a Stantec on-site representative providing construction monitoring services.

- Recommendations have been submitted to construct a drainage ditch lined with filter fabric and rip-rap near the 48" HDPE Pipe at the southeast corner of the West Pond. The recommendations and drawing were submitted in document let_003_paf_171468118. The repair work is currently being completed by HED personnel with a Stantec on-site representative providing construction monitoring services.
- Stantec is currently reviewing options to change the location and operation of the decant spillway to move it further away from the critical area between the two ponds.
- Stantec is also considering options to extend the outlet of the sluice lines further into the East Pond to control erosion of interior slopes on the north dike.
- HED personnel are currently constructing a drainage ditch at the toe of the south slope of the West Pond to route runoff and seepage water to an existing 24” CMP culvert pipe. A Stantec on-site representative is providing construction monitoring services for this repair work.
- Once the clearing of vegetation including phragmites growth has been completed on the south slope of the East Pond, a more detailed assessment should be made of the sloughing at the toe of the slope. At this time, additional recommendations may have to be made to repair or monitor this area.
- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.
- Based on observations made during the site visits and review of the documents provided, it is recommended that a hydraulic and hydrologic analysis be performed for this facility. This facility has significant flow concentrations and is critical to operation of the plant.
- It is recommended that a facility specific Operations & Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.
- It is recommended that an Emergency Action Plan be developed to identify concerns and actions necessary to effectively manage the concerns.

8.2. Maintenance Recommendations

- Monitor freeboard conditions periodically. If the available freeboard continues to decrease, a plan must be developed to lower the pool elevation or raise the crest height.
- Continue mowing of exterior slopes and remove all remaining trees. Fill in voids left by tree removal with compacted cohesive soil.
- Repair erosion gullies on exterior slopes and re-seed, mulch and fertilize areas to establish vegetation.
- Continue annual inspection program and execute recommendations.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
Scrubber Sludge Complex Stilling Pond (GSP)

1. General Facility Information

Facility Status:	Active	NID Identification:	None
Surface Area (inside dikes)	33.5 Acres	Maximum Height (toe to top of dike):	34 feet
Free Water Volume:	900 Acre-feet	Maximum Water Storage:	1,100 Acre-feet
Estimated CCB Storage:	100 Acre-feet	Dike Length:	2,000 feet
Plant Discharge to Facility:	0 (discharge from gypsum stack only)	Current Pool Elevation:	477

2. Site Visit Information

Stantec Assessment Team:	Rob Kirkbride, PE; Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 6, 2009
Weather/Site Conditions:	35 degrees F, sunny, windy

3. History/Description of Usage

History and Operation:	The Scrubber Sludge Complex is located in the southwest corner of the TVA reservation. The Stilling Pond is located to the south of the East Pond and consists of an upper stilling pond and a lower clarification pond. Water is discharged from the gypsum pond through two vertical spillways in the northwestern corner of the upper stilling pond, then through a TVA standard vertical riser spillway into the lower pond. From the lower pond, water is emptied into a ditch which flows into Jacob's Creek Ash Pond. The dike between the upper and lower stilling pools was part of the original earthfill starter dike of the Scrubber Sludge Complex.
Past Failures/Releases:	No failures or releases reported.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.
TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	The outlets of the finger drains were noted to be clogged by vegetation. There were small trees and brush noted to be pulled up on the south slopes.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	10W4280-12R1, 10W4280-13R1, 10W4280-16R0, 10W4280-17R1, SK-1, SK-2
TVA As-Built Drawings:	10W4280-1R1, 10W4280-3R1, 10W4280-4R1, 10W4280-6R1, 10W4280-7R1
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1986 to 2008.
Geotechnical Data:	Limited data includes lab results, but difficult to tell specific locations of soil borings. (File: Paradise Geotechnical Data.pdf). Summary of soil parameters from unknown source (File: PAF SCRUBBER SLUDGE DISPOSAL AREA SUMMARY SOIL PROPERTIES ATTACHMENT 1.pdf)

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	The interior slopes consisted mainly of thick phragmites growth, especially near the pool level on both the upper and lower ponds. There was also grass and brush growth intermixed with the phragmites.
Trees:	There were some smaller trees on the south slope of the upper pond. Some of these have since been removed in accordance with Stantec recommendations.
Wave Wash Protection:	Some sparse rip-rap protection was located on the south slopes of the upper pond. It was not uniformly placed, and the stone diameter varied from 6 inches up to 2 feet.
Erosion:	Wave erosion was noted on the south slope of the upper pond. The bottom 1 to 3 feet of the slope had eroded into the pond, leaving a bare, vertical slope. The north side of the upper pond showed erosion and sloughing at the toe, but thick phragmites made it difficult to observe the extents. This area is the exterior slope of the Scrubber Sludge Complex and observations and recommendations for this area are discussed in more detail in the summary for that structure.
Instabilities:	The sloughing on the north side which was mentioned above is discussed in more detail in the summary for the Scrubber Sludge Complex.
Animal Burrows:	None observed.
Freeboard:	**Measured:** 8 feet (estimated) **Design:** 4 feet (minimum)
Encroachments:	Current (March 2009) stabilization to the Gypsum Stack dikes near the Stilling Pond inflow is encroaching into the northwest corner.
Slope:	**Measured:** 3H:1V (estimated) **Design:** 3H:1V

6.2. Crest

Crest Cover and Slope:	The crest of the south slope of the upper pond is used as a road to access the Gypsum Pond. There is some gravel on the roadway, but bare earthfill (mine spoil) which was used to construct the dike is mostly visible. There is very little grass cover except on the edges of the crest. It is relatively level.
Erosion:	None observed.
Alignment:	Appears to follow the original design.
Settlement/Cracking:	None observed.
Bare Spots/Rutting:	Some vehicular ruts were noted, nothing significant.
Width:	**Measured:** 19 to 22 feet (south crest of upper pond) **Design:** 16 feet

6.3. Exterior Slopes

Vegetation:	The south slope of the upper pond has sparse grass and weeds covering the upper portion of the slope. The lower portion of the slope near the bottom pond has thick phragmites growth, especially near the pool level.
Trees:	There were trees of varying sizes noted during the initial assessment. Most of these have since been removed by HED in accordance with Stantec recommendations.
Erosion:	One significant erosion gulley was noted running adjacent to a rip-rap channel from the intermediate bench to the lower pond. The gulley was located near the west side of the lower pond and measured 4 to 5 feet wide, 2 to 3 feet deep, and about 30 feet long. Some minor erosion was also noted throughout the slope.
Instabilities:	None observed.
Uniform Appearance:	Uniform slopes.
Seepage:	There was some ponding of water on the inside of the intermediate bench. It appeared to be runoff which was pooled due to poor drainage and collected at a low point on the bench.

Benches:	There was one intermediate bench on the slope, it was located adjacent to the lower pond, and did not extend to the west end of the upper pond slope.
Foundations, Drains, Relief Wells, Instrumentation:	The original chimney drains which were installed during the starter dike construction for the gypsum pond were installed along the length of the stilling pond dike. There were 7 finger drain outlets shown in the designs along the length of the stilling pond dike. Only one was found during the site visit, and it appears most have been covered by vegetation and sedimentation. No instrumentation was found.
Animal Burrows:	Numerous small (1 to 2 inch) burrows were noted along the bottom portion of the slope.
Slope:	**Measured:** 3H:1V (estimated) **Design:** 3H:1V
Height:	**Measured:** 10 to 15 feet to bench (estimated) **Design:** Up to 34 feet (entire slope)

6.4. Spillway Weirs/Riser Inlets

Number:	1 (located in eastern portion of upper pond)
Size, Type and Material:	Assumed 48 inch concrete push-together manhole riser structure with skimmer.
Height of Riser Inlets:	Unable to measure.
Access:	Located in pond, no access.
Joints:	Assumed push-together, unable to observe.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	None observed.

6.5. Outlet Pipes

Number:	One (1) (from upper pond to lower pond)
Size, Type and Material:	36 inch reinforced concrete pipe.
Headwall:	Some rip-rap and poured concrete around outlet, top of outlet pipe is about 1 foot below pool level in lower pond, difficult to observe.
Joint Separations:	Unable to observe, pipe is buried.
Mis-Alignment:	Unable to observe, pipe is buried.
Closed/Abandoned Conduits:	None observed.

7. Notable Observations and Concerns

- The south dike of the scrubber sludge stilling pond was originally constructed as part of the original gypsum pond to hold scrubber sludge. The design drawings (10W4280-1 Rev 1 and 10W4280-3 Rev 1) show the dike was constructed with earthfill which is believed to be mine spoil. After the West and East Ponds were separated in the 1990's the current upper stilling pond was converted into the clarification pond to receive decanted water from the gypsum ponds. The lower stilling pond accepts decanted water from the clarification pond through the original Type B spillway in the eastern corner of the pond. The only dike above the surrounding ground is the south dike separating the upper stilling pond from the lower pond. The exterior slopes were approximately 3H:1V as observed in the field, which is consistent with the design drawings.
- Some wave erosion on the interior slopes was observed on the south side of the upper stilling pond. The erosion was 1 to 3 feet high near the pool level. Some sporadic rip-rap protection had been placed on the interior slopes, but there was no consistency around the dikes.
- There was a rip-rap channel from the intermediate bench between the two stilling ponds that extended to the toe of the slopes. An erosion gulley has formed running parallel next to the rip-rap channel and was 4 to 5 feet wide at the bench level. (Photo GSP-1)

- At the time of the initial observations there was dense vegetation on the exterior south slopes, including trees of varying sizes. In accordance with Stantec recommendations, HED personnel mowed the slopes and removed trees in the area. However, some thick vegetation, mainly phragmites, still remain on the lower portion of the slope near the pool level of the lower pond. This makes it difficult to fully observe the slopes in these areas. (Photo GSP-2)
- There are several inactive sluice lines and potentially abandoned spillway pipes from the East and West Pond that outlet in the west and north banks of the stilling pond. The concerns and recommendations regarding these structures are covered in the Phase 1B report for the Scrubber Sludge Complex - Gypsum Stack.
- There is a 12 inch HDPE drainage pipe from the toe drainage ditch of the east side of the East Pond that outlets under an access road into the eastern corner of the stilling pond. The outlet end of the pipe is partially filled with sediment, and there is dense phragmites growth in the drainage channel leading to the stilling pond causing the water to pond and not flow properly into the pond.
- RCP push-together riser structure spillways are a concern. There is the possibility for leakage at the joints between sections. The upper stilling pond has one 36 inch Type B push-together spillway structure (Drawings 10W4280-3 Rev 1 and 10W4280-6 Rev 1) which decants water into the lower stilling pond. The outlet of the spillway pipe is under the pool level of the pond, making it difficult to observe the condition of the pipe. (Photo GSP-3)
- It appears that most or all of the Scrubber Sludge Complex Stilling Pond was constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, as-built drawings and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- Based on the limited construction records (QA/QC testing and as-built drawings) and geotechnical information available, it is recommended that a Geotechnical Evaluation be performed to determine the existing soil conditions at this facility. The initial phase would be limited to evaluation of the existing soil conditions and installation of instrumentation (piezometers and inclinometers). Based on the results obtained, additional evaluation and analysis could be needed.

- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.
- Based on observations made during the site visits and review of the documents provided, it is recommended that a hydraulic and hydrologic analysis be performed for this facility. This facility has significant flow concentrations and is critical to operation of the plant.
- It is recommended that a facility specific Operations & Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.
- It is recommended that an Emergency Action Plan be developed to identify concerns and actions necessary to effectively manage the concerns.

8.2. Maintenance Recommendations

- Continue mowing of exterior slopes and remove any remaining trees. Fill in voids left by tree removal with compacted cohesive soil.
- Continue annual inspection program and execute recommendations.
- Implement annual joint repairs of RCP risers. This spillway system may ultimately be modified or replaced, pending Stantec-TVA assessment of replacement system. Monitor until that time.
- Repair erosion areas on interior slopes, and line with rip-rap to help reduce future wave erosion. Repair erosion on exterior slopes and widen rip-rap ditch to reduce future erosion.
- Clean out the drainage channel in the eastern corner of the stilling pond from all phragmites and dense vegetation. Line the channel with filter fabric and rip-rap and grade to promote drainage into the stilling pond.
- The pool level of the lower stilling pond should be lowered below the invert of the spillway outlet in order to facilitate observations of the spillway pipe.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
East and West Dredge Cells (DC)

1. General Facility Information

Facility Status:	Inactive	NID Identification:	East: KY15010 West: KY15011
Surface Area (inside dikes)	30 Acres (East Cell) 11 Acres (West Cell)	Maximum Height (toe to top of dike):	25 feet
Free Water Volume:	N/a (East Cell) 200 Acre-feet (West Cell)	Maximum Water Storage:	N/a (East Cell closed) 300 Acre-feet (West Cell)
Estimated CCB Storage:	Unknown (East Cell) 0 (West Cell)	Dike Length:	N/A (East Cell closed) 350 feet (West Cell)
Plant Discharge to Facility:	0 (East Cell inactive and West Cell only receives storm water runoff)	Current Pool Elevation:	N/A (East Cell closed) 475 (West Cell)

2. Site Visit Information

Stantec Assessment Team:	Randy Roberts, PE; Paul Cooper, EIT; Rob Kirkbride, PE and Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 4, 2009
Weather/Site Conditions:	Mid 20 degrees F, sunny, moist ground

3. History/Description of Usage

History and Operation:	The East and West Dredge Cells were constructed in 1991 to accept dredged fly ash from the Jacob's Creek Ash Pond. Fly ash was dredged into the East Cell from 1992 to 1994. No material has been dredged into the West Cell, however it acts as a storm water control pond.
Past Failures/Releases:	No failures or releases reported.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.
TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	Seepage was noted at the toe of the East Dredge Cell during the years dredging activity took place (1992-1993). Some significant erosion was reported on exterior slopes and around the armored ditches on both cells. Since dredging stopped, no seepage has been reported.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	10W251-2R1, 10W252-1R0, 10W252-2R1, 10W252-3R0, 10W252-4R0, 10W252-5R0, 10W252-6R0,10W252-7R0, 10W252-8R0, 10W252-9R0, 10W3261-1R1, 10W3262-1R1, 10W3262-2R1, 10W3262-3R1, 10W3262-4R0, 10W3263-1R1
TVA As-Built Drawings:	10W3261-1R1, 10W3262-2R1, 10W3263-1R1
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1992 to 2008.
Geotechnical Data:	None available.

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	East Cell: Dense, tall weeds and grasses. West Cell: Dense, tall weeds and grasses and thick phragmites growth on west side, grasses and weeds on other sides.	
Trees:	East Cell: A few minor trees noted. West Cell: Some minor trees noted on west and north sides.	
Wave Wash Protection:	None observed.	
Erosion:	None observed, thick vegetation made it hard to assess slopes.	
Instabilities:	None observed.	
Animal Burrows:	A few small (1 to 2 inch) rodent holes on west side of West Cell. The west dike of the West Cell is part of the lower exterior dike of the Gypsum Stack East Pond.	
Freeboard:	**Measured:**	Greater than 10 feet on the West Cell, East Cell had very little ponded water remaining.
	Design:	5 feet (minimum) both cells
Encroachments:	None	
Slope:	**Measured:**	Approximately 1H:1V (west side of West Cell), 2.5H:1V or flatter (East Cell south dike) (Estimated)
	Design:	2H:1V (West Cell), 3H:1V (East Cell)

6.2. Crest

Crest Cover and Slope:	East Cell - Dense brush, weeds and phragmites. Relatively level. West Cell - Phragmites and other weeds. Relatively level.
Erosion:	None observed.
Alignment:	Appears uniform.

Settlement/Cracking:	None observed.
Bare Spots/Rutting:	None observed, and this area does not have any significant vehicular traffic.
Width:	**Measured:** East: 25 to 30 feet (estimated) **Design:** 16 feet (both)

6.3. Exterior Slopes

Vegetation:	The only exterior slopes constructed were on the south sides of the East Cell and West Cell. Dense grass and weeds are present on the entire south slope of the East Cell and the West Cell has adequate vegetation in good condition.
Trees:	A few trees were noted on the south slope of the East Cell. Most were medium sized (6"-12").
Erosion:	Some major erosion gullies were noted at both cells. The East Cell has an erosion gulley (3 feet wide and 3 feet deep) to the west of the south dike adjacent to a former access road. TVA has previously identified an erosion gulley next to an armored ditch at the northeast corner of the dike. It was measured approximately 4 feet deep and 8 feet wide and over 100 feet long. The west cell has several erosion gullies at the two corners of the south dike. These have been identified in previous TVA annual reports and have not seemed to worsen. The largest was on the east side of the spillway and was 12 feet wide and up to 3 feet deep at its beginning.
Instabilities:	None observed.
Uniform Appearance:	The slopes exhibit a fairly uniform slope, the vegetation makes it difficult to observe.
Seepage:	None observed during Stantec assessment, previous TVA inspection reports noted seepage at the toe of the East Cell during the years of dredging activity.
Benches:	Portions of the East Cell dike contain one or two intermediate benches.
Foundations, Drains, Relief Wells, Instrumentation:	None observed.

Animal Burrows:	None observed.	
Slope:	**Measured:**	2H:1V to 3H:1V (Estimated)
	Design:	3H:1V (both cells)
Height:	**Measured:**	Not measured
	Design:	Varies, East Cell up to ~55 feet, West Cell up to ~25 feet

6.4. Spillway Weirs/Riser Inlets

Number:	2 (One in East Cell, One in West Cell)
Size, Type and Material:	Both are 48 inch diameter, half sections of CMP fully bituminous coated spillway riser (14 gage minimum), with 2 inch x 6 inch riser boards.
Height of Riser Inlets:	According to the plans - East Cell 32 feet and West Cell 26.9 feet.
Access:	East Cell is mostly drained, and the riser is surrounded by dried dredged material. West Cell is in the pond and inaccessible.
Joints:	Can not be observed in the field. Plans show continuous welding between riser pipe and spillway outlet pipe.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	Unknown if East Cell spillway has been properly abandoned.

6.5. Outlet Pipes

Number:	2 (One in East Cell, One in West Cell)
Size, Type and Material:	East Cell outlet could not be located in the field, plans show both Cell spillway outlets to be 30 inch fully bituminous coated CMP (14 gage minimum.)
Headwall:	No headwall, but there is a rip-rap layer underlain by filter blanket shown on plans.
Joint Separations:	None observed.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	Unknown abandonment procedures of East Cell spillway.

7. Notable Observations and Concerns

- The exterior and interior slopes have good vegetative cover, and there are a few areas with isolated storm water runoff erosion problems. (Photo DC-2)
- The East Cell appears to be mostly drained of free water, but the West Cell still is retaining a large amount of water and the decant spillway structure is still in use for storm water control. Abandonment procedures for the East Cell weir structure are unknown. (Photo DC-1)
- The interior slopes of the west side of the West Dredge Cell also serve as exterior slopes for the East Pond of the Scrubber Sludge Complex - Gypsum Stack. According to TVA documents, no material was ever dredged into the West Cell. The toe of the slope (pond bottom) consists of unknown material composition. (Photo DC-3)
- It is possible that the East and West Dredge Cells were constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, complete as-built drawings, closure plans and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- If the East Cell spillway is no longer in use or has not been properly abandoned, an abandonment plan should be developed and implemented.
- Based on the limited construction records (QA/QC testing and as-build drawings) and geotechnical information available, it is recommended that a Geotechnical Evaluation be performed to determine the existing soil conditions at the East and West Cells. The initial phase would be limited to evaluation of the existing soil conditions and installation of instrumentation (piezometers and inclinometers). Based on the results obtained, additional evaluation and analysis could be needed.
- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.

- Based on observations made during the site visits and review of the documents provided, it is recommended that a hydraulic and hydrologic analysis be performed for this facility. This facility has significant flow concentrations
- It is recommended that a facility specific Operations & Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.
- It is recommended that an Emergency Action Plan be developed to identify concerns and actions necessary to effectively manage the concerns.

8.2. Maintenance Recommendations

- Erosion should be repaired and monitored for future deterioration.
- Access road and perimeter ditches should be lined with rip-rap and graded to promote positive drainage.
- Continue mowing of exterior and interior slopes on both cells.
- Continue annual inspection program and execute recommendations.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
Jacob's Creek Ash and Stilling Ponds (JCAP)

1. General Facility Information

Facility Status:	Inactive	NID Identification:	KY15006
Surface Area (inside dikes)	73.9 Acres	Maximum Height (toe to top of dike):	34 feet
Free Water Volume:	1,500 Acre-feet	Maximum Water Storage:	2,000 Acre-feet
Estimated CCB Storage:	1200 Acre-feet	Dike Length:	4,500 feet
Plant Discharge to Facility:	0 (Inactive)	Current Pool Elevation:	416

2. Site Visit Information

Stantec Assessment Team:	Rob Kirkbride, PE and Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 4, 2009
Weather/Site Conditions:	20 Degree F, frozen ground, sunny

3. History/Description of Usage

History and Operation:	The Jacob's Creek Ash and Stilling Ponds are located southeast of the powerhouse. Water originally flowed through a divider dike with a floating boom skimmer structure and into the stilling pond before being discharged into Jacob's Creek via three TVA standard spillways. The skimmers and floating boom in the stilling pool have been removed and the opening in the divider dike filled. Water now flows through a dike breach in the southwest portion of the ash pond then into the Peabody Ash Pond Extension.
Past Failures/Releases:	Some surface sloughing was noted on the south dike just west of the divider dike and on the northwest dike, mostly caused by equipment travel and road maintenance for the Ash Pond Extension which has undercut the toe.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.
TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	The sluice lines were noted to be operating in a submerged condition for a number of years, raising safety concerns during repairs and inspections. Poor drainage was noted due to sediment building and improper grading at the toe of the north dike. Some seepage was also noted through the north dike.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	10N3259R2, 10W3264R0
TVA As-Built Drawings:	10N3205R9, 10N3206R6, 10N3207R4, 10N3208R4
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1971 to 2008.
Geotechnical Data:	None available.

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	Very dense weeds and brush growth. Tall phragmites make up most of the vegetation on the interior slopes of the Ash and Stilling Ponds. The phragmites make it nearly impossible to observe the water level and slopes.
Trees:	Approximately 15 trees on the interior slopes, mostly on the Ash Pond slopes. Most are <6 inch diameter.
Wave Wash Protection:	None observed.
Erosion:	Could not observe thoroughly due to the thick vegetation.
Instabilities:	Could not observe thoroughly due to the thick vegetation.
Animal Burrows:	None observed. Difficult to access.
Freeboard:	**Measured:** 6 to 7 feet **Design:** 4 feet
Encroachments:	Primarily dense vegetation.
Slope:	**Measured:** 2H:1V (Estimated) **Design:** 2H:1V

6.2. Crest

Crest Cover and Slope:	Mostly bare, some gravel. Design shows a 5% grade towards pond, crest was observed to be mostly flat.
Erosion:	Several small erosion gullies, likely due to ponding water in ruts. Around 2 inches deep and 2 inches wide, several feet long.
Alignment:	Some minor vertical alignment differences up to 6 inches for 10 to 25 foot lengths. Likely due to vehicle rutting and regrading causing some depressions. No significant horizontal issues.
Settlement/Cracking:	None observed.

Bare Spots/Rutting:	Some bare spots with no gravel surfacing. Some ruts on the south embankment of the Ash and Stilling Pond. Approximately 6 inches deep by 6 inches wide, and 10 to 25 feet in length.
Width:	**Measured:** 16 to 18 feet **Design:** 16 feet

6.3. Exterior Slopes

Vegetation:	Dense, tall weeds and grasses along the east and south slopes of the Ash and Stilling Pond. Very thick with some small-tree like brush present. Thick vegetation made it difficult to observe the slopes.
Trees:	Approximately 20 or more trees sporadically located throughout slope. Most are 6 to12 inch diameter evergreens. Trunk was usually midway up exterior slope, majority on south dike of Ash Pond and Stilling Pond, some located on east dike.
Erosion:	Bottom 1 to 3 feet of south dike toe slumped off along majority of slope. Possibly due to toe becoming saturated and slumping off or grading of road excavating into the toe.
Instabilities:	Some minor bulging along south dike (lower 10 feet of slope) in areas where the toe has slumped/eroded off. This area should be monitored.
Uniform Appearance:	Uniform appearance except for bulging occurring in portions along the south dike. The western side of the south dike flattens out and connects to the existing ground surface. Western slope limits can not be identified because of very thick phragmites growth.
Seepage:	An area on the access road at the toe of the upper exterior slope on the south dike of the Stilling Pond was wet. There was some ponding water near the toe in several areas that were approximately 10 feet long and 2 to 3 feet wide. This could be due to a low spot on the road collecting and holding water, or potentially could be seepage. No flow was noted.

Benches:	The access road at the toe of the upper exterior slope along the eastern and south dikes of the Stilling Pond was the crest of the original dike. This now forms a bench which separates Jacob's Creek Pond from the Peabody Ash Pond to the south, and from the spillway outlet to the east.	
Foundations, Drains, Relief Wells, Instrumentation:	No instrumentation found	
Animal Burrows:	None observed.	
Slope:	**Measured:**	2.5H:1V or flatter
	Design:	2.5H:1V
Height:	**Measured:**	Approximately 15 feet maximum to access road (estimated)
	Design:	Varies, 9 to10 feet typical

6.4. Spillway Weirs/Riser Inlets

Number:	3
Size, Type and Material:	Probable 48 inch diameter, RCP push together manhole risers in northern portion of Stilling Pond
Height of Riser Inlets:	Estimate 15 feet based on design drawings.
Access:	Walkway near middle of three spillways provides limited access.
Joints:	Push together joints, seals between sections unknown. Skimmer has been removed and water is not currently flowing over weirs, but flow can be heard in all 3 structures. Likely leakage through joints allowing flow.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	Potentially abandoned spillways mentioned in section below.

6.5. Outlet Pipes

Number:	3
Size, Type and Material:	36 inch concrete Class IV pipe, approximately 170 feet long from riser to outlet.
Headwall:	None, but rip-rap and filter blanket placed below pipe outlets
Joint Separations:	None observed, however, flow could be heard at the riser inlets for all three pipes, and flow was observed at the outlets for all three spillways.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	Two potentially abandoned Type B Spillways in northeastern corner of the Stilling Pond just north of three current spillways. Drawing 10N3207R4 shows the two spillways that received a 6 foot concrete plug at the upstream and downstream ends of the spillway pipe. The outlets of the spillways could not be located in the field on the slope where they are shown on the design drawing. From the drawings it appears the ends of the pipe outlets may have been cut off at a point within the slope.

7. Notable Observations and Concerns

- The design drawings show the Jacob's Creek Ash and Stilling Pond dikes were constructed using earthfill (labeled as spoil material) on top of the existing ground surface. The dikes that are significantly above the surrounding ground are located on the east and south dikes of the Stilling Pond and the south dike of the Ash Pond. The initial dike was raised from elevation 411 to 420 placing earthfill on top of sluiced ash fill. This method of construction is a potential slope stability concern.
- The exterior slopes of both the Ash and Stilling Ponds contain several large and many small trees located sporadically along the entire length of the embankments. (Photo JCAP-2)
- The toe of the exterior slope along the southern portion of the Stilling Pond and Ash Pond embankments had erosion in the bottom 1 to 3 feet. There was also ponding water on the access road immediately below the toe. The ponding water could be due to some seepage at the toe, or possibly from poor drainage of the road. The exterior slopes were also steep in some of these areas. This erosion and saturated conditions in steep sloped areas could potentially be a slope stability concern. (Photo JCAP-3)

- RCP push-together riser structure spillways are a concern. The Jacob's Creek Stilling Pond has three of these structures in the northeast corner of the pond. During the assessments, flow through the joints could be heard and water flow was observed coming from the outlet ends of all three spillway pipes. (Photo JCAP-1)
- The construction drawings (10N3205 REV 9 and 10N3207 REV 4) show two abandoned Type B Spillways in the northeastern corner of the stilling pond just north of the three current spillways. These concrete spillway pipes were supposedly abandoned with a concrete plug on both the upstream and downstream end. The upstream inlet of the pipe is now under the current pool level and the outlet end of the spillway could not be found in the field to evaluate the abandonment procedures.
- It is possible that the Jacob's Creek Ash and Stilling Ponds were constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, complete as-built drawings and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- Based on the limited construction records (QA/QC testing and as-built drawings) and geotechnical information available, it is recommended that a Geotechnical Evaluation be performed to determine the existing soil conditions at this facility. The initial phase would be limited to evaluation of the existing soil conditions and installation of instrumentation (piezometers and inclinometers). Based on the results obtained, additional evaluation and analysis could be needed.
- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.
- This facility has a significant storage volume. Based on observations made during the site visits and review of the documents provided, it is recommended that a hydraulic and hydrologic analysis be performed for this facility.

- It is recommended that a facility specific Operations & Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.
- It is recommended that an Emergency Action Plan be developed to identify concerns and actions necessary to effectively manage the concerns.

8.2. Maintenance Recommendations

- Monitor the area near the current spillway outlets for increased flow due to leakage through riser joints. Also monitor for leakage through the ground surface coming from potential abandoned spillways that could be caused by improper abandonment procedures.
- Continue mowing of exterior slopes and remove trees. Fill in voids left by tree removal and compact with cohesive soil.
- Continue annual inspection program and execute recommendations.
- Implement annual joint repairs of RCP risers. This spillway system may ultimately be modified or replaced, pending Stantec-TVA assessment of replacement system. Monitor until that time.
- Repair erosion areas on exterior slopes and monitor areas for increased seepage or saturated conditions.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
Peabody Ash and Stilling Ponds (PAP)

1. General Facility Information

Facility Status:	Active	NID Identification:	KY15007
Surface Area (inside dikes)	137.3 Acres	Maximum Height (toe to top of dike):	18 feet
Free Water Volume:	3,000 Acre-feet	Maximum Water Storage:	3,500 Acre-feet
Estimated CCB Storage:	600 Acre-feet	Dike Length:	5,500 feet
Plant Discharge to Facility:	30 MGD	Current Pool Elevation:	404

2. Site Visit Information

Stantec Assessment Team:	Rob Kirkbride, PE and Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 4, 2009
Weather/Site Conditions:	20 Degrees F, frozen ground, sunny

3. History/Description of Usage

History and Operation:	The Peabody Ash and Stilling Ponds were put into service in 1997. The area is located adjacent to and south of the existing Jacob's Creek Fly Ash Disposal Area. Dikes in the southern and eastern portion of the area were raised from approximate Elevation 400 to Elevation 408. The existing dike of the Jacob's Creek Fly Ash Disposal Area was breached at the southwest end of the pond. This allows water to flow into the new pond. After the ash settles out, the water flows into a stilling pool located in the northeast portion of the pond through a divider dike with a floating boom. Water is then discharged through three 48 inch riser spillways to Jacob's Creek.
Past Failures/Releases:	No failures or releases reported.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.
TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	All annual inspections prior to 2005 mention beaver activity in the northern portion of the pond. The access stairway to the discharge point of the spillways was also noted as an unsafe condition. The wooden platform to access the carbon dioxide lines was also in need of repairs.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	10W293-1R1, 10W3274-1R1, 10W3274-2R1, 10W3274-3R0, 10W3274-4R1, 10W3274-5R1, 10W3274-6R1
TVA As-Built Drawings:	None available.
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1998 to 2008.
Geotechnical Data:	Limited data includes lab results, but difficult to tell specific locations of soil borings. (File: PAF RESULTS OF GEOTECHNICAL TESTING ASH DISPOSAL AREA MAY 23 2005.pdf)

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	Dense, very tall phragmites growth along entire east and south dike interior slopes. Some sparse grass present.
Trees:	None observed.
Wave Wash Protection:	None observed.
Erosion:	Approximate 10 foot wide areas of wave erosion at several locations with no vegetation. Erosion is occurring at the bottom 2 to 3 feet of the slope above pool level. Could be present in more areas that could not be observed because of dense phragmites growth.
Instabilities:	None observed.
Animal Burrows:	Several observed near the pool level on the slopes. Could be many more that are impossible to locate due to thick vegetation. Several animal trails to the pond were observed but no significant ruts were observed.
Freeboard:	**Measured:** 4 to 6 feet **Design:** 4 feet (minimum)
Encroachments:	None
Slope:	**Measured:** approximately 2H:1V **Design:** 2.5H:1V

6.2. Crest

Crest Cover and Slope:	Gravel on crest, compacted and good drivable access road. Fairly flat.
Erosion:	None observed.
Alignment:	Some significant horizontal bends in crest that follow original dike design and pond alignment. No other alignment issues observed.
Settlement/Cracking:	None observed.

Bare Spots/Rutting:	No significant ruts observed.
Width:	**Measured:** 15 to18 feet **Design:** 16 feet

6.3. Exterior Slopes

Vegetation:	Mostly brush and weeds with some intermingled grass. Dense brush and weeds along entire east and south dikes on exterior slopes, up to several feet tall in areas. Makes it difficult to observe slopes in areas.
Trees:	There are many trees on the east dike below the intermediate bench down to the toe. This was the original dike that was left undisturbed when the initial/impounding dike was constructed. Most of the trees are 12 inch diameter or less, but there are some larger trees. There are a few trees on the upper portion of the exterior slope.
Erosion:	One significant erosion gulley observed on the east slope adjacent to the divider dike between the Ash and Stilling Ponds. Gulley extended from intermediate bench down slope towards toe and measured 4 feet wide at the bench, up to 2 feet deep and 30 feet long down the slope. The gulley seemed to originate from a low point on the bench where water collects and flows over the bench and down the slope.
Instabilities:	One significant slide noted on the eastern dike, approximately midway along the eastern dike of the Stilling Pond. The slide measured 11 feet wide by 27 feet down the slope and occurred from the outer edge of the intermediate bench and extended to the toe of the slope. A severed white PVC pipe was noted in the slide, the pipe ran parallel to the crest. No flow was noted coming from the pipe. It is unclear if the pipe was severed by the slide, or a leak in the pipe contributed to the failure. This slide could be due to poor drainage that created wet conditions at a low point in the bench.
Uniform Appearance:	Lower portion of slope from bench down slope varied in slope and alignment. It was left undisturbed from its original condition and there are steep (1H:1V and steeper) areas as well as locations of flatter slopes.

Seepage:	None observed, but the steep slopes and the creek running parallel to lower exterior slope make it difficult to observe seepage on the slope.	
Benches:	One intermediate bench, which appears to be the crest of original existing dike prior to construction of the initial earthfill dike for impoundment. The bench is poorly graded and ponds water in several areas. No drainage features are available to allow runoff water to flow from the bench into the creek.	
Foundations, Drains, Relief Wells, Instrumentation:	None observed.	
Animal Burrows:	None observed.	
Slope:	**Measured:**	1H:1V (Lower) 3H:1V (Upper) (estimated)
	Design:	3H:1V or flatter (Upper)
Height:	**Measured:**	Varies significantly (12 to 20 feet)
	Design:	Varies (approximately 15 feet at typical section)

6.4. Spillway Weirs/Riser Inlets

Number:	3
Size, Type and Material:	RCP manhole risers, appear to be 48 inch riser with CMP skimmers.
Height of Riser Inlets:	Not observable. Drawing shows approximate height of 8 feet.
Access:	Walkway near middle of three spillways provide limited observation. The other spillways are within the stilling pond off the bank.
Joints:	Assumed push together joints. Constant flow over the top so leakage could not be determined.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	None observed.

6.5. Outlet Pipes

Number:	3
Size, Type and Material:	36 inch RCP pipes, approximately 400 feet long.
Headwall:	An observation hatch was located near the outlet on each pipe. Rip-rap was placed around the three pipe outlets and down slope where the water is discharged.
Joint Separations:	Unable to observe.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	An existing permitted Peabody Discharge was shown on Drawing 10W3274-1R1 in the SW portion of the dike. A pipe could not be found in the area, but a rip-rap channel from the slope to the toe was found. The channel discharged into a small channel which fed into Jacob's Creek. The rip-rap channel was located at the apparent location of the discharge. No flow was noted coming through the rip-rap.

7. Notable Observations and Concerns

- The Peabody Ash and Stilling Ponds were constructed using earthfill on top of an existing dike separating the original ponds from Jacob's Creek. The exterior lower slope consists of the original unaltered dike, which was not to be disturbed according to the design drawings. This original dike has some areas with steep (1H:1V or steeper) slopes and the entire section of the dike, which forms the east and south embankments of the Ash Pond, contains large trees and brush. (Photo PAP-3)
- One significant slope slide was observed on the original existing dike on the east side of the Stilling Pond exterior embankment. The slide extends from the intermediate bench (top of original dike) to the toe of the slope. Within the slide zone a severed pipe was also observed. The white PVC pipe runs parallel with the crest, and no visible flow was coming from either severed end. It is unknown whether the PVC pipe caused or contributed to the failure. (Photos PAP-1 and PAP-2)
- The design drawings for the Peabody Ash Pond state a minimum of 4 feet of available freeboard must be maintained at all times. There are some areas of the Ash Pond where the freeboard is slightly less than the required amount, as it was measured at several locations to be between 3 and 4 feet. (Photo PAP-4)

- The sluice channel on the west side of the Ash Pond which directs sluiced water/ash mixture into the Pond has dense phragmites growth making it difficult to observe and monitor the channel.
- The design drawings show that the current dike (elevation 408.5) will be raised in the future to elevation 420. The raised dike will be constructed inward on top of sluiced ash fill. This method of upstream construction on sluiced ash fill is a slope stability concern.
- The use of RCP push-together riser structure spillways is a concern. There is the possibility for leakage at the joints between sections.
- Several small areas of wave erosion were observed on the interior slopes near the pool level.
- It is possible that the Peabody Ash and Stilling Ponds were constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, as-built drawings and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- Based on the limited construction records (QA/QC testing and as-built drawings) and geotechnical information available, it is recommended that a Geotechnical Evaluation be performed to determine the existing soil conditions at this facility. The initial phase would be limited to evaluation of the existing soil conditions and installation of instrumentation (piezometers and inclinometers). This facility would require additional phases due to the existing slope stability concerns and the critical nature of this facility with plant operations.
- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.

- This facility has a significant storage volume. Based on observations made during the site visits and review of the documents provided, it is recommended that a hydraulic and hydrologic analysis be performed for this facility. This facility has significant flow concentrations and is critical to operation of the plant. The freeboard is also a concern due to the large capacity of this facility.
- It is recommended that a facility specific Operations & Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.
- It is recommended that an Emergency Action Plan be developed to identify concerns and actions necessary to effectively manage the concerns.

8.2. Maintenance Recommendations

- Monitor freeboard conditions periodically. If the available freeboard continues to decrease, a plan must be developed to lower the pool elevation of the Ash Pond.
- Continue mowing of exterior slopes and remove trees. Fill in voids left by tree removal with compacted cohesive soil
- Continue annual inspection program and execute recommendations.
- Implement annual joint repairs of RCP risers. This spillway system may ultimately be modified or replaced, pending Stantec-TVA assessment of replacement system. Monitor until that time.
- Repair erosion areas on interior slopes, and line with rip-rap to help reduce future wave erosion.
- Clean out the sluice channel of all phragmites and dense vegetation to assist with future observations. If the rip-rap lining is missing or void in areas place rip-rap to provide consistent erosion protection within remainder of channel.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
Slag Mountain (SM)

1. General Facility Information

Facility Status:	Inactive placement, active reclamation	NID Identification:	N/A
Surface Area (inside dikes)	N/A	Maximum Height (toe to top of dike):	50 feet (varies)
Free Water Volume:	N/A	Maximum Water Storage:	N/A
Estimated CCB Storage:	Unknown	Dike Length:	N/A
Plant Discharge to Facility:	0 (Inactive)	Current Pool Elevation:	N/A

2. Site Visit Information

Stantec Assessment Team:	Roger Denick, PE; Ryan Riker; Rob Kirkbride, PE; Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 6, 2009
Weather/Site Conditions:	Mid 40 degrees F, sunny

3. History/Description of Usage

History and Operation:	Boiler slag was stacked to create Slag Mountain during earlier years of the plant operation and is currently being reclaimed for commercial use by Reed Minerals. Slag Mountain is not a conventional dry stack with only exterior slopes, because of the reclamation of material, interior slopes and depressions have been formed. There is one internal dike to contain runoff water during the reclamation.
Past Failures/Releases:	Annual reports indicate a previous slough occurred that encroached into Jacob's Creek, but details are limited.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.
TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	Previous slough that encroached into Jacob's Creek, details are limited.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	10W4272-1 R0, 10W4272-2 R0
TVA As-Built Drawings:	None available;
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1980 to 2008.
Geotechnical Data:	Limited data includes lab results, but difficult to tell specific locations of soil borings. (File: PAF ASH DISPOSAL AREA RECLAMATION SUBSURFACE INVESTIGATION MAY 1991.pdf)

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	Bare slag material. No vegetation was present on the interior slopes. They were formed by material being reclaimed from the original stack.	
Trees:	None observed.	
Wave Wash Protection:	None observed, no actual pool was present, just ponding areas from storm water runoff	
Erosion:	Erosion gullies present on all interior slopes. The steep, unprotected slopes were prone to severe erosion.	
Instabilities:	Steep unprotected slopes are susceptible to slope instability, including severe erosion.	
Animal Burrows:	None observed.	
Freeboard:	**Measured:**	40 to 50 feet above ponding areas formed by reclamation
	Design:	N/A (Not designed to hold water)
Encroachments:	None	
Slope:	**Measured:**	1H:1V (east), steep on all sides
	Design:	N/A (No interior slopes shown)

6.2. Crest

Crest Cover and Slope:	Grass and brush on the north and west sides, not maintained and generally too tall. South and east sides have bare to sparse vegetation. Slope varies.
Erosion:	One significant erosion gulley located on east dike cut 4 feet into the crest and extended down slope to the pond below. The gulley measured 5.5 feet wide at the crest.
Alignment:	No design plan to show alignment after reclamation. Slopes constantly changing as material is removed.
Settlement/Cracking:	None observed.

Bare Spots/Rutting:	Crest is bare with no vegetation on south and east dikes.	
Width:	**Measured:**	16 feet (east) 4 feet (northeast)
	Design:	No drawings available.

6.3. Exterior Slopes

Vegetation:	Dense, tall grass and brush on all sides of exterior slopes. Had trouble observing due to the thick vegetation.	
Trees:	Trees of varying sizes were noted on all sides of the embankments. Especially prevalent on the south and east dikes.	
Erosion:	Could not thoroughly observe due to steep slopes and dense vegetation	
Instabilities:	Could not thoroughly observe due to steep slopes and dense vegetation	
Uniform Appearance:	Differences in slopes on sides of the dike. Dike was formed by placing material and reclaiming material in some areas and has lead to non-uniform appearance.	
Seepage:	Could not thoroughly observe due to steep slopes and dense vegetation	
Benches:	None observed.	
Foundations, Drains, Relief Wells, Instrumentation:	No instrumentation observed.	
Animal Burrows:	None observed.	
Slope:	**Measured:**	Varies significantly. Many very steep (1H:1V)
	Design:	Varies from 3H:1V to 20H:1V
Height:	**Measured:**	Varies. Max height approximately 50 feet.
	Design:	Estimated to be 50 feet.

6.4. Spillway Weirs/Riser Inlets

Number:	N/A
Size, Type and Material:	N/A
Height of Riser Inlets:	N/A
Access:	N/A
Joints:	N/A
Mis-Alignment:	N/A
Closed/Abandoned Conduits:	N/A

6.5. Outlet Pipes

Number:	No outlet structure was found from ponding areas discharging out of Slag Mountain. A floating pump structure was located in the southeast ponding area and pumped water through a divider dam to the northwest ponding area.
Size, Type and Material:	N/A
Headwall:	N/A
Joint Separations:	N/A
Mis-Alignment:	N/A
Closed/Abandoned Conduits:	N/A

7. Notable Observations and Concerns

- Material has been placed to significant heights over a long time span. On the east side of the mountain the exterior slopes were measured to be 1.5H:1V and had trees along the slope and the toe. The interior slope was approximately 1H:1V and had sparse vegetation. The only available design drawings (10W4272-2 Rev 0 and 10W4272-1 Rev 0) show 3H:1V to 4H:1V exterior slopes on the west side and 10H:1V on the south side. These drawings do not cover the entire area where material was stacked and is currently being reclaimed. No plans are available for the reclamation work. (Photo SM-2)

- The exterior slopes have dense vegetation and are steep making it difficult to assess the slopes.
- The interior slopes had numerous erosion channels and no erosion protection was observed on any slope. (Photos SM-4 and SM-5)
- Two interior ponds were observed flowing from the southeast to the northwest. No outlet was observed for the northwest pond. (Photos SM-1 and SM-3)
- It is possible that Slag Mountain was constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Operation and Maintenance Plan, as-built drawings and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- Based on the limited construction records (QA/QC testing and as-build drawings) and geotechnical information available, it is recommended that a Geotechnical Evaluation be performed to determine the existing soil conditions at this facility. The initial phase would be limited to evaluation of the existing soil conditions and installation of instrumentation (piezometers and inclinometers). This facility is primarily a slag pile with steep slopes, therefore, a slope stability analysis is recommended. Based on the results obtained, additional evaluation and analysis could be needed.
- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.
- It is recommended that a facility specific Operations & Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.

8.2. Maintenance Recommendations

- A pump or other drainage measures should be used to dewater all ponding areas that currently have no drainage outlet. The areas should then be regraded to allow positive drainage.
- Repair all erosion gullies. Line with rip-rap if necessary to reduce future erosion and grade to tie into existing slopes.
- Continue annual inspection program and execute recommendations.
- The vegetation on the exterior slopes needs to be mowed to facilitate observation. All bare areas should be seeded, mulched and fertilized.
- All steep interior slopes (greater than 3H:1V) need to be graded to a minimum of 3H:1V or some form of slope protection installed.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
Slag Mountain Pond 1 (SMP 1)

1. General Facility Information

Facility Status:	Active runoff collection pond	NID Identification:	N/A
Surface Area (inside dikes)	6 Acres	Maximum Height (toe to top of dike):	15 to 20 feet
Free Water Volume:	100 Acre-feet	Maximum Water Storage:	125 Acre-feet
Estimated CCB Storage:	0	Dike Length:	600 feet
Plant Discharge to Facility:	0 (storm water only direct discharge)	Current Pool Elevation:	4 to 9 feet below crest (elevation unknown)

2. Site Visit Information

Stantec Assessment Team:	Rob Kirkbride, PE and Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 4, 2009
Weather/Site Conditions:	10 degrees F, frozen ground, sunny

3. History/Description of Usage

History and Operation:	Documentation was not available for the history of this structure. This pond was constructed to receive storm water flow from operations at Slag Mountain. Storm water flows into the pond from the north and is believed to transfer the water into Jacob's Creek via an 8 inch diameter PVC pipe culvert.
Past Failures/Releases:	A 75 foot long by 4 foot section of the south dike slid into the edge of Jacob's Creek in the early 1990's. The plant personnel visually checked the area daily. The amount of seepage through the area was unknown.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.
TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	Several areas of seepage have been noted at the toe with growing deposits of minerals.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	None available.
TVA As-Built Drawings:	None available.
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1980 to 2008.
Geotechnical Data:	None available.

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	Dense, tall weeds, grasses and some phragmites. Good vegetative cover but too tall in some areas to observe slopes.
Trees:	The south dike, which is the only raised dike above surrounding ground, has many large trees up to 12 inches in diameter and some larger. The other sides of the pond are surrounded by higher ground, but trees are present on all sides of the pond.
Wave Wash Protection:	None observed.
Erosion:	Some wave erosion near the water surface (less than 5 feet deep) was observed on most of the dike. Several (3 to 8) runoff erosion gullies were observed on the interior slopes. They were sporadically located across different sides of the pond and most were 1 to 3 feet deep and 1 to 4 feet wide and extended from the crest to the water level.
Instabilities:	Could not observe south slope thoroughly due to thick vegetation and trees in southwestern portion of slope. None observed on southeast portion.
Animal Burrows:	None observed.
Freeboard:	**Measured:** 4 to 9 feet **Design:** No design drawings available
Encroachments:	None
Slope:	**Measured:** 1.5H:1V (estimated) **Design:** No design drawings available.

6.2. Crest

Crest Cover and Slope:	Mostly bare bottom slag and fines material. The south slope crest is used as an access road to get to Slag Mountain Pond 2. There is no defined crest to the north, and the NE and NW, as the surrounding ground is much higher than the pond.
Erosion:	None observed.
Alignment:	Fairly consistent horizontally and vertically. Some slight vertical differences (6 inches or so), but no significant issues.
Settlement/Cracking:	None observed.
Bare Spots/Rutting:	Some minor vehicular ruts, 2 to 3 inches deep and 3 to 6 inches wide with some standing water (frozen during assessment).
Width:	**Measured:** 25 to 35 feet **Design:** No design drawings available.

6.3. Exterior Slopes

Vegetation:	Sparse vegetation on south exterior slope, mostly weeds and some brush. Most ground cover is debris from trees (fallen leaves and branches).
Trees:	Dense trees were observed covering the south slope. Most are very tall and large (6 to 12 inch diameter) with some even bigger.
Erosion:	One significant erosion gulley was observed on the south slope. It measured 2 feet deep, 2 feet wide, and extended 15 feet down the slope (crest to toe).
Instabilities:	None observed.
Uniform Appearance:	Some areas are near vertical, while others have 3H:1V slope. Appears natural grade on exterior slope was retained during embankment construction leading to a non-uniform appearance.

Seepage:	Several red water seeps were observed below the toe of south slope. Multiple red water seeps have been identified and monitored by TVA in this area in the past. One significant seep was observed with flow (approximately up to 5 gpm) carving a 2 foot wide channel and leading towards Jacob's Creek. The flow originated from the toe of the south slope, but did not appear to be coming out of the slope. Another significant red water seepage area had some flow and was creating a large ponded area below the toe. The area measured approximately 35 feet by 20 feet and was saturated with standing water. Both seepage areas had a strong odor, and rust-colored deposits and aquatic vegetation were present in the seepage areas.
Benches:	None observed.
Foundations, Drains, Relief Wells, Instrumentation:	None observed.
Animal Burrows:	None observed.
Slope:	**Measured:** Vertical to 3H:1V (estimated) **Design:** No design drawings available.
Height:	**Measured:** 15 to 25 feet (estimated) **Design:** No drawings available.

6.4. Spillway Weirs/Riser Inlets

Number:	None observed.
Size, Type and Material:	N/A
Height of Riser Inlets:	N/A
Access:	N/A
Joints:	N/A
Mis-Alignment:	N/A
Closed/Abandoned Conduits:	Unknown.

6.5. Outlet Pipes

Number:	2 pipes (could be potential inactive inlets or outlets)
Size, Type and Material:	One 8 inch PVC pipe in west embankment and one 3 inch PVC pipe from pool level in Slag Mountain Pond 2 running over the crest to eastern corner well above pool level in Slag Mountain Pond 1.
Headwall:	N/A
Joint Separations:	N/A
Mis-Alignment:	N/A
Closed/Abandoned Conduits:	The 8 inch PVC in the western side of Pond 1 could be a potential inlet from a drainage channel or a potential outlet into a channel to the west of Pond 1. No flow was observed coming into or out of the pipe, and it was located about 1 foot above the pool level. The 3 inch PVC pipe in the eastern corner of Pond 1 is possibly a siphon drain from Pond 2 (the pipe runs into the water in Pond 2) into Pond 1. The outlet end at Pond 1 is over 10 feet above the pool level in Pond 1. The pipe is connected to an electrical box at the crest of Pond 1 (could be for pumping water into Pond 2). The pump was not operating at the time of the assessment, and looked to be inactive for some time.

7. Notable Observations and Concerns

- There are no available design drawings for Slag Mountain Pond 1. This pond was created by constructing a dike on the south side of the pond.
- There is dense vegetation on both the interior and exterior slopes in this area, including many large trees. (Photo SMP 1-4)
- The exterior slopes seem to be original ground configurations which remained undisturbed. There are areas on the south exterior dike which are very steep (1H:1V or steeper) and are potential stability concerns. One major erosion gulley was noted on the exterior slope in this area, even in an area with vegetative cover. (Photo SMP 1-3)
- There are several red-water seeps which are actively flowing at the toe of the south exterior slope. One seep area is creating a channel and flowing towards Jacob's Creek. Other seepage areas are creating ponding water and saturating the ground

below the toe. No seepage on the slope itself is evident. Several of these seeps have been identified by the plant and are periodically inspected and monitored. (Photos SMP 1-1 and SMP 1-2)

- There is an 8 inch PVC pipe on the west interior slope near the pool level which is of unknown origin. No flow was observed coming out or going into the pipe.
- There appears to be no emergency overflow structure for Pond 1. The only potential overflow mechanism is a 3 inch PVC pipe which originates at the pool level in Slag Mountain Pond 2 and runs over the crest with the outlet end approximately 10 feet above the pool level of Pond 1. An electrical box was connected to a pump for the pipe, but neither was operating. This potentially could be a siphon from Pond 2 into Pond 1.
- It is possible that the Slag Mountain Pond 1 was constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, as-built drawings and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- Based on the limited construction records (QA/QC testing and as-build drawings) and geotechnical information available, it is recommended that a Geotechnical Evaluation be performed to determine the existing soil conditions at this facility. The initial phase would be limited to evaluation of the existing soil conditions and installation of instrumentation (piezometers and inclinometers). This facility has significant seepage occurring at the toe of the dike which needs to be evaluated. Based on the results obtained, additional evaluation and analysis could be needed.
- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.
- Based on observations made during the site visits and review of the documents provided, it is recommended that a hydraulic and hydrologic analysis be performed for this facility.

- It is recommended that a facility specific Operations & Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.
- It is recommended that an Emergency Action Plan be developed to identify concerns and actions necessary to effectively manage the concerns.

8.2. Maintenance Recommendations

- Repair erosion on interior and exterior slopes and stabilize with rip-rap as needed to reduce future erosion.
- Continue annual inspection program and execute recommendations.
- Continue to periodically monitor and evaluate the red water seeps at the toe of the slope. Check for increasing flow and deposition of material. To facilitate improved monitoring, the area around the seeps and ponding should be cleared of all vegetation and debris. If noticeable changes in the volume of seepage or mineral deposition occur than an engineering analysis may have to be performed to evaluate the seepage and slope stability.
- The apparently inactive PVC pipe on the west side of the pond needs to be further investigated to determine its origin and current operating status. If it is determined the pipe is out of service or not properly abandoned, an abandonment plan needs to be formulated or the pipe removed.
- The 3 inch PVC pipe, which potentially acts as a siphon between Ponds 1 and 2, needs to be investigated to determine its origin and current operating status. If it is determined the pipe is out of service or not properly abandoned, an abandonment plan needs to be formulated or the pipe removed.
- The vegetation on the exterior and interior slopes needs to be mowed to facilitate observations. Trees present on all slopes need to be removed and the voids created need to be filled with cohesive soil and compacted.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
Slag Mountain Pond 2 (SMP 2)

1. General Facility Information

Facility Status:	Active runoff collection pond	NID Identification:	N/A
Surface Area (inside dikes)	5 Acres	Maximum Height (toe to top of dike):	20 feet
Free Water Volume:	60 Acre-feet	Maximum Water Storage:	75 Acre-feet
Estimated CCB Storage:	0	Dike Length:	700 feet
Plant Discharge to Facility:	0 (storm water only direct discharge)	Current Pool Elevation:	3 to 8 feet below crest (elevation unknown)

2. Site Visit Information

Stantec Assessment Team:	Rob Kirkbride, PE and Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 4, 2009
Weather/Site Conditions:	10 degrees F, frozen ground, sunny

3. History/Description of Usage

History and Operation:	Documentation was not available for the history of this structure. This pond was constructed to receive storm water flow from operations at Slag Mountain. Storm water flows into the pond from the north and discharges through a rip-rap lined open channel at the northeast corner of the pond. Flow then empties into Jacob's Creek.
Past Failures/Releases:	No failures or releases reported.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.

TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	Several seeps have been noted along the toe of the south dike. Overtopping of the dike in the area of the spillway has previously occurred because debris was blocking the spillway.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	None available.
TVA As-Built Drawings:	None available.
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1980 to 2008.
Geotechnical Data:	None available.

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	Dense vegetation (tall grass, weeds and phragmites) in most areas with a some bare spots. Debris (leaves and branches) from all the trees covers much of the slopes.
Trees:	Dense amount of trees on the interior slope of the south-southeast dike. The surrounding ground on the other sides of the pond is well above the pool level, the south-southeast dike is the only actual dike. There are many medium (6 to 12 inch) and larger trees (greater than 12 inches) across the entire length of the south-southeast dike. The other banks of the pond all contain a dense amount of trees as well.

Wave Wash Protection:	None observed.
Erosion:	Some wave erosion near the water surface (less than 5 feet deep) was observed on most of the dike. Several (5 to 10) runoff erosion gullies were observed on the interior slopes. They were sporadically located across different sides of the pond and most were 1 to 3 feet deep and 1 to 5 feet wide and extended from the crest to the water level.
Instabilities:	None observed.
Animal Burrows:	Numerous 1 to 2 foot diameter holes near pool level on most sides of the pond. Presumed to be beaver or muskrat holes. Also several animals trails through vegetation to the pond, no serious ruts.
Freeboard:	**Measured:** 3 to 8 feet **Design:** No design drawings available.
Encroachments:	None
Slope:	**Measured:** 2H:1V to 2.5H:1V **Design:** No design drawings available.

6.2. Crest

Crest Cover and Slope:	Mostly bare earth, some sporadic grass and debris from trees on crest and slopes (leaves and branches).
Erosion:	Some minor erosion along portions of the south-southeast dike crest (several inches wide and deep).
Alignment:	Both horizontal and vertical alignment follows no specific symmetry. There are vertical elevation differences of up to 10 feet along the south dike, and the elevation varies significantly, sloping up and down several times. The horizontal alignment is not as variant as the vertical, but still has no clear symmetry. The width of the embankment becomes very narrow (approximately 5 feet) at points along the south-southeast dike.
Settlement/Cracking:	None observed.
Bare Spots/Rutting:	No rutting. Vehicular traffic can not travel on crest due to trees and slope variations. Vegetation has not been established along the entire crest. It appears only what has grown naturally is present.

Width:	**Measured:**	5 to 15 feet (South-southeast crest)
	Design:	No design drawings available.

6.3. Exterior Slopes

Vegetation:	Sparse grass cover, mostly bare earth with debris from trees on slope (leaves and branches)
Trees:	Dense trees, middle sized (6 to 12 inches) to large (greater than 12 inches) along entire length of south-southeast slope from crest to toe and beyond. Several have fallen with root ball still intact and pulled from ground.
Erosion:	Some minor erosion due to runoff at low points along the crest.
Instabilities:	One slide has occurred on the western portion of the south exterior slope. Slide is 40 feet long along crest, and 22 feet vertically from crest edge to bottom (toe of slope). The remaining slope is very steep (steeper than 1H:1V) and the crest is approximately 5 feet wide along the slide length. A tree in the failure area has fallen with the root ball still intact and pulled from the ground.
Uniform Appearance:	Very non-uniform appearance. Slope is near vertical in some areas along south dike and flatter (3H:1V) towards the southeast. The vertical height also varies greatly and the slope appears to be the natural ground configuration with no apparent symmetry.
Seepage:	The majority of the area below the south-southeast slope toe had visible ponding of water. It appeared that the area does not drain efficiently towards Jacob's Creek and water was collecting at low points. There are also several red water seeps, as identified at Slag Mountain Pond 1. These have also been previously identified and monitored by TVA. Even during frozen ground conditions, ponding areas with red water seepage were found unfrozen below the toe of the slope. A thick cover of leaves makes it difficult to identify the location and extent of wet areas, but while searching below the toe, a Stantec engineer stepped into a seepage ponded area and his leg sank approximately 16 inches into the ground (very saturated and disturbed).
Benches:	None observed.

Foundations, Drains, Relief Wells, Instrumentation:	None observed.	
Animal Burrows:	None observed.	
Slope:	**Measured:**	Near vertical (south) to 3H:1V (southeast) (estimated)
	Design:	No design drawings available.
Height:	**Measured:**	Approximately 5 feet (SE)- 20 feet (SW)
	Design:	No design drawings available.

6.4. Spillway Weirs/Riser Inlets

Number:	None observed.
Size, Type and Material:	N/A
Height of Riser Inlets:	N/A
Access:	N/A
Joints:	N/A
Mis-Alignment:	N/A
Closed/Abandoned Conduits:	None observed.

6.5. Outlet Pipes

Number:	2
Size, Type and Material:	The rip-rap channel is the primary spillway in the eastern corner of the pond. It measures approximately 5 feet wide and 20 feet long and discharges flow towards Jacob's Creek. The rip-rap protection is non-uniform and fairly sparse. There is a beaver dam present just upstream from the channel in the pond which has slowed down flow to approximately 40 gpm. A second possible outlet is a 3 inch PVC pipe in the southwestern corner of the pond that runs from the pool in Pond 2 over the crest and ends up in Pond 1 (about 10 feet above the pool level). No water was observed flowing from Pond 2 to Pond 1, and the box and pump were not operating. It appears this is a possible siphon from Pond 2 to Pond 1, but does not appear to have been active for some time.
Headwall:	N/A

Joint Separations: N/A

Mis-Alignment: N/A

Closed/Abandoned Conduits: None observed.

7. Notable Observations and Concerns

- There are no available design drawings for Slag Mountain Pond 2. The pond was created by constructing dikes on the south and southeast side.
- There is dense vegetation on both the interior and exterior slopes of this pond, including many large trees. (Photo SMP 2-1)
- The exterior slopes seem to be original ground configuration which remain undisturbed. There are areas on the south exterior dike which are very steep (1H:1V or steeper) and are potential stability concerns. One slide along the exterior of the crest was noted. The slide was 40 feet wide and extended 22 feet down the slope to the toe. One tree with the root-ball intact had fallen in the failure zone. (Photo SMP 2-2).
- There are several active red water seeps at the toe of the south exterior slope. These seepage areas are creating ponding water and saturating the ground below the toe. No seepage on the slope itself is evident. Several of these seeps have been identified by the plant and are periodically inspected and monitored. (Photo SMP 2-3)
- The current crest alignment on the south slope is misaligned both horizontally and vertically. There are variations of several feet in both the width and elevation of the crest. (Photo SMP 2-4)
- Pond 2 contains a primary spillway in the eastern corner of the pond, which consists of a gravity draining rip-rap channel which discharges into Jacob's Creek. A beaver dam was present at the time of the site visit just upstream of the spillway in the pond. Tall phragmites growth was also present along the channel, blocking some flow and obstructing observation. The existing rip-rap protection was sparse and non-uniform.
- A potential overflow mechanism was located near the western corner of Pond 2. It consists of a 3 inch PVC pipe which originates at the pool level in Slag Mountain Pond 2 and runs over the crest with the outlet end approximately 10 feet above the pool level of Pond 1. An electrical box was connected to a pump for the pipe, but neither was operating. This could possibly be a siphon from Pond 2 into Pond 1.
- It is possible that the Slag Mountain Pond 2 was constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, as-built drawings and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- Based on the limited construction records (QA/QC testing and as-build drawings) and geotechnical information available, it is recommended that a Geotechnical Evaluation be performed to determine the existing soil conditions at this facility. The initial phase would be limited to evaluation of the existing soil conditions and installation of instrumentation (piezometers and inclinometers). This facility has significant seepage occurring at the toe of the dike which needs to be evaluated. Based on the results obtained, additional evaluation and analysis could be needed.
- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.
- Based on observations made during the site visits and review of the documents provided, it is recommended that a hydraulic and hydrologic analysis be performed for this facility.
- It is recommended that a facility specific Operations & Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.
- It is recommended that an Emergency Action Plan be developed to identify concerns and actions necessary to effectively manage the concerns.

8.2. Maintenance Recommendations

- Repair slide on exterior slope. Use borrow soil to grade to minimum 2H:1V slope and place rip-rap to stabilize slope if needed. The slope repairs should be tied into the existing slope on both sides to reduce uneven settlement or cracking.
- In areas where the crest has insufficient width (approximately 5’), repairs need to be made to widen the crest. This will require placement of soil on the interior or exterior slope to provide a base for the widened crest. The new slopes should be graded and tied into the existing slopes on either side of the addition. The crest should also be tied into the existing crest on all sides to reduce cracking or uneven settlement.
- Continue annual inspection program and execute recommendations.

- Continue to periodically monitor and review the red water seeps at the toe of the slope. Check for increasing flow and deposit of material. If noticeable changes in the volume of seepage or mineral deposition occur then an engineering analysis may have to be performed to evaluate the seepage and slope stability.
- The beaver dam just upstream of the primary spillway (rip-rap channel) needs to be removed to allow for proper flow through the spillway. The vegetation in the channel needs to be removed and additional rip-rap placed to protect the channel.
- The 3 inch PVC siphon pipe between Ponds 1 and 2 needs to be evaluated to determine its origin and current status. If it is determined the pipe is out of service or not properly abandoned, an abandonment plan needs to be formulated or the pipe removed.
- The vegetation on the exterior and interior slopes needs to be mowed to facilitate observation. Trees present on all slopes need to be removed and the voids created need to be filled with cover soil and compacted.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
Slag Pond 2A (SP 2A)

1. General Facility Information

Facility Status:	Active	NID Identification:	KY15005
Surface Area (inside dikes)	16.5 Acres	Maximum Height (toe to top of dike):	10 feet
Free Water Volume:	30 Acre-feet	Maximum Water Storage:	350 Acre-feet
Estimated CCB Storage:	300 Acre-feet	Dike Length:	800 feet (divider berm)
Plant Discharge to Facility:	Unknown	Current Pool Elevation:	413

2. Site Visit Information

Stantec Assessment Team:	Roger Denick, PE; Ryan Riker, EIT; Rob Kirkbride, PE; Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 4, 2009
Weather/Site Conditions:	20 degrees F, frozen ground, sunny

3. History/Description of Usage

History and Operation:	Boiler slag is sluiced into the south end of pond 2A and flows into pond 2B through three RCP culverts (two 48 inch diameter and one 60 inch diameter). Flow is directed around a series of baffles which allow for a longer settling time. The water then exits into the stilling pond to the east through a 35 foot wide concrete flume. The sluice water exits the stilling pond either by pumping to Jacob's Creek or direct discharge via three 36 inch diameter RCP riser spillways into the Green River. The water is directed into the Green River if it is environmentally acceptable.
Past Failures/Releases:	No failures or releases reported.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.
TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	Some erosion on interior slopes. The pond has been dredged to create more capacity.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	10N222R1, 10N236R1, 10N3203R6, 10N3204R1, 10N3209R0,10W3220, 10N3223R2, 10N3228R0, 10N3263R0, 10W3290R1
TVA As-Built Drawings:	10W3267-1R0, 10W3267-2R1, 10W3267-3R0
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1967 to 2008.
Geotechnical Data:	Limited data includes lab results, but difficult to tell specific locations of soil borings. (File: PAF COAL RECEIVING FACILITY SOIL INVESTIGATION FOR ASH POND DIKE ADJACENT TO BARGE DOCK CELLS.pdf)

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	Little vegetation on interior slopes, mostly exposed ash fines. Some sparse phragmites growth.
Trees:	None observed.
Wave Wash Protection:	None observed.
Erosion:	Multiple significant erosion gullies on the east interior slope, which is divider dike between Slag Ponds 2A and 2B. Most measured between 2 and 5 feet wide by 1 to 3 feet deep and tapered off from the crest towards the toe (pool level). One erosion gulley was noted on the northwest slope below a 6 inch inlet pipe from the Coal Yard Runoff Pond 2, which measured 4 inches deep and 20 inches wide.
Instabilities:	One slump was noted on the east interior divider dike about 270 feet from the northeast corner of the pond. It measured approximately 20 feet long and 6 feet down slope. It appeared to have occurred some time ago because vegetation was present in the failed area.
Animal Burrows:	None observed.
Freeboard:	**Measured:** 2.5 to 3 feet **Design:** 2 feet
Encroachments:	None
Slope:	**Measured:** 1:7H:1V (East) 1:7H:1V to 3H:1V (North and West) **Design:** 4H:1V (West and North) 3H:1V (East)

6.2. Crest

Crest Cover and Slope:	Mostly bare exposed ash fines, very sparse vegetation on crest.
Erosion:	Numerous erosion gullies on the east interior divider dike cutting into crest and on interior slope section above.

Alignment:	No observed issues	
Settlement/Cracking:	None observed.	
Bare Spots/Rutting:	Numerous heavy construction vehicles were driving around perimeter of pond, including divider dike. No significant ruts observed, but requires monitoring.	
Width:	**Measured:**	34 feet (East)
	Design:	Varies between drawings (12 to16 feet)

6.3. Exterior Slopes

Vegetation:	N/A	
Trees:	N/A	
Erosion:	N/A	
Instabilities:	N/A	
Uniform Appearance:	N/A	
Seepage:	N/A	
Benches:	N/A	
Foundations, Drains, Relief Wells, Instrumentation:	N/A	
Animal Burrows:	N/A	
Slope:	**Measured:**	There are no exterior slopes. The north, south, and west sides of the pond are surrounding by higher existing ground including the plant to the south. The east divider dike exterior slope is the interior slope to Slag Pond 2B and will be discussed as such.
	Design:	N/A
Height:	**Measured:**	Can not be observed.
	Design:	22 feet from original spillway pipe invert to raised dike crest

6.4. Spillway Weirs/Riser Inlets

Number:	4
Size, Type and Material:	Type B concrete manhole risers, two apparent 48 inch diameter, and two apparent 36 inch diameter (could not be measured because of location in pond);
Height of Riser Inlets:	Unable to measure due to location in the pond.
Access:	All four spillways located in north section of pond, inaccessible from bank.
Joints:	Assumed push together sections, no flow could be heard and plants were growing from the top of the two 48 inch risers.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	All four spillway outlets were originally located north of the pond into a discharge flume. Red Water Pond 2 is now in the location of the discharge flume. Drawings 10W3267-1R0 and 10W3267-2R1 show the two 36 inch spillways (northern most spillways) being abandoned by removing the skimmer and plugging with concrete on 10/4/84. Drawing 10N3203R6 shows that the two original (48 inch) spillways are to be used for emergency discharge only, but no abandonment plans have been located.

6.5. Outlet Pipes

Number:	3 (all discharge into Slag Pond 2B through east divider dike)
Size, Type and Material:	Two 48 inch concrete culvert pipes and one 60 inch concrete culvert pipe located in the northern portion of the interior divider dike
Headwall:	On the Slag Pond 2A side of divider dike (inlet side) there is some gravel and concrete slabs, but no headwall. The slabs seem to be just dropped in place.
Joint Separations:	None observed.
Mis-Alignment:	None observed.

Closed/Abandoned Conduits: None observed.

7. Notable Observations and Concerns

- No design drawings were available for Slag Pond 2A that originated after 1984. There is only one embankment above the surrounding area, which is an ash divider dike on the east side of Slag Pond 2A that separates this pond from Slag Pond 2B. The dike has sufficient crest width but the interior slopes on the Pond 2A side are approximately 1.7H:1V, while the design drawings (10N3203 REV 6) show 3H:1V to 4H:1V interior and exterior slopes. (Photo SP 2A-2)
- The interior slopes of the divider dike contain little to no vegetation consisting primarily of phragmites, which provides little protection against erosion. This has lead to multiple severe erosion channels (2 to 5 feet wide) and many smaller channels. One slump was noted along a 20 foot section of the interior slope of the divider dike. (Photos SP 2A-1)
- There is minimal available freeboard throughout most of the dikes along the perimeter of the pond. (2.5 to 3 feet) There are three culvert pipes in the divider dike which outlet water from Pond 2A to Pond 2B from the northeastern portion of Slag Pond 2A. No active emergency overflow structures could be found. (Photo SP 2A-5)
- The current spillway structure is believed to be constructed of RCP, push-together riser sections. Slag Pond 2A has two 48 inch and two 36 inch riser structures in the northeast corner of the pond. The design drawings (10N3203 REV 6 and 10N3209 REV 0) show these spillway outlets located in the area where Red Water Pond 2 is currently located. It appears these spillways have been abandoned, as vegetation was growing on top of the 48" risers. Drawings 10W3267-1R0 and 10W3267-2R1 show the two 36 inch spillway (northern most spillways) being abandoned by removing the skimmer and plugging with concrete on October 4, 1984. Drawing 10N3203R6 shows that the two original (48 inch) spillways are to be used for emergency discharge only, but no abandonment plans have been located. (Photo SP 2A-4)
- It is possible that Slag Pond 2A was constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, complete and current as-built drawings and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- The abandonment of the four riser spillways in the northeast corner of the pond needs to be further evaluated to check if proper abandonment techniques were used. If it is found that these spillways were not properly abandoned, then an abandonment plan needs to be developed and implemented.
- Based on the limited construction records (QA/QC testing and as-built drawings) and geotechnical information available, it is recommended that a Geotechnical Evaluation be performed to determine the existing soil conditions at this facility. The initial phase would be limited to evaluation of the existing soil conditions and installation of instrumentation (piezometers and inclinometers). Based on the results obtained, additional evaluation and analysis could be needed.
- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.
- Based on observations made during the site visits and review of the documents provided, it is recommended that a hydraulic and hydrologic analysis be performed for this facility. This facility has significant flow concentrations and is critical to operation of the plant. The freeboard is also a concern due to the limited capacity of this facility.
- It is recommended that a facility specific Operations & Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.
- It is recommended that an Emergency Action Plan be developed to identify concerns and actions necessary to effectively manage the concerns.

8.2. Maintenance Recommendations

- Repair all erosion gulleys and slumps noted on interior slopes and line with rip-rap to reduce future erosion. Place rip-rap on entire divider dike length (east slope) and grade to final slope of 3H:1V.
- Any areas on the interior slope not to receive rip-rap protection (north, west and south slopes) that are steeper than 3H:1V need to be re-graded to 3H:1V or flatter. After grading, proceed to seed, mulch and fertilize these areas following TVA standards.
- Continue annual inspection program and execute recommendations.
- Periodically monitor freeboard on all sides of the pond. If the available freeboard begins to decrease a plan must be developed and implemented to lower the pool level or dredge material to create more capacity.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
Slag Pond 2B (SP 2B)

1. General Facility Information

Facility Status:	Active	NID Identification:	KY15005
Surface Area (inside dikes)	11.5 Acres	Maximum Height (toe to top of dike):	24 feet
Free Water Volume:	60 Acre-feet	Maximum Water Storage:	85 Acre-feet
Estimated CCB Storage:	150 Acre-feet	Dike Length:	800 feet
Plant Discharge to Facility:	0 (discharge from Slag Pond 2A)	Current Pool Elevation:	413

2. Site Visit Information

Stantec Assessment Team:	Roger Denick, PE; Ryan Riker; Rob Kirkbride, PE; Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 5, 2009
Weather/Site Conditions:	20 degrees F, frozen ground, sunny

3. History/Description of Usage

History and Operation:	Boiler slag is sluiced into the south end of pond 2A and flows into pond 2B through three RCP culverts (two 48 inch diameter and one 60 inch diameter). Flow is directed around a series of baffles which allow for a longer settling time. The water then exits into the stilling pool to the east through a 35 foot wide concrete flume. The sluice water exits the stilling pond either by pumping to Jacob's Creek or direct discharge via three 36 inch diameter RCP riser spillways into the Green River. The water is directed into the Green River if it is environmentally acceptable.
Past Failures/Releases:	No failures or releases reported.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.
TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	Some erosion on the interior and exterior slopes. A crack was noted in the concrete flume to the Stilling Pond.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	10N222R1, 10N236R1, 10N3203R6, 10N3204R1, 10N3209R0,10W3220, 10N3223R2, 10N3228R0, 10N3263R0, 10W3290R1
TVA As-Built Drawings:	10W3267-1R0, 10W3267-2R1, 10W3267-3R0
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1967 to 2008.
Geotechnical Data:	Limited data includes lab results, but difficult to tell specific locations of soil borings. (File: PAF COAL RECEIVING FACILITY SOIL INVESTIGATION FOR ASH POND DIKE ADJACENT TO BARGE DOCK CELLS.pdf)

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	Sparse vegetative cover on all sides of Pond 2B. Some grass and weeds and a few areas with phragmites.
Trees:	None observed except in southwestern corner, in area of slope not well defined.
Wave Wash Protection:	None observed.
Erosion:	Multiple erosion gullies were observed on several sides of the pond, mainly due to lack of vegetation to protect against erosion. The west dike (divider dike shared with Pond 2A) had several significant erosion gullies measuring between 3 and 7 feet wide and up to 2 feet deep. They extended from the crest and tapered off to the pool level. The northeast corner of the pond contained one significant erosion gulley, measuring 3.5 feet wide x 1 foot deep. The east dike (the southern portion is a divider dike shared with the Stilling Pond) had numerous erosion gullies, with the largest measuring 5 feet wide by 1 foot deep. Two pump lines from Red Water Pond 1 were discharging into the southern portion of Pond 2B and causing severe erosion on the interior slopes. A 10 foot section of a 12 inch HDPE pipe running parallel to the slope was exposed, and a gulley has formed with a maximum width of 12 feet and up to 5 feet deep.
Instabilities:	Several small instabilities were noted on the west interior dike which is the divider dike shared with Pond 2A. A small slump was also noted in the northwest corner of the pond, and measured 5 feet wide, 1 foot deep, and extended 8 feet down the slope. The northeast slopes were near vertical and evidence could be seen of portions of the embankment falling into the pond. Several slope instabilities were noted on the east dike as well, one slide measured 5 feet along the dike and extended 3 feet down slope. It was located approximately 400 feet south of the northeast corner of the pond.

Animal Burrows:	None observed.

Freeboard:	**Measured:**	2.5 feet (north and east) - 6.5 feet (west)
	Design:	2 feet
Encroachments:	None	
Slope:	**Measured:**	2H:1V (west), 1.7H:1V (east), near vertical (northeast)
	Design:	3H:1V

6.2. Crest

Crest Cover and Slope:	East and north side crest has a gravel roadway surface with some grass patches. West side divider dike crest is mostly bare coal ash fines. Southeastern and southern crest with are divider dikes between Stilling Pond and Red Water Pond 1 have grass cover. Relatively level.
Erosion:	None observed on the crest. Some erosion gullies on west dike extend from crest down slope and have washed out portions of the outer edge of the crest.
Alignment:	No issues observed.
Settlement/Cracking:	None observed.
Bare Spots/Rutting:	West divider dike has little vegetation and is mostly exposed coal ash fines. Some small vehicle ruts were noted on the east dike crest.

Width:	**Measured:**	34 feet (west), 28 feet (east)
	Design:	16 feet (west), 30 feet (east)

6.3. Exterior Slopes

Vegetation:	Only exterior slope which is not an interior slope for another pond is the east embankment, north of the Stilling Pond, which separates Pond 2B from the Green River. There is dense grass and brush cover on the exterior slopes in this area.
Trees:	There were multiple trees on the lower portion of the eastern exterior slope. They were of varying sizes with several larger trees. There is a perimeter fence just outside of the crest on the east dike and reduced close observation of the exterior slopes. The slope appears to have at least one bench and then slopes to the Green River.

Erosion:	Unable to observe thoroughly due to the perimeter fence.	
Instabilities:	Unable to observe thoroughly due to the perimeter fence.	
Uniform Appearance:	Unable to observe thoroughly due to the perimeter fence.	
Seepage:	Unable to observe thoroughly due to the perimeter fence.	
Benches:	Appears to be at least one bench. A reference is made to Drawing 10W5250 for grading of the exterior slope area which shows a typical section consists of one bench.	
Foundations, Drains, Relief Wells, Instrumentation:	No instrumentation found, past reports mention monuments on exterior slope.	
Animal Burrows:	Unable to observe thoroughly due to the perimeter fence.	
Slope:	**Measured:**	Could not observe thoroughly due to the perimeter fence.
	Design:	3H:1V
Height:	**Measured:**	Unable to observe thoroughly due to the perimeter fence.
	Design:	Varies

6.4. Spillway Weirs/Riser Inlets

Number:	4 shown on drawings, only 2 could be located in the field, all 4 are inactive, as the only outlet is a concrete flume into the Stilling Pond.
Size, Type and Material:	1 located 48", 1 located 36" Type B concrete push-together manhole riser inlets.
Height of Riser Inlets:	Unable to measure due to location in the pond.
Access:	Both inaccessible from bank and located in pond.
Joints:	Assumed push together sections, no flow could be heard through joints from the bank.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	All four spillway outlets were originally located north of the pond and discharged into a flume. Red Water Pond 2 is now in the location of the discharge flume. Drawings 10W3267-1R0 and 10W3267-2R1 show the two 36 inch spillways (northern most spillways) being abandoned by

removing the skimmer and plugging with concrete on 10/4/84. Drawing 10N3203R6 shows that the two original (48 inch) spillways are to be used for emergency discharge only, but no abandonment plans have been located.

6.5. Outlet Pipes

Number:	No pipe outlets, a concrete flume.
Size, Type and Material:	38 foot wide flume with 2H:1V side slopes and 16 foot bottom channel width, total length of concrete approximately 55 feet including upstream and downstream slopes. Six inch thick reinforced concrete on top of 6 inches of crushed stone.
Headwall:	20 feet of rip-rap on upstream end outside of flume edge.
Joint Separations:	Cracks were present at joints between concrete slabs on both banks of the upstream side of the flume. Cracks widths measured 1 to 1.5 inches.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	See section above.

7. Notable Observations and Concerns

- No design drawings were available for Slag Pond 2B that originated after 1984. Slag Pond 2B shares a divider dike with Slag Pond 2A, which is an ash divider dike on the west side of Slag Pond 2B. The dike has sufficient crest width but the interior slopes on the Pond 2B side are approximately 2H:1V, while the design drawings (10N3203 REV 6) show 3H:1V to 4H:1V interior and exterior slopes. The northeastern interior slopes were nearly vertical and the eastern slopes were 1.7H:1V, much steeper than the drawings show.
- Dikes above surrounding ground are also present on the north and east sides of Slag Pond 2B. The east dikes separate Pond 2B from the Green River. Multiple trees of varying sizes are present on the east side exterior slopes outside of the plant perimeter fence. This fence reduced close observation of these exterior slopes. (Photo SP 2B-2)
- The interior slopes on all sides of the Pond contain little to no vegetation, with the only real growth being phragmites, which provide little protection against erosion. This has lead to multiple severe erosion channels (2 to 5 feet wide) and many smaller channels which were not noted. Several small slumps and slides were also

observed on the interior slopes on several sides of the pond. (Photo SP 2B-6)

- There is minimal available freeboard on the northern and eastern dikes (approximately 3 feet). The interior slopes in these areas are very steep, some even near vertical, and portions of the dike can be seen as having fallen into the pond. Overtopping of the eastern or northern embankments could lead to material being released into the Green River. (Photo SP 2B-1)
- The current spillway structure is believed to be constructed of RCP, push-together riser sections. Slag Pond 2B has one 48 inch and one 36 inch riser structures in the north section of the pond. The design drawings (10N3203 REV 6 and 10N3209 REV 0) show these spillway outlets located in the area where Red Water Pond 2 is currently located. Drawings 10W3267-1R0 and 10W3267-2R1 show the two 36 inch spillways (northern most spillways) being abandoned by removing the skimmer and plugging with concrete on 10/4/84. Drawing 10N3203R6 shows that the two original (48 inch) spillways are to be used for emergency discharge only, but no abandonment plans have been located. The flow is currently transferred to the Stilling Pond through the concrete flume in the eastern dike of Pond 2B.
- A 10 inch fiberglass pipe coming from Red Water Pond 2 was noted in the northern portion of the dike. The pipe has a hole in the side that is discharging water directly onto the ground. (Photo SP 2B-3)
- Slag Pond 2B outlets water into the Slag Stilling Pond through a concrete flume structure in the eastern dike of Pond 2B. Cracks were observed on both sides of the weir structure and were 1 to 1.5 inches wide at the joints between the concrete slabs. (Photos SP 2B-4 and SP 2B-5)
- Two pump lines from Red Water Pond 1 were discharging in the southern portion of the Pond 2B dike. The lines are discharging directly onto the slope causing severe erosion and had exposed a 10 foot section of a 12 inch HDPE pipe running parallel to the dike. (Photo SP 2B-7)
- It is possible that Slag Pond 2B was constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, complete and updated as-built drawings and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- The abandonment of the two located riser spillways and the two apparent riser spillways in the northern section of the pond needs to be further investigated to check if proper abandonment techniques were used. If it is found that these spillways weren't properly abandoned, then an abandonment plan needs to be developed and implemented.
- Based on the limited construction records (QA/QC testing and as-built drawings) and geotechnical information available, it is recommended that a Geotechnical Evaluation be performed to determine the existing soil conditions at this facility. The initial phase would be limited to evaluation of the existing soil conditions and installation of instrumentation (piezometers and inclinometers). Based on the results obtained, additional evaluation and analysis could be needed.
- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.
- Based on observations made during the site visits and review of the documents provided, it is recommended that a hydraulic and hydrologic analysis be performed for this facility. This facility has significant flow concentrations and is critical to operation of the plant. The freeboard is also a concern due to the limited capacity of this facility.
- It is recommended that a facility specific Operations and Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.
- It is recommended that an Emergency Action Plan be developed to identify concerns and actions necessary to effectively manage the concerns.

8.2. Maintenance Recommendations

- Repair erosion on interior slopes (east, north, and west sides) and line with rip-rap to reduce future erosion. Place rip-rap protection near pool level on entire length of east, north, and west interior dikes and grade to 3H:1V slopes.
- Any areas on the interior slope not to receive rip-rap protection that are steeper than 3H:1V need to be re-graded to 3H:1V or flatter. After grading, proceed to seed, mulch and fertilize these areas following TVA standards.
- Continue annual inspection program and execute recommendations.
- Periodically monitor freeboard on all sides of the pond, if the available freeboard begins to decrease a plan must be developed and implemented to lower the pool level.
- The exposed pipe line that has been uncovered needs to be checked for deficiencies and then carefully backfilled with sufficient cover to reduce damage and future exposure.
- The outlets for the pump lines from Red Water Pond 1 that discharge at the southern portion of the Pond 2B dike need to be placed further into Pond 2B to reduce erosion of the slopes. If this is not possible, erosion control consisting of a rip-rap channel needs to be placed at the outlet of the pipes.
- The hole in the 10 inch fiberglass pipe in the northern dike of Pond 2B needs to be patched.
- The vegetation on the exterior east slopes outside of the perimeter fence needs to be mowed to facilitate assessments. Trees present on this slope need to be removed and the voids created need to be filled with cohesive soil and compacted.
- The cracks in the concrete flume between Pond 2B and the Slag Stilling Pond need to be cleaned out and filled with water-tight grout or epoxy sealant.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Paradise Fossil Plant (PAF)
Slag Stilling Pond (SSP)

1. General Facility Information

Facility Status:	Active	NID Identification:	N/A
Surface Area (inside dikes)	3.5 Acres	Maximum Height (toe to top of dike):	20 feet
Free Water Volume:	60 Acre-feet	Maximum Water Storage:	70 Acre-feet
Estimated CCB Storage:	25 Acre-feet	Dike Length:	700 feet
Plant Discharge to Facility:	0 (decant water from Slag Pond 2B)	Current Pool Elevation:	410

2. Site Visit Information

Stantec Assessment Team:	Roger Denick, PE; Ryan Riker; Rob Kirkbride, PE; Will Mattingly, EIT
TVA Staff Present:	Brian Lankford
Field Assessment Dates:	February 5, 2009
Weather/Site Conditions:	20 degrees F, sunny

3. History/Description of Usage

History and Operation:	Boiler slag is sluiced into the south end of pond 2A and flows into pond 2B through three RCP culverts (two 48 inch diameter and one 60 inch diameter). Flow is directed around a series of baffles which allow for a longer settling time. The water then exits into the stilling pool to the east through a 35 foot wide concrete flume. The sluice water exits the stilling pond either by pumping to Jacob's Creek or direct discharge via three 36 inch diameter RCP riser spillways into the Green River. The water is directed into the Green River if it is environmentally acceptable.
Past Failures/Releases:	No failures or releases reported.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Paradise Fossil Plant covering active facilities.
TVA Maintenance:	Maintenance is performed on an as-needed basis and this facility does not have a specific maintenance plan.
TVA Inspections:	TVA Engineering performs dike inspections and prepares reports annually. Plant personnel make observations throughout the year on a random basis.
Problems Previously Identified During Past TVA Inspections:	Some erosion on interior and exterior slopes. Some bare areas needed seeding. Cracks in concrete flume into Stilling Pond. Possible holes at outlet of discharge pipes.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	10N3203R6, 10N3204R1, 10N3209R0, 10W3220R7, 10W3290R1, 10W5250
TVA As-Built Drawings:	10W3267-1R0, 10W3267-2R1, 10W3267-3R0, 10N3223R2
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA annual inspection reports from 1967 to 2008.
Geotechnical Data:	Limited data includes lab results, but difficult to tell specific locations of soil borings. (File: PAF COAL RECEIVING FACILITY SOIL INVESTIGATION FOR ASH POND DIKE ADJACENT TO BARGE DOCK CELLS.pdf)

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	Mostly grass, adequate coverage, not maintained.	
Trees:	Sparse on east interior slope, mostly less than 6 inch with one tree noticeable near pump station over 6 inches	
Wave Wash Protection:	None observed.	
Erosion:	One significant erosion gulley was noted in the northeast corner of the pond. It measured 3.5 feet wide by 1 foot deep, and was 17 feet long. It was vegetated and seemed to be stable at the time of the evaluation.	
Instabilities:	Two slides were observed on the west interior slope, 580 feet south of the pump station. The first slump was 11 feet wide and the second was 7 feet wide. Numerous small slumps and slides were noted on the north bank of the pond, exposing bare earth. The largest was a thin scarp line developing on the north bank directly across from the 002 spillway outfall. It measured 50 feet long and 6 inches down the slope.	
Animal Burrows:	None observed.	
Freeboard:	**Measured:** **Design:**	3.5 to 9.5 feet Varies, minimum 3.5 feet
Encroachments:	None	
Slope:	**Measured:** **Design:**	1.6h:1V to 4H:1V (east) 3.5H:1V (north), 4H:1V (east), 3H:1V (west and southeast)

6.2. Crest

Crest Cover and Slope:	Gravel road with little vegetation on north and east dikes. West dike is divider dike with Slag Pond 2B and has grass cover. Relatively level.
Erosion:	None observed.
Alignment:	No issues observed.
Settlement/Cracking:	None observed.
Bare Spots/Rutting:	None observed.
Width:	**Measured:** 50 feet (east) **Design:** 16 feet (east and west), 34 feet (north)

6.3. Exterior Slopes

Vegetation:	Dense, thick weeds and grass cover. The exterior slope on the eastern dike extended from the crest to the Green River. Exterior slope on east side was outside of perimeter chain link fence located at outer edge of crest. This reduced a thorough observation of the exterior slopes.
Trees:	Numerous trees could be seen on the exterior slope. They ranged in size from small to large.
Erosion:	Unable to observe thoroughly due to the chain link perimeter fence.
Instabilities:	Unable to observe thoroughly due to the chain link perimeter fence.
Uniform Appearance:	Unable to observe thoroughly due to the chain link perimeter fence.
Seepage:	Unable to observe thoroughly due to the chain link perimeter fence.
Benches:	Unable to observe thoroughly due to the chain link perimeter fence.
Foundations, Drains, Relief Wells, Instrumentation:	None observed.

Animal Burrows:	Unable to observe thoroughly due to the chain link perimeter fence.	
Slope:	**Measured:**	2H:1V to 5H:1V (east)
	Design:	Varies, not shown, appears original ground was excavated and sloped in connection with a barge unloading dock
Height:	**Measured:**	Unable to observe thoroughly due to the chain link perimeter fence.
	Design:	Varies, not shown

6.4. Spillway Weirs/Riser Inlets

Number:	3 primary decant spillways, 1 concrete flume spillway into Stilling Pond from Slag Pond 2B (discussed in Pond 2B summary)
Size, Type and Material:	Type B Spillways, assumed 48 inch concrete riser push-together manhole structures.
Height of Riser Inlets:	Unable to measure due to location in pond.
Access:	A walkway was available to the northern most spillway. Old stairs to the southern most spillway were present but inaccessible to the spillway, a wooden plank was propped on this spillway from the bank but was under water.
Joints:	Assumed push together, because spillways were flowing over the top it was impossible to identify any leakage.
Mis-Alignment:	None observed.
Closed/Abandoned Conduits:	None observed.

6.5. Outlet Pipes

Number:	
Size, Type and Material:	3 primary spillways outlet via 36 inch concrete pipes approximately 190 feet from weir inlet. 3 emergency pumps discharge into one 36 inch fiberglass pipe. Fiberglass pipe is buried at inlet and could not be observed.
Headwall:	At outlet of three primary spillway pipes a rip-rap ditch accepts discharged water and directs it into Green River. Drawings show 1.5 feet of rip-rap underlain by filter fabric. This area could not be thoroughly observed because of the perimeter fence.
Joint Separations:	None observed. This area could not be thoroughly observed because of the perimeter fence.
Mis-Alignment:	None observed. This area could not be thoroughly observed because of the perimeter fence.
Closed/Abandoned Conduits:	None observed.

7. Notable Observations and Concerns

- The Slag Stilling Pond shares a divider dike with Slag Pond 2B, which was constructed with mine spoil on the west side of the Stilling Pond. The Stilling Pond also has a spoil dike on the east side separating it from the Green River. Both dikes have sufficient crest width but the interior slopes on the east side dikes range from approximately 4H:1V to 1.6H:1V, while the design drawings (10N3203 REV 6) show 3H:1V to 4H:1V interior and exterior slopes. Failure of the eastern embankments could cause material to be released into the Green River.
- Several as-built drawings from 1967-1977 show the Stilling Pond extending to the northern extents of Slag Pond 2B. Other drawings from the same time period show this pond to be a Fly Ash Disposal Area. Other drawings from 1970 and 1984 show the Stilling Pond in the same location and configuration that it exhibits in its current state. It is unclear if the Stilling Pond was moved, or if it was built on top of an existing fly ash disposal area.
- Several small trees and brush are present on the east side interior slopes, as well as multiple larger trees of varying sizes on the east side exterior slopes outside of the plant perimeter fence. This fence reduced close observation of these exterior slopes.

- Several erosion channels were observed on the southwest and northern portions of the interior dike. Several small slumps and slides were also noted on the interior slopes on several sides of the pond which are exposing bare earth. The largest of these measured approximately 50 feet long and 6 inches down the slope. (Photos SSP-2 and SSP-4)
- RCP push-together riser structure spillways is a concern. Slag Pond 2B has three 36 inch riser structures in the eastern section of the pond. The southern most spillway has a wooden walkway board which is partially under water. (Photo SSP-1)
- A white 10 inch PVC stand pipe was observed near the central section of the pond on a peninsula extending from the eastern dike. The pipe has 1 inch diameter boreholes approximately 3 feet from the top of the pipe. It is unknown what the purpose or origin of this pipe are. (Photo SSP-3)
- An apparently abandoned rusted pipe was observed near the outlet of the three 36 inch spillway pipes on the exterior slope near the Green River. The abandoned pipe is in the path of the discharged water and was observed with a hole in its side.
- It is possible that the Slag Stilling Pond was constructed on top of thick mine spoil deposits which are difficult to characterize.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, as-built drawings and construction testing records is a concern.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- Based on the limited construction records (QA/QC testing and as-built drawings) and geotechnical information available, it is recommended that a Geotechnical Evaluation be performed to determine the existing soil conditions at this facility. The initial phase would be limited to evaluation of the existing soil conditions and installation of instrumentation (piezometers and inclinometers). Based on the results obtained, additional evaluation and analysis could be needed.
- Based on the limited as-built drawings available, it is recommended that a program be established to develop current conditions / as-built drawings to record future modifications to this facility. Construction records should also be included as part of this program to record and quantify construction means, methods and results.
- Due to the limited construction monuments at this facility, it is recommended that additional surveyed construction monuments be established at selected locations. These monuments should be surveyed annually as a minimum.

- Based on observations made during the site visits and review of the documents provided, it is recommended that a hydraulic and hydrologic analysis be performed for this facility. This facility has significant flow concentrations and is critical to operation of the plant. The freeboard is also a concern due to the limited capacity of this facility.
- It is recommended that a facility specific Operations & Maintenance Plan be developed to provide means and methods of operating this facility efficiently and identifying the maintenance necessary to allow for proper evaluations.
- It is recommended that an Emergency Action Plan be developed to identify concerns and actions necessary to effectively manage the concerns.

8.2. Maintenance Recommendations

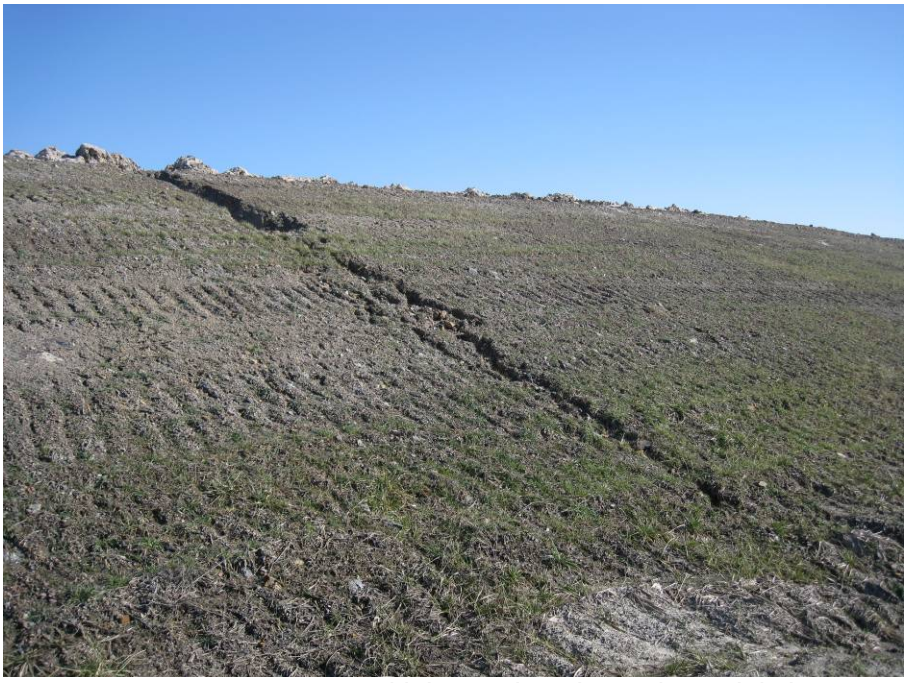
- Repair erosion and slumps on interior slopes and tie grading into existing slope. Line repaired areas and entire interior slope near pool level with rip-rap to minimize future erosion and failures (west, north, east, and southeast sides).
- Any areas on the interior slope not to receive rip-rap protection that are steeper than 3H:1V need to be re-graded to 3H:1V or flatter. After grading, the areas need to be seeded, mulched and fertilized in accordance with TVA standards.
- Continue annual inspection program and execute recommendations.
- Perform annual joint repairs of RCP risers. This spillway system may ultimately be modified or replaced, pending Stantec-TVA assessment of replacement system. Monitor until that time.
- The apparently abandoned rusted pipe near the outlet of the three spillways needs to evaluated to determine its origin and current status. If it is determined the pipe is out of service or not properly abandoned, an abandonment plan needs to be formulated or the pipe removed.
- The white 10 inch PVC standpipe needs to be evaluated to determine its origin and current status. If it is determined the pipe is out of service or not properly abandoned, an abandonment plan needs to be formulated or the pipe removed.
- The vegetation on the exterior east slopes outside of the perimeter fence needs to be mowed to facilitate observations. Trees present on this slope need to be removed and the voids created need to be filled with cohesive soil and compacted.

Drawing Mark GS-1

Minimal available freeboard along saddle dike and majority of west pond embankment.

Drawing Mark GS-2

Significant rutting and ponding of water along majority of benches of both east and west pond embankments.



Drawing Mark GS-3

Multiple erosion channels, mainly in upper slope on both east and west pond embankments.

Drawing Mark GS-4

Uncontrolled seepage surfacing on majority of slopes and benches of both ponds leading to saturated conditions and poor drainage.

Drawing Mark GS-5

Active seep with boiling and material transfer on intermediate bench in vicinity of potential abandoned west pond spillway.

Drawing Mark GS-6

Five (5) inactive 12 inch sluice lines located at pool level of stilling pond below west pond east dike.

Drawing Mark GS-7

Poor grading of all benches and drainage ditches leading to ponding water and flow over benches.

Drawing Mark GS-8

Sparse vegetation on upper lift of all exterior slopes.

Drawing Mark GS-9

Dense phragmites growth on lower portion of slopes makes it difficult to assess dikes.

Drawing Mark GS-10

East pond abandoned spillway outlet located with water flowing. Abandonment techniques presumed inadequate.

Drawing Mark GS-11 Red water seep on lower exterior slope on south side of east pond.

Drawing Mark GS-12 Steep exterior lower slopes on east side of east pond embankment.

Drawing Mark GS-13

Steep interior slopes near influent sluice lines on north side of east pond.

Drawing Mark GS-14

Slope slough to the west of influent sluice lines on north dike of east pond. Seepage surfacing in sloughing area.

Drawing Mark GS-15

Slope repairs to west slough area. Repairs including rip-rap and dry gypsum placement to achieve 4H:1V slope.

Drawing Mark GS-16

Slope slough to the east of sluice lines on north dike. Seepage surfacing in sloughing area.

Drawing Mark GS-17	Slope repairs to east slough zone. Repairs included rip-rap and dry gypsum placement to achieve 4H:1V slope.

Drawing Mark GS-18

Sluice line exposed near toe of slope on north dike of east pond.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
GS-1	Minimal available freeboard along saddle dike and majority of west pond embankment.	IMG_0692
GS-2	Significant rutting and ponding of water along majority of benches of both east and west pond embankments.	IMG_1156
GS-3	Multiple erosion channels, mainly in upper slope on both east and west pond embankments.	IMG_0693
GS-4	Uncontrolled seepage surfacing on majority of slopes and benches of both ponds leading to saturated conditions and poor drainage.	IMG_0704
GS-5	Active seep with boil, strong odor, and material transfer located on intermediate bench at east side of west pond. Boil is occurring in the vicinity of potentially abandoned west pond spillway pipe.	IMG_1217
GS-6	5 Inactive 12 inch Cast Iron Sluice Line Pipes located on lower slope of east side of west pond. Outlet ends of several pipes had frozen water from flow visible.	IMG_1220
GS-7	Poor grading of benches and drainage ditches leading to poor drainage and ponding water and water flowing over benches directly downslope. Flat benches can be observed on both the east and west pond embankments.	IMG_0715

p-\	Sparse vegetation on upper portion of exterior slopes along both East and West Ponds. Photo shown is upper slope on south side of east pond.	IMG_0774
GS-9	Dense phragmites growth makes it difficult to assess lower portion of exterior slopes along both east and west ponds. Some vegetation has been mowed per Stantec requests since initial assessments.	IMG_0766
GS-10	Two 24 inch CMP inactive spillway pipes (one from each pond) haven't been properly abandoned. This photo (east pond) shows the outlet of one pipe with water flow. The former west pond spillway outlet has been buried and is yet to be identified.	IMG_1236
GS-11	Red water seep on lower exterior slope on south side of east pond.	IMG_1244
GS-12	Steep exterior lower slopes on east side of east pond embankment.	IMG_1080
GS-13	Steep interior slopes near influent sluice lines on north side of east pond.	IMG_1163
GS-14	Slope slough to the west of influent sluice lines on north dike of east pond. Seepage visible surfacing in slope slough area. Slough has since been repaired per Stantec recommendations.	IMG_1087

GS-15	Slope repairs to slough to west of sluice lines on north dike of east pond. Rip-rap was placed to fill in slough zone and create 3H:1V slope, and dry gypsum was placed on top to create 4H:1V slope.	IMG_3800
GS-16	Slope slough to the east of influent sluice lines on north dike of east pond. Seepage visible surfacing in slope slough area. Slough has since been repaired per Stantec recommendations.	IMG_1090
GS-17	Slope repairs of slough to east of sluice lines on north dike of east pond. Rip-rap was placed to fill in slough zone and create 3H:1V slope, and dry gypsum was placed on top to create 4H:1V slope.	IMG_3799
GS-18	Sluice line exposed near toe of slope on north dike of east pond.	IMG_1178

Drawing Mark GSP-1 Erosion gulley next to rip-rap channel.

Drawing Mark GSP-2 Dense vegetation on lower half of slope.

Drawing Mark GSP-3

Spillway pipe under pool level in lower stilling pond makes it difficult to observe.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
GSP-1	Erosion gulley next to rip-rap channel.	IMG_1256
GSP-2	Dense vegetation on lower half of slope.	IMG_1253
GSP-3	Spillway pipe under pool level in lower stilling pond makes it difficult to observe.	IMG_1251

Drawing Mark DC-1

East Cell weir structure still exposed, unknown abandonment procedures.

Drawing Mark DC-2

Erosion on access road area leading to south side of East Cell.

Drawing Mark DC-3

Steep West Dredge Cell interior slopes on west side also serve as exterior slopes to east pond of gypsum stack.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
DC-1	East Cell weir structure still exposed, unknown abandonment procedures.	IMG_0030
DC-2	Erosion on access road area leading to south side of East Cell.	IMG_0033
DC-3	Steep West Dredge Cell interior slopes on west side also serve as exterior slopes to east pond of gypsum stack.	IMG_1109

Drawing Mark JAP-1

Supposedly inactive concrete weir risers (3 total) in Stilling Pond observed with some flow through joints.

Drawing Mark JAP-2

Exterior slopes have thick vegetation and trees.

Drawing Mark JAP-3

Ponding of water on bench and erosion of bottom (1-3 feet) of exterior slope.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
JAP-1	Supposedly inactive concrete weir risers (3 total) in stilling pond observed with some flow through joints.	IMG_1055
JAP -2	Exterior slopes have thick vegetation and trees.	IMG_1058
JAP -3	Ponding of water on bench and erosion of bottom (1-3 feet) of exterior slope.	IMG_1060

Drawing Mark PAP-1 Slope failure on exterior lower slope.

Drawing Mark PAP-2 Severed pipe within slope failure on exterior lower slope.

Drawing Mark PAP-3 Thick vegetation and trees along exterior.

Drawing Mark PAP-4 Minimal freeboard (3-4 feet) in some areas.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
PAP-1	Slope failure on exterior lower slope.	IMG_1189
PAP -2	Severed pipe within slope failure on exterior lower slope.	IMG_1192
PAP -3	Thick vegetation and trees along exterior slopes.	IMG_0971
PAP-4	Minimal freeboard (3-4 feet) in some areas.	IMG_0981

Drawing Mark SM-1

Pumping station that moves water from the west ponding area to the east ponding area.

Drawing Mark SM-2

General conditions of coal ash staging/mining area.

Drawing Mark SM-3	General conditions of the west end of the eastern ponding area.

Drawing Mark SM-4

Erosion of high angle peak of the eastern embankment of stacking area.

Drawing Mark SM-5	Detail photo of erosion on eastern embankment.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
SM-1	Pumping station that moves water from the west ponding area to the east ponding area.	Paradise (166)
SM-2	General conditions of coal ash staging/mining area.	Paradise (163)
SM-3	General conditions of the west end of the eastern ponding area.	Paradise (172)
SM-4	Erosion of high angle peak of the eastern embankment of stacking area.	Paradise (175)
SM-5	Detail photo of erosion of eastern embankment.	Paradise (174)

Drawing Mark SM P1-1 Active red water seep with flow at toe of exterior slope.

Drawing Mark SM P1-2 Active red water seep creating ponding area at toe of exterior slope.

Drawing Mark SM P1-3 Erosion gulley on steep exterior slope.

Drawing Mark SM P1-4 Dense vegetation including large trees on both interior and exterior slopes.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
SM P1-1	Active red water seep with flow at toe of exterior slope.	IMG_1045
SM P1-2	Active red water seep creating ponding area at toe of exterior slope.	IMG_1047
SM P1-3	Erosion gulley on steep exterior slope.	IMG_1042
SM P1-4	Dense vegetation including large trees on both interior and exterior slopes.	IMG_1041

Drawing Mark SM P2-1 Trees present on interior and exterior slopes.

Drawing Mark SM P2-2 Small slide on exterior slope.

Drawing Mark SM P2-3 Seepage creating saturated area at toe of exterior slope.

Drawing Mark SM P2-4 Uneven crest alignment both horizontally and vertically.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
SM P2-1	Trees present on interior and exterior slopes.	IMG_1037
SM P2-2	Small slide on exterior slope.	IMG_1023
SM P2-3	Seepage creating saturated area at toe of exterior slope.	IMG_1020
SM P2-4	Uneven crest alignment both horizontally and vertically.	IMG_1021

Drawing Mark SP 2A-1	Typical large erosion gully on the separation dike between Ponds 2A and 2B.

Drawing Mark SP 2A-2

View of general condition along separation dike, between Ponds 2A and 2B.

Drawing Mark SP 2A-3 Bottom ash inlets.

Drawing Mark SP 2A-4 Four riser pipe spillways on north end of Pond 2A.

Drawing Mark SP 2A-5	General condition along west embankment of Pond 2A, note the low free board.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
SP 2A-1	Typical large erosion gully on the separation dike between Ponds 2A and 2B.	Paradise (88)
SP 2A-2	View of general condition along separation dike, between Ponds 2A and 2B.	Paradise (92)
SP 2A-3	Bottom ash inlets.	Paradise (68)
SP 2A-4	Four riser pipe spillways on north end of Pond 2A.	IMG_0902
SP 2A-5	General condition along west embankment of Pond 2A, note the low free board.	IMG_0896

Drawing Mark SP 2B-1

Near vertical embankment along northern most corner.

Drawing Mark SP 2B-2

Trees and other vegetation along north east slope to Green River.

Drawing Mark SP 2B-3

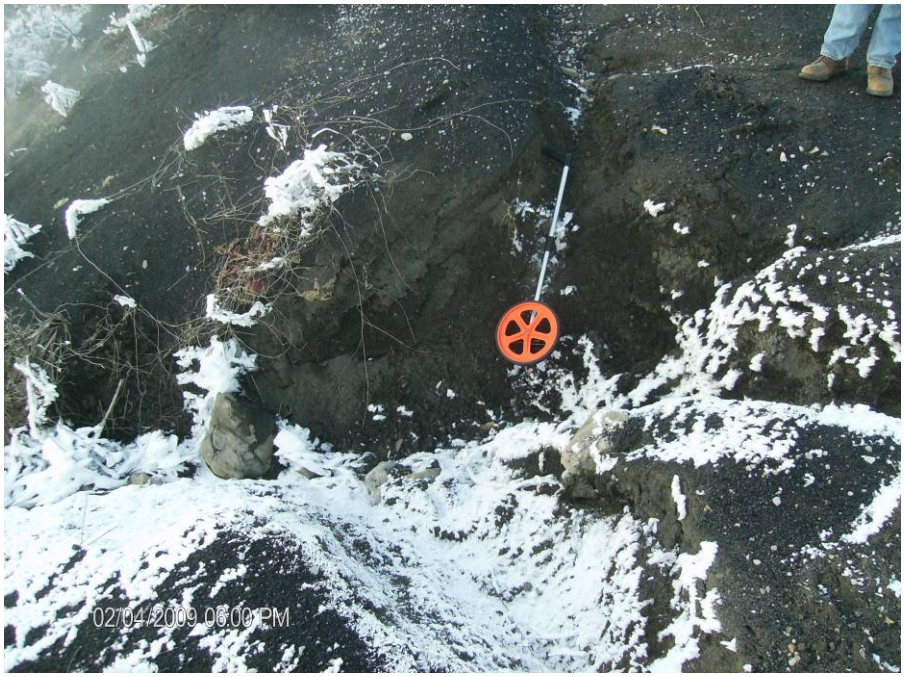
Pipe with a hole discharging water into north embankment.

Drawing Mark SP 2B-4

Detailed image of cracks in north side of weir, between Pond 2B and the Slag Stilling Pond.

Drawing Mark SP 2B-5

Image of cracking on southern side of weir between Ponds 2B and Slag Stilling Pond.



Drawing Mark SP 2B-6 Typical large erosion gully feature in the separation dike between Ponds 2A and 2B.

Drawing Mark SP 2B-7 Erosion gully exposing buried pipe line.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
SP 2B-1	Near vertical embankment along northern most corner.	IMG_0876.
SP 2B-2	Trees and other vegetation along north east slope to Green River.	IMG_0869.
SP 2B-3	Pipe with a hole discharging water into north embankment.	IMG_0883
SP 2B-4	Detailed image of cracks in north side of weir, between Pond 2B and the Slag Stilling Pond.	Paradise (125)
SP 2B-5	Image of cracking on southern side of Weir between Ponds 2B and Slag Stilling Pond.	Paradise (126)
SP 2B-6	Typical large erosion gully feature in the separation dike between Ponds 2A and 2B.	Paradise (100)
SP 2B-7	Erosion gully exposing buried pipe line.	Paradise (138)

Drawing Mark SSP-1

Outlet pipe with wooden walk way partly under surface of water.

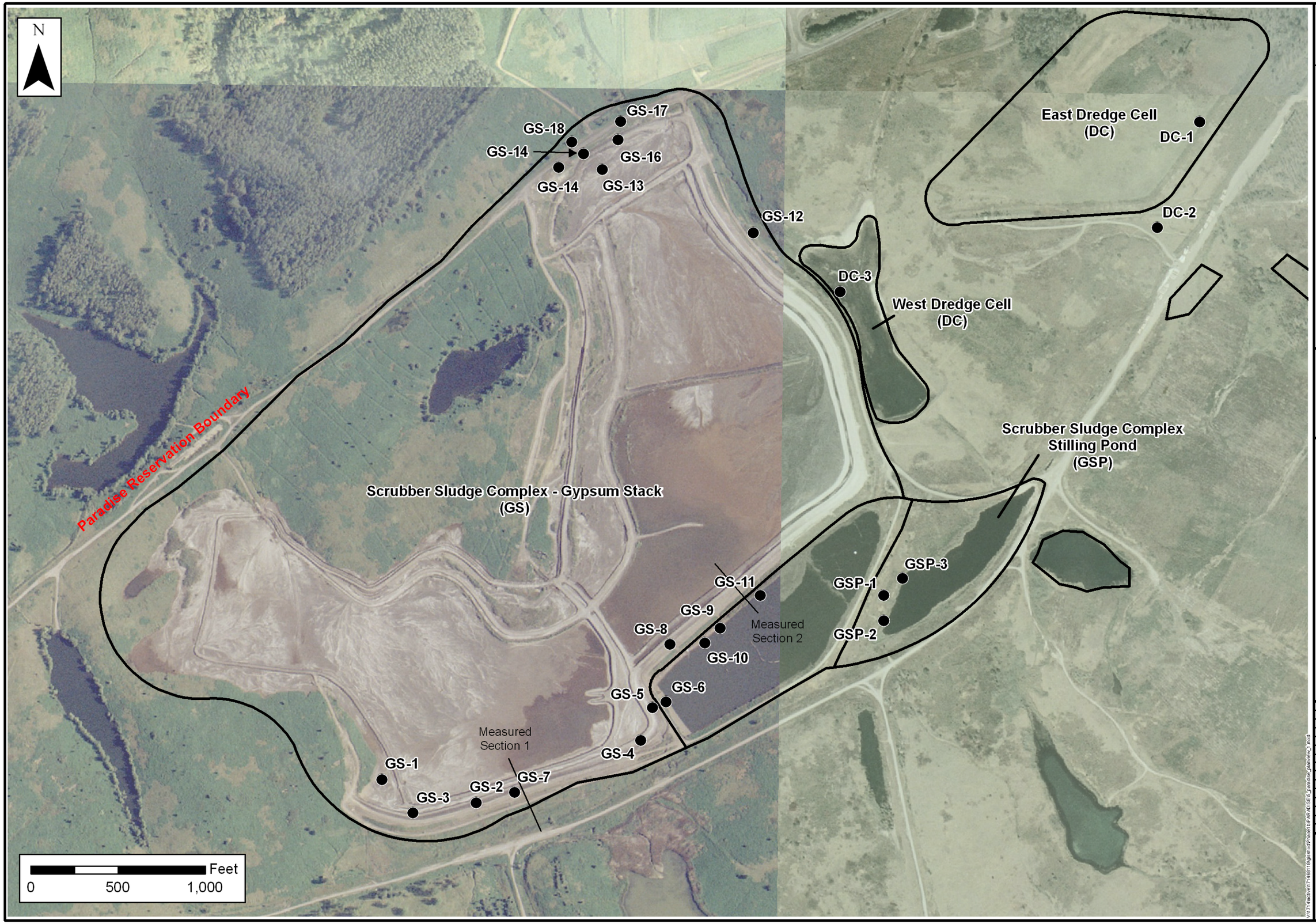
Drawing Mark SSP-2

Slumping along southwest interior slope of the Slag Stilling Pond.

Drawing Mark SSP-3 10” PVC pipe off east embankment.

Drawing Mark SSP-4 Scarp along the southwest interior slope.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
SSP-1	Outlet Pipe with wooden walk way partly under surface of water.	IMG_0850
SSP-2	Slumping along southwest interior slope of the slag stilling pond.	Paradise (131)
SSP-3	10” PVC Pipe off east embankment.	Paradise (128)
SSP-4	Scarp along the southwest interior slope.	Paradise (130)



STANTEC
CONSULTING
SERVICES INC.
1409 N. Forbes Rd.
Lexington, Kentucky
40511-2050
859-422-3000

Stantec

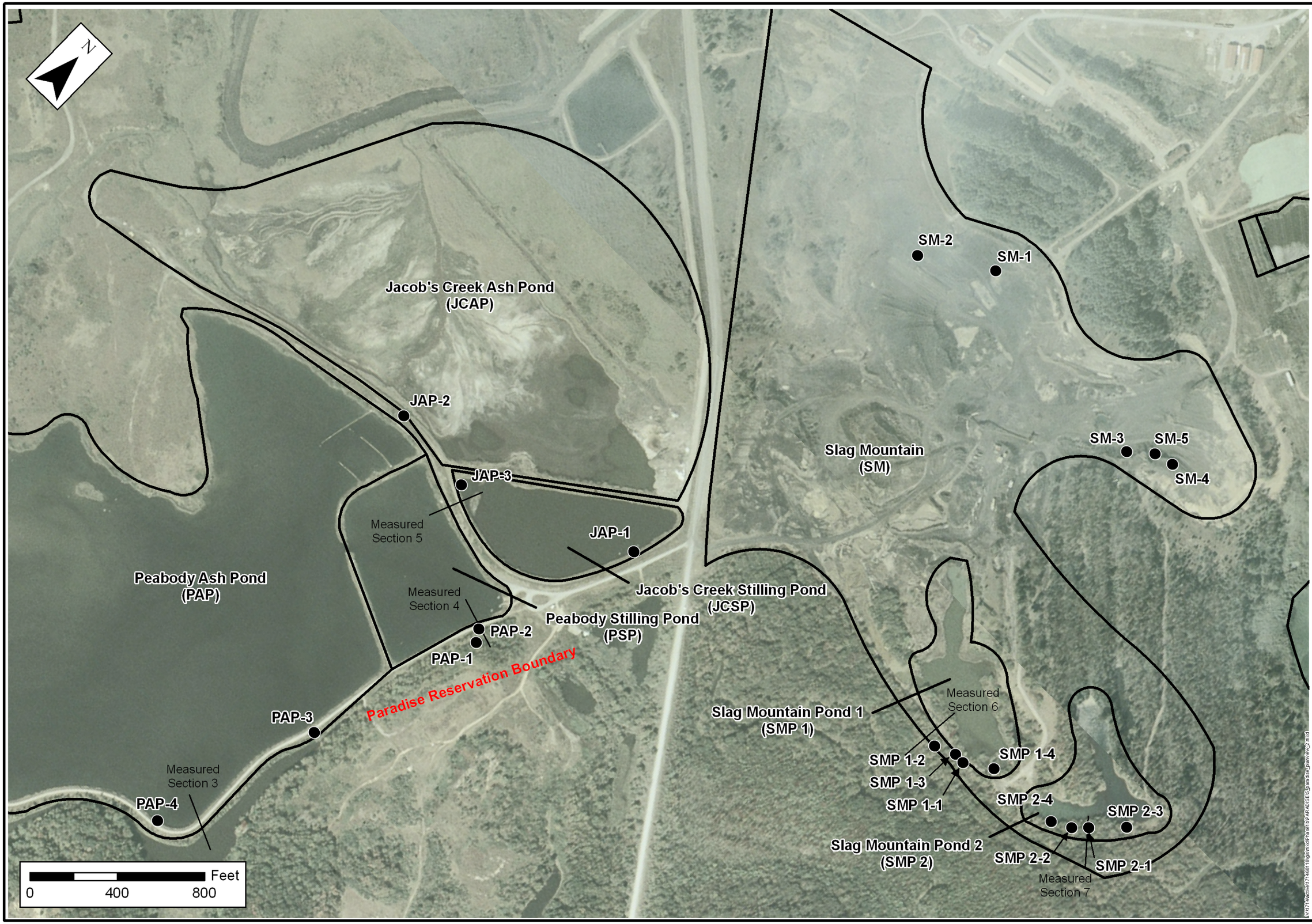
Plan View 1 - PAF

Tennessee Valley Authority
Paradise Fossil Plant
Drakesboro, Muhlenberg County, Kentucky

PROJECT NO.	171468118
DATE	MARCH 2009
DRAWN BY	AMS
CHECKED BY	RJK
CHECKED BY	DAG
SCALE	AS SHOWN
REVISED	
1	
2	
3	
4	
5	
6	
7	
8	

SHEET

1 OF 3



STANTEC
CONSULTING
SERVICES INC.
1409 N. Forbes Rd.
Lexington, Kentucky
40511-2050
859-422-3000

Stantec

Plan View 2 - PAF

Tennessee Valley Authority
Paradise Fossil Plant
Drakesboro, Muhlenberg County, Kentucky

PROJECT NO.	171468118
DATE	MARCH 2009
DRAWN BY	MDB
CHECKED BY	RJK
CHECKED BY	DAG
SCALE	AS SHOWN
REVISED	
1	
2	
3	
4	
5	
6	
7	
8	

SHEET

2 OF 3

STANTEC CONSULTING SERVICES INC.
1409 N. Forbes Rd.
Lexington, Kentucky
40511-2050
859-422-3000

Stantec

Plan View 3 - PAF

Tennessee Valley Authority
Paradise Fossil Plant
Drakesboro, Muhlenberg County, Kentucky

PROJECT NO.	171468118
DATE	MARCH 2009
DRAWN BY	MDB
CHECKED BY	RJK
CHECKED BY	DAG
SCALE	AS SHOWN
REVISED	
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

SHEET

3 OF 3

Date Reviewed	Reviewed by	File Name	File Type
3/10/2009	RJK	001000 Cover.pdf	PDF
3/10/2009	RJK	001001 Plant Operations Diagram.pdf	PDF
3/10/2009	RJK	001014 Aerial Maps.pdf	PDF
3/10/2009	RJK	001015 Table Of Content.pdf	PDF
3/10/2009	RJK	001016 Long Term Disposal Plan.pdf	PDF
3/10/2009	RJK	001018 By-Product Handling Scope Of Work And Contract.pdf	PDF
3/10/2009	RJK	001019 Construction Plan - Peabody Complex.pdf	PDF
3/10/2009	RJK	001021 Construction Plan - Slag Pond Complex (2A, 2B And Stilling Ponds).pdf	PDF
3/10/2009	RJK	001023 Construction Plan - Coal Fines Pond Details (Daniel Run).pdf	PDF
3/10/2009	RJK	001039 Construction Plan - Coarse And Medium Refuse Stack.pdf	PDF
3/10/2009	RJK	001041 Construction Plan - Gypsum Stack (Scrubber Sludge Pond).pdf	PDF
3/10/2009	RJK	001045 Construction Plan - Ash Stacking Plan (See Unknown Book).pdf	PDF
3/10/2009	RJK	001046 Landfill Permitting Summary.pdf	PDF
3/10/2009	RJK	001048 Procedures - Pond And Ash Management.pdf	PDF
3/10/2009	RJK	001049 Dam Inspection Report - Annual Stability Inspection Of Waste Disposal Areas 2006.pdf	PDF
3/10/2009	RJK	001052 Contacts List.pdf	PDF
3/10/2009	RJK	001053 Budget.pdf	PDF
3/10/2009	RJK	001054 Work Package - Fy06 Routine Coal Fines Handling (Daniel Run).pdf	PDF
3/10/2009	RJK	001055 Work Package - Fy06 Install Fines Blending Facility.pdf	PDF
3/10/2009	RJK	001056 Work Package - Fy06 Gypsum Pipe Extension (Gypsum Stack).pdf	PDF
3/10/2009	RJK	001057 Work Package - Fy06 Vegetate Fines Pond Slopes (Daniel Run).pdf	PDF
3/10/2009	RJK	001058 Work Package - Fy06 Interim Cover On Coarse And Medium Refuse Stack.pdf	PDF
3/10/2009	RJK	001059 Work Package - Fy07 Gypsum Stack Final Cover (On Slopes).pdf	PDF
3/10/2009	RJK	001060 Capital Project Justification Form.pdf	PDF
3/10/2009	RJK	001061 By-Product Marketing.pdf	PDF
3/10/2009	RJK	Annual Inspection Of Waste Disposal Areas May-1985 (Endes_Dike).pdf	PDF
3/10/2009	RJK	Annual Inspection Of Waste Disposal Areas May-1985 (Endes_Dike).pdf	PDF
3/10/2009	RJK	Annual Stability Inspection Of Waste Disposal Areas - Dec 2008 (PAF_Ashpondinsp_Fy09_Draft).pdf	PDF
3/10/2009	RJK	Annual Stability Inspection Of Waste Disposal Areas - Feb 2008 (PAF_Ash_Pond_Insp_Fy08).pdf	PDF
3/10/2009	RJK	Annual Stability Inspection Of Waste Disposal Areas - Jan 2003 (2002_Stability_Report).pdf	PDF
3/10/2009	RJK	Annual Stability Inspection Of Waste Disposal Areas - March 2002 (2002_Stability_Insp).pdf	PDF
3/10/2009	RJK	Annual Stability Inspection Of Waste Disposal Areas Dec-2002 (2002_Stability_Report).pdf	PDF
3/10/2009	RJK	Annual Stability Inspection Of Waste Disposal Areas Nov-2001 (2002_Stability_Report).pdf	PDF
3/10/2009	RJK	Asbestos Disposal Area Inspection - 1996 (Cddland_Fill_1996).pdf	PDF
3/10/2009	RJK	C&M Refuse Stack Plans.pdf	PDF
3/10/2009	RJK	Chemical Waste Ponds (.cal Files).pdf	PDF
3/10/2009	RJK	Client Data Review - Annual Inspection Reports Summary.Xls	XLS
3/10/2009	RJK	Client Data Review - Chemical Waste Ponds.Xls	XLS

Date Reviewed	Reviewed by	File Name	File Type
3/10/2009	RJK	Client Data Review - Coal Yard Runoff Ponds.Xls	XLS
3/10/2009	RJK	Client Data Review - Daniel Run, East And West Dredge Cells, C&M Refuse Stack.doc	DOC
3/10/2009	RJK	Client Data Review - Jacobs Creek Ash And Stilling Ponds.Xls	XLS
3/10/2009	RJK	Client Data Review - Peabody Ash And Stilling Ponds.Xls	XLS
3/10/2009	RJK	Client Data Review - Scrubber Sludge Complex.Xls	XLS
3/10/2009	RJK	Client Data Review - Slag Pond 2A And 2B.Xls	XLS
3/10/2009	RJK	Coal Wash Fines Storage Area 2 Plans.pdf	PDF
3/10/2009	RJK	Daniel Run Drawings (From .cal).pdf	PDF
3/10/2009	RJK	Daniel Run Permanent Fines Pond Details.pdf	PDF
3/10/2009	RJK	Dike Inspection Sketches 1985A (Miscl_Records-001).pdf	PDF
3/10/2009	RJK	Dike Inspection Sketches 1985B (Miscl_Records).pdf	PDF
3/10/2009	RJK	Dike Inspection Sketches 1987 (Dike_94-97-003).pdf	PDF
3/10/2009	RJK	Dike Inspection Sketches 1987-1988 (Dike_94-97-002).pdf	PDF
3/10/2009	RJK	Dike Inspection Sketches 1988A (Dike_94-97-001).pdf	PDF
3/10/2009	RJK	Dike Inspection Sketches 1988B (Dike_94-97).pdf	PDF
3/10/2009	RJK	East & West Dredge Cells Plans.pdf	PDF
3/10/2009	RJK	Environmental Assessment - Proposed Peabody Ash Pond 1988 - Draft (Jcap_Ea_Assessment).pdf	PDF
3/10/2009	RJK	Environmental Assessment - Proposed Peabody Ash Pond 1988 (Jac_Creek_Ashpond).pdf	PDF
3/10/2009	RJK	Facility Inspections 1985-1987 (Solid_Waste).pdf	PDF
3/10/2009	RJK	General Coad Info 1995 (Miscl__5-Part D).pdf	PDF
3/10/2009	RJK	General Culvert Details.pdf	PDF
3/10/2009	RJK	General Drainage Details.pdf	PDF
3/10/2009	RJK	General Erosion Control Details.pdf	PDF
2/26/2009	WRM	General Facility Plans.pdf	PDF
3/10/2009	RJK	Groundwater Monitoring Documentation 1994 (FGD_Landfill).pdf	PDF
3/10/2009	RJK	Groundwater Monitoring Report 1998 (Grd_Wtr_1998).pdf	PDF
3/10/2009	RJK	Groundwater Monitoring Report 1999 (Grd_Wtr_1999).pdf	PDF
3/10/2009	RJK	Groundwater Monitoring Report 2000 (Grd_Wtr_2000).pdf	PDF
3/10/2009	RJK	Groundwater Monitoring Report 2001 (Grd_Wtr_2001).pdf	PDF
3/10/2009	RJK	Groundwater Monitoring Report 2002 (Grd_Wtr_2002).pdf	PDF
3/10/2009	RJK	Groundwater Sampling Report 1995 (Grd_Wtr__Dec_1995).pdf	PDF
3/10/2009	RJK	Groundwater Sampling Report 1995B (Grd_Wtr_Dec_1995).pdf	PDF
3/10/2009	RJK	Groundwater Sampling Report Aug-1996 (Grd_Wtr_Aug_1996).pdf	PDF
3/10/2009	RJK	Groundwater Sampling Report Dec-1996 (Grd_Wtr__Dec_1996).pdf	PDF
3/10/2009	RJK	Groundwater Sampling Report Dec-1997 (Grd_Wtr_Dec_1997).pdf	PDF
3/10/2009	RJK	Groundwater Sampling Report Feb-1996 (Grd_Wtr_Feb_1996).pdf	PDF
3/10/2009	RJK	Groundwater Sampling Report June-1997 (Grd_Wtr__June_1997).pdf	PDF
3/10/2009	RJK	Groundwater Sampling Report June-1997 (Grd_Wtr_June1997).pdf	PDF

Date Reviewed	Reviewed by	File Name	File Type
3/10/2009	RJK	Groundwater Sampling Report May-1996 (Grd_Wtr_May_1996).pdf	PDF
3/10/2009	RJK	Groundwater Sampling Report Nov-1995 (Ground_Water_11-95).pdf	PDF
3/10/2009	RJK	Gypsum Sales To Georgia Pacific (Gypsum_Sales).pdf	PDF
3/10/2009	RJK	Horseshoe Pond 1995 (Miscl__5-Part A).pdf	PDF
3/10/2009	RJK	Hwy 176 Grade Change Plan.pdf	PDF
3/10/2009	RJK	Jacobs Creek Ash And Stilling Ponds Drawings (From .cal).pdf	PDF
3/10/2009	RJK	Jacobs Creek Ash Pond Divider Dike Info 1985 (Jcap_Dike).pdf	PDF
1/26/2009	WRM	Jacobs Creek Non-Compliance 1992 (Miscl__5-Part B).pdf	PDF
3/10/2009	RJK	Kdep Request For Permit Submittal (FGD__Lf_1992).pdf	PDF
3/10/2009	RJK	Lawsuit Documentation 1997 (Miscl__5-Part C).pdf	PDF
3/10/2009	RJK	Misc Dike Inspections - 1988 (1988 Dike_Inspections 1).pdf	PDF
3/10/2009	RJK	Misc Dike Inspections - 1989 (1998 Daily Diike Inspections).pdf	PDF
3/10/2009	RJK	Misc Dike Inspections - 1990 (1990_Dike_Inspections).pdf	PDF
3/10/2009	RJK	Noi And Not Permitting Documentation (U3 FGD).pdf	PDF
3/10/2009	RJK	Notice Of Termination Of Coverage - Aquatic Toxicity Project - Feb 2007 (Atoxic).pdf	PDF
1/28/2009	RAD	Pa0D39~1.cal	CAL
1/28/2009	RAD	Pa0D99~1.cal	CAL
1/28/2009	RAD	Pa1A51~1.cal	CAL
1/28/2009	RAD	Pa2A2B~1.cal	CAL
1/28/2009	RAD	Pa4297~1.cal	CAL
1/28/2009	RAD	Pa655E~1.cal	CAL
1/28/2009	RAD	Pa74F5~1.cal	CAL
1/28/2009	RAD	Pa9D2D~1.cal	CAL
1/28/2009	RAD	Paaba2~1.cal	CAL
1/28/2009	RAD	Pab6F2~1.cal	CAL
1/28/2009	RAD	Pae4A8~1.cal	CAL
3/10/2009	RJK	PAF 11 X 17 Drawing.pdf	PDF
2/27/2009	WRM	PAF Additional By-Product Capacity Fly Ash Pond Expansion Scope Of Work.pdf	PDF
3/10/2009	RJK	PAF Additional By-Product Capacity Fly Ash Pond Expansion Scope Of Work.pdf	PDF
3/10/2009	RJK	PAF Ash Disposal Area Reclamation Subsurface Investigation May 1991.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy 2000.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy 2001.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy 2002.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy 2003.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy 2004.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy 2005.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy 2006.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy 2007.pdf	PDF

Date Reviewed	Reviewed by	File Name	File Type
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy67.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy68.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy69.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy70.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy71.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy72.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy73.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy74.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy75.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy76.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy77.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy78.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy79.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy80.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy81.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy82.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy83.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy84.pdf	PDF
2/26/2009	WRM / RJK	PAF Ash Pond Insp Fy85.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy86.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy87.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy88.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy91.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy92.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy93.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy94.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy95.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy96.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy97.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy98.pdf	PDF
1/26/2009	WRM / RJK	PAF Ash Pond Insp Fy99.pdf	PDF
3/10/2009	RJK	PAF Attachment A Scrubber Slude Stacking.pdf	PDF
3/10/2009	RJK	PAF Coal Receiving Facility Soil Investigation For Ash Pond Dike Adjacent To Barge Dock Cells.pdf	PDF
2/27/2009	WRM	PAF Coal Wash Fines Pond Iii.pdf	PDF
2/27/2009	WRM	PAF Draft Report On Fly Ash Pond Expansion From From Jerry Glover To Phil Pfeifer Mar 29 1998.pdf	PDF
3/10/2009	RJK	PAF Draft Report On Fly Ash Pond Expansion From From Jerry Glover To Phil Pfeifer Mar 29 1998.pdf	PDF
2/26/2009	WRM	PAF Dredge Area No 3 Plan.pdf	PDF
2/26/2009	WRM	PAF Dredge Area No 3 Sections And Details.pdf	PDF

Date Reviewed	Reviewed by	File Name	File Type
2/27/2009	WRM	PAF Environmental Assessment Report Development Of Additional Byproduct Capacity Sept 21 1993.pdf	PDF
2/27/2009	WRM	PAF Fax To G. Southerland From Ron Powell On Coal Wash Refuse Stack O & M Procedures.pdf	PDF
2/26/2009	WRM	PAF Fax To Mike Conley Transash From Ron Powell June 16 1993 On PAF Scrubber Waste Pond.pdf	PDF
2/26/2009	WRM	PAF FGDs Scrubber Dike East Dike Computation Sheet.pdf	PDF
2/26/2009	WRM	PAF FGDs Scrubber Dike West Dike Computation Sheet.pdf	PDF
2/27/2009	WRM	PAF Fines Pond No. 3 Soil Properties.pdf	PDF
3/10/2009	RJK	PAF Fines Pond No. 3 Soil Properties.pdf	PDF
2/27/2009	WRM	PAF Fossil And Hydro Power Production Manager Training.pdf	PDF
2/27/2009	WRM	PAF General Plan Wet Stacking.pdf	PDF
3/10/2009	RJK	PAF Group Breakdown.Xls	XLS
3/10/2009	RJK	PAF Helicopter Pics 001.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 002.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 003.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 004.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 005.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 006.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 007.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 008.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 009.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 010.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 011.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 012.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 013.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 014.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 015.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 016.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 017.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 018.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 019.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 020.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 021.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 022.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 023.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 024.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 025.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 026.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 027.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 028.jpg	JPG

Date Reviewed	Reviewed by	File Name	File Type
3/10/2009	RJK	PAF Helicopter Pics 029.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 030.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 031.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 032.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 033.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 034.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 035.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 036.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 037.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 038.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 039.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 040.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 041.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 042.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 043.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 044.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 045.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 046.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 047.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 048.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 049.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 050.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 051.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 052.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 053.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 054.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 055.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 056.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 057.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 058.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 059.jpg	JPG
3/10/2009	RJK	PAF Helicopter Pics 060.jpg	JPG
3/10/2009	RJK	PAF Incremental Scrubber Sludge Stacking Plan Sept 30 1993 By Gilbert Commonwealth Inc..pdf	PDF
2/26/2009	WRM	PAF Iron Chemical Treatment Pond Cer #Jwd-73079R2.pdf	PDF
2/27/2009	WRM	PAF Jacobs Creek Ash Disposal Area Estimate.pdf	PDF
2/27/2009	WRM	PAF Jacobs Creek Fly Ash Disposal Area Dike Raising En Des Soils Schedule No. 64.41.pdf	PDF
3/10/2009	RJK	PAF Jacobs Creek Fly Ash Disposal Area Dike Raising En Des Soils Schedule No. 64.41.pdf	PDF
2/27/2009	WRM	PAF Jan 13 1986 Memo Field Revised Drawings - Various Facilities.pdf	PDF

Date Reviewed	Reviewed by	File Name	File Type
2/27/2009	WRM	PAF Live Piles 1 And 2 Bottom Ash Testing.pdf	PDF
3/10/2009	RJK	PAF Memo From E C Miller On Reclamation Of Slag Mountain Meeting Notes From Nov 20 1990 Meeting.pdf	PDF
2/27/2009	WRM	PAF Memo From To C N Dammann To W W Dorroh On Red Water Seepage Report.pdf	PDF
3/10/2009	RJK	PAF Memo To Bjbond From Herbert S. Sanger On Proposed Scrubber Sludge Disposal Facility - Dam Construction Permitting.pdf	PDF
2/27/2009	WRM	PAF Memo To Jsbaugh From Kwburnett On Wet Scrubber System Gypsum Ponding Area.pdf	PDF
3/10/2009	RJK	PAF Memo To Jsbaugh From Kwburnett On Wet Scrubber System Gypsum Ponding Area.pdf	PDF
2/27/2009	WRM	PAF Memo To Wdhall From Mtscott On Scrubber Sludge Stacking Plant Phase I.pdf	PDF
3/10/2009	RJK	PAF Memo To Wdhall From Mtscott On Scrubber Sludge Stacking Plant Phase I.pdf	PDF
2/27/2009	WRM	PAF Notes Perimeter Dikes And Main Dike.pdf	PDF
3/10/2009	RJK	PAF Nov 14 1984 Memo Waste Scrubber Sludge Dike - Proposed Filter Material.pdf	PDF
3/10/2009	RJK	PAF Process Flowchart (Est).Xls	XLS
2/27/2009	WRM	PAF Quality Est - Raising Dike Jacobs Creek Ash Disposal Area.pdf	PDF
3/10/2009	RJK	PAF Quality Est - Raising Dike Jacobs Creek Ash Disposal Area.pdf	PDF
3/10/2009	RJK	PAF Railroad Inspection 2009 - Preliminary.pdf	PDF
2/27/2009	WRM	PAF Redwater Containment Plan And Grading.pdf	PDF
3/10/2009	RJK	PAF Results Of Geotechnical Testing Ash Disposal Area May 23 2005.pdf	PDF
2/27/2009	WRM	PAF Scrubber Dike - Soil Stability Computation Sheets.pdf	PDF
3/10/2009	RJK	PAF Scrubber Dike - Soil Stability Computation Sheets.pdf	PDF
2/27/2009	WRM	PAF Scrubber Pond Raised Section Of Perimeter Dike Southwest End.pdf	PDF
3/10/2009	RJK	PAF Scrubber Pond Raised Section Of Perimeter Dike Southwest End.pdf	PDF
2/27/2009	WRM	PAF Scrubber Sludge Disposal Area Summary Oil Properties Attachment 1.pdf	PDF
3/10/2009	RJK	PAF Scrubber Sludge Disposal Area Summary Oil Properties Attachment 1.pdf	PDF
2/27/2009	WRM	PAF Scrubber Sludge Stacking Plan.pdf	PDF
3/10/2009	RJK	PAF Scrubber Sludge Stacking Plan.pdf	PDF
3/10/2009	RJK	PAF Sep 04 1985 Memo Wet Scrubber System Gypsum Ponding Inspect Of Construction - Punchlit Of Remaining Work.pdf	PDF
2/27/2009	WRM	PAF Short Long Term Ash Disposal Plan.pdf	PDF
2/27/2009	WRM	PAF Solid Waste Disposal Areas Map.pdf	PDF
1/26/2009	WRM / RJK	PAF Summary 2008.pdf	PDF
2/27/2009	WRM	PAF Tab B Construct Coal Wash Plant Fines Pond No. 3 Scope Of Work.pdf	PDF
2/27/2009	WRM	PAF Wss Dike Cost Study.pdf	PDF
2/26/2009	WRM	PAF-103N10344-Sht -Rev 1 Coal Handling Facilities Concrete Progress Chart Live Pile Hoppers ,Aux. Hoppers Live Pile Cut-Off Wall & Bc-11 & 12.cal	CAL
2/26/2009	WRM	PAF-103N10394-Sht -Rev 1 Coal Handling Facilities Concrete Progress Chart Cable Tunnel & Mh 16 , Bc-19 Transfer Sta. A , Breaker & Service Bl.cal	CAL
2/26/2009	WRM	PAF-103N10419-Sht -Rev 1 Coal Handling Facilities Concrete Progress Chart Conditioner Building And Bc-13&14.cal	CAL
2/26/2009	WRM	PAF-103N10511-Sht -Rev 1 Coal Handling Superstructure And Utility Building Concrete Progress Chart.cal	CAL
1/26/2009	RAD	PAF-108K502-Sht -Rev 0 Construction Plant Unit 3 Pipe Crossing And Catch Basin Details Ash Fill Bc-3&4 Vicinity.cal	CAL
1/26/2009	RAD	PAF-10H3233-Sht -Rev 2 Paradise Unit 3 Pipe Extension And Special Fill Detail Ash Disposal Area No.4.cal	CAL

Date Reviewed	Reviewed by	File Name	File Type
1/26/2009	RAD	PAF-10H3245-Sht -Rev 3 Paradise Access Road For Ash Conveyors Typical Sections.cal	CAL
1/26/2009	RAD	PAF-10H3246-Sht -Rev 3 Ash Conveyor And Road.cal	CAL
1/26/2009	RAD	PAF-10H3247-Sht -Rev 3 Paradise Steam Plant Ash Conveyor And Road.cal	CAL
1/26/2009	RAD	PAF-10H3248-Sht -Rev 3 Paradise Steam Plant Ash Conveyor And Road.cal	CAL
1/26/2009	RAD	PAF-10H3249-Sht -Rev 3 Paradise Steam Plant Ash Conveyor And Road.cal	CAL
1/26/2009	RAD	PAF-10H3250-Sht -Rev 2 Ash Conveyor & Road Details.cal	CAL
1/26/2009	RAD	PAF-10H3251-Sht -Rev 2 Paradise Steam Plant Ash Conveyor & Road.cal	CAL
1/26/2009	RAD	PAF-10H3252-Sht -Rev 2 Paradise Steam Plant X-Sects Ash Cnvyr & Rd.cal	CAL
1/26/2009	RAD	PAF-10H3253-Sht -Rev 2 Paradise Steam Plant X-Sects Ash Cnvyr & Rd.cal	CAL
1/26/2009	RAD	PAF-10H3254-Sht -Rev 2 Paradise Steam Plant X-Sects Ash Cnvyr & Rd.cal	CAL
1/26/2009	RAD	PAF-10H3255-Sht -Rev 2 Paradise Steam Plant X-Sects Ash Cnvyr & Rd.cal	CAL
1/26/2009	RAD	PAF-10H3256-Sht -Rev 1 Ash Conveyor And Road Details Sheet 2.cal	CAL
1/26/2009	WRM	PAF-10H3260-Sht -Rev 0 Paradise Steam Plant Jacobs Creek Ash Conveyor & Road Extension.cal	CAL
1/26/2009	WRM	PAF-10H3261-Sht -Rev 2 Jacobs Creek Ash Conveyor & Road Extension Typical Section And Details.cal	CAL
2/26/2009	WRM	PAF-10H4276-15-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Plan - Interim Stage 1.cal	CAL
2/26/2009	WRM	PAF-10H4276-16-Sht -Rev 2 Yard Coal Washing Refuse Medium & Coarse Storage Plan - Interim Stage 2.cal	CAL
2/26/2009	WRM	PAF-10H4276-17-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coars Storage Plan - Interim Stage 3.cal	CAL
2/26/2009	WRM	PAF-10H4276-18-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Plan - Interim Stage 4.cal	CAL
2/26/2009	WRM	PAF-10H4276-19-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Plan - Interim Stage 5.cal	CAL
2/26/2009	WRM	PAF-10H4276-20-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Plan - Interim Stage 6.cal	CAL
2/26/2009	WRM	PAF-10H4276-21-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Plan - Interim Stage 7.cal	CAL
2/26/2009	WRM	PAF-10H4276-22-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Plan - Interim Stage 8.cal	CAL
2/26/2009	WRM	PAF-10H4276-23-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Plan - Interim Stage 9.cal	CAL
2/26/2009	WRM	PAF-10H4276-24-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Plan - Interim Stage 10.cal	CAL
2/26/2009	WRM	PAF-10H4276-25-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Plan - Interim Stage 11.cal	CAL
2/26/2009	WRM	PAF-10H4276-26-Sht -Rev 2 Yard Coal Washing Refuse Medium & Coarse Storage Finished Grading Plan.cal	CAL
2/26/2009	WRM	PAF-10H4276-27-Sht -Rev 0 Yard Coal Washing Refuse Fy01 Recovery Scheme Sections & Details.cal	CAL
2/26/2009	WRM	PAF-10H4276-28-Sht -Rev 0 Yard Course And Medium Coal Refuse Final Closure - Stage 2 Drawing Index And Legend.cal	CAL
2/26/2009	WRM	PAF-10H4276-29-Sht -Rev 0 Yard Course And Medium Coal Refuse Final Closure - Stage 2 Existing Conditions.cal	CAL
2/26/2009	WRM	PAF-10H4276-30-Sht -Rev 0 Yard Coarse And Medium Coal Refuse Final Closure - Stage 2 Initial Grading Plan.cal	CAL
2/26/2009	WRM	PAF-10H4276-31-Sht -Rev 0 Yard Coarse And Medium Coal Refuse Final Closure - Stage 2 Final Grading Plan.cal	CAL
2/26/2009	WRM	PAF-10H4276-32-Sht -Rev 0 Yard Coarse And Medium Coal Refuse Final Closure - Stage 2 Cross Sections.cal	CAL
2/26/2009	WRM	PAF-10H4276-33-Sht -Rev 0 Yard Coarse And Medium Coal Refuse Final Closure - Stage 2 Details.cal	CAL
2/26/2009	WRM	PAF-10H4276-34-Sht -Rev 0 Yard Coarse And Medium Coal Refuse Final Closure - Stage 2 Details.cal	CAL
2/26/2009	WRM	PAF-10H4277-14-Sht -Rev 0 Yard-Permanent Fines Pond Pipe Culvert Installation & Bedding Details.cal	CAL
2/26/2009	WRM	PAF-10H4277-15-Sht -Rev 1 Yard-Permanent Fines Pond Miscellaneous Drainage Details.cal	CAL
2/26/2009	WRM	PAF-10H4277-16-Sht -Rev 0 Yard-Permanent Fines Pond Miscellaneous Ditch Protection Details.cal	CAL
2/26/2009	WRM	PAF-10H4277-601-Sht -Rev 1 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL

Date Reviewed	Reviewed by	File Name	File Type
2/26/2009	WRM	PAF-10H4277-602-Sht -Rev 4 Permanent Fines Pond.cal	CAL
2/26/2009	WRM	PAF-10H4277-701-Sht -Rev 1 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10H4277-702-Sht -Rev 1 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10H4277-703-Sht -Rev 1 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10H4277-704-Sht -Rev 1 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10H4277-705-Sht -Rev 2 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10H4277-706-Sht -Rev 0 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10H4277-707-Sht -Rev 0 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10H4277-708-Sht -Rev 0 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10H4277-709-Sht -Rev 0 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10H4277-710-Sht -Rev 0 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10H4277-711-Sht -Rev 0 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
1/26/2009	WRM	PAF-10H4280-10-Sht -Rev 1.cal	CAL
1/26/2009	WRM	PAF-10H4280-11-Sht -Rev 1.cal	CAL
1/26/2009	WRM	PAF-10H4280-8-Sht -Rev 1.cal	CAL
1/26/2009	WRM	PAF-10H4280-9-Sht -Rev 1.cal	CAL
1/26/2009	RAD	PAF-10N209-Sht -Rev 3 Main Plant Surfacing Coal Yard Area.cal	CAL
1/26/2009	RAD	PAF-10N211-Sht -Rev 8 Main Plant General Grading Plan Coal Yard - Sheet 1.cal	CAL
1/26/2009	RAD	PAF-10N212-Sht -Rev 4 Main Plant General Grading Plan Coal Yard - Sheet 2.cal	CAL
1/26/2009	RAD	PAF-10N222-Sht -Rev 1 Main Plant Ash Disposal Areas Miscellaneous Details.cal	CAL
1/26/2009	RAD	PAF-10N236-Sht -Rev 1 Main Plant Drainage Plan Ash Disposal Area.cal	CAL
1/26/2009	RAD	PAF-10N3203-Sht -Rev 6 Yard Ash Disposal Areas 2A & 2B General Plan & Sections For Raising Dikes.cal	CAL
1/26/2009	RAD	PAF-10N3204-Sht -Rev 1 Yard Ash Disposal Areas 2A & 2B Details & Sections.cal	CAL
1/26/2009	WRM	PAF-10N3205-Sht -Rev 9 Main Plant Jacobs Creek Ash Disposal Area Sheet 1.cal	CAL
1/26/2009	WRM	PAF-10N3206-Sht -Rev 6 Main Plant Jacobs Creek Ash Disposal Area Sheet 2.cal	CAL
1/26/2009	WRM	PAF-10N3207-Sht -Rev 4 Main Plant Jacobs Creek Ash Disposal Area Sheet 3.cal	CAL
1/26/2009	WRM	PAF-10N3208-Sht -Rev 4 Main Plant Jacobs Creek Ash Disposal Area Sheet 4.cal	CAL
1/26/2009	RAD	PAF-10N3209-Sht -Rev 0 Yard Ash Ponds 2A & 2B Check Dam & Riprap For Spillway Outlets.cal	CAL
1/26/2009	RAD	PAF-10N3222-Sht -Rev 0 Main Plant Drainage Plan And Details Ash Disposal Area No.4.cal	CAL
1/26/2009	RAD	PAF-10N3223-Sht -Rev 2 Main Plant Sheet Pile For Divider Dike At Ash Areas 2A & 2B.cal	CAL
2/26/2009	WRM	PAF-10N3224-Sht -Rev 0.cal	CAL
2/26/2009	WRM	PAF-10N3226-Sht -Rev 2.cal	CAL
1/26/2009	RAD	PAF-10N3228-Sht -Rev 0 Yard Ash Dosposal Areas 2A & 2B Concrete Trench & Gutter For Dewatering Pumps.cal	CAL
1/26/2009	WRM	PAF-10N3259-Sht -Rev 2 Main Plant Jacobs Creek Ash Disposal Area Sheet 5.cal	CAL
1/26/2009	RAD	PAF-10N3263-Sht -Rev 0 Yard Ash Disposal Areas 2A & 2B Dragline Track For Ash Reclamation.cal	CAL
1/26/2009	RAD	PAF-10N3400-Sht -Rev 3 Yard Unit 3 Concrete Ash Sluice Trench & Pipe Supports - Outline & Reinf, Sh 1.cal	CAL
1/26/2009	RAD	PAF-10N3401-Sht -Rev 1 Yard Unit 3 Concrete Ash Sluice Trench & Pipe Supports - Outline & Reinf-Sh2.cal	CAL
1/26/2009	RAD	PAF-10N3402-Sht -Rev 2 Yard Unit 3 Concrete Ash Sluice Trench & Pipe Supports - Outline & Reinf - Sh 3.cal	CAL

Date Reviewed	Reviewed by	File Name	File Type
1/26/2009	RAD	PAF-10N3403-1-Sht -Rev 1 Yard Unit 3 Concrete Ash Sluice Trench & Pipe Supports - Outline & Reinf-Sh 5.cal	CAL
1/26/2009	RAD	PAF-10N3403-Sht -Rev 1 Yard Unit 3 Concrete Ash Sluice Trench & Pipe Supports-Outline & Reinf -Sh 4.cal	CAL
1/26/2009	RAD	PAF-10N3404-Sht -Rev 2 Yard Units 1-3 Concrete Ash Reclaiming Hopper Outline.cal	CAL
1/26/2009	RAD	PAF-10N3405-Sht -Rev 2 Yard Units 1-3 Concrete Ash Reclaiming Hopper Reinf -Sheet 1.cal	CAL
1/26/2009	RAD	PAF-10N3406-Sht -Rev 2 Yard Units 1-3 Concrete Ash Reclaiming Hopper Reinforcement - Sheet 2.cal	CAL
1/26/2009	WRM	PAF-10N3407-Sht -Rev 8 Yard Units 1-3 Concrete Ash Conveyor Foundations Outline & Reinf - Sheet 1.cal	CAL
1/26/2009	WRM	PAF-10N3408-Sht -Rev 8 Yard Units 1-3 Concrete Ash Conveyor Foundations Outline & Reinf - Sh 2.cal	CAL
1/26/2009	WRM	PAF-10N3409-Sht -Rev 1 Yard Units 1-3 Concrete Ash Conveyor Foundations Outline & Reinf - Sheet 3.cal	CAL
1/26/2009	WRM	PAF-10N3410-Sht -Rev 3 Yard Units 1-3 Concrete Ash Conveyor Foundations Outline & Reinf - Sheet 4.cal	CAL
1/26/2009	WRM	PAF-10N3411-Sht -Rev 1 Yard Units 1-3 Concrete Ash Conveyor Foundations Outline & Reinf -Sheet 5.cal	CAL
1/26/2009	WRM	PAF-10N3412-Sht -Rev 0 Yard Unit 1-3 Concrete Ash Conveyor Foundations Outline & Reinf - Sheet 6.cal	CAL
1/26/2009	RAD	PAF-10N3414-Sht -Rev 0 Yard Units 1-3 Ash Reclaiming Tunnel Repair Outline And Reinforcement.cal	CAL
3/10/2009	RJK	PAF-10N341-Sht -Rev 4 Yard Units 1 & 2 Concrete Cable Tunnel - P.H. To Coal Structures Plan & Profile.cal	CAL
2/26/2009	WRM	PAF-10N346-Sht -Rev 4 Coal Handling Facilities Units 1 & 2 Concrete Calbe Tunnels Mh 14 To Livepile & Transfer Sta A To Mh 16 Out & Reinf.cal	CAL
3/10/2009	RJK	PAF-10W226-74-Sht -Rev 0 Limestone Area Unit 3 Civil Limestone Area - Runoff Pond Cross Sections.cal	CAL
2/26/2009	WRM	PAF-10W251-Sht 2-Rev 1.cal	CAL
2/26/2009	WRM	PAF-10W252-2-Sht -Rev 1.cal	CAL
2/26/2009	WRM	PAF-10W252-Sht 1-Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W252-Sht 2-Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W252-Sht 3-Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W252-Sht 4-Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W252-Sht 5-Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W252-Sht 6-Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W252-Sht 7-Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W252-Sht 8-Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W252-Sht 9-Rev 0.cal	CAL
3/10/2009	RJK	PAF-10W261-Sht -Rev 1 Coal Handling Facilities Units 1 - 3 Soil Boring Location Plan.cal	CAL
1/26/2009	WRM	PAF-10W262-Sht -Rev 1 Proposed Scrubber Sludge Disposal (Wet Ponding) Area Soil Boring Location Plan.cal	CAL
2/26/2009	WRM	PAF-10W263-1-Sht -Rev 0 Permanent Fines Pond Floating Pump Support Platform And Walkway Plans, Sections And Detail.cal	CAL
2/26/2009	WRM	PAF-10W264-1-Sht -Rev 0 Permanent Fines Pond Concrete And Misc. Steel Platf. And Cable Restraint Plans, Sections And Details.cal	CAL
1/24/2009	RAD	PAF-10W265-1-Sht -Rev 1 Chemical Treatment Pond Floating Pump Support Platform & Walkway Plans, Sections And Detail.cal	CAL
1/24/2009	RAD	PAF-10W265-2-Sht -Rev 0 Chemical Treatment Pond Floating Pump Support Platform & Walkway Construction Details.cal	CAL
1/24/2009	RAD	PAF-10W265-3-Sht -Rev 0 Chemical Treatment Pond Floating Pump Support Platform And Walkway Anchorage Details.cal	CAL
1/26/2009	WRM	PAF-10W293-1-Sht -Rev 1 Yard Unit 3 Fuel Switch Project Discharge Pond Conditioning Access Road And Plan.cal	CAL
1/26/2009	RAD	PAF-10W3211-Sht -Rev 10 Main Plant General Grading Plan Coal Yard.cal	CAL
1/28/2009	RAD	PAF-10W3211-Sht -Rev 10 Main Plant General Grading Plan Coal Yard.cal	CAL
2/26/2009	WRM / RJK	PAF-10W3214-Sht -Rev 6 Civil Standard Drawing Ash Disposal Area Spillways Type A & B.cal	CAL

Date Reviewed	Reviewed by	File Name	File Type
2/26/2009	WRM	PAF-10W3214-Sht -Rev 6.cal	CAL
3/10/2009	RJK	PAF-10W3215-Sht -Rev 2 Main Plant Paving & Grading Under Fly Ash Precipitators Unit 1.cal	CAL
1/26/2009	RAD	PAF-10W3220-Sht -Rev 7 Main Plant Drainage Plan Ash Disposal Area.cal	CAL
2/26/2009	WRM / RJK	PAF-10W3229-Sht -Rev 4 Civil Standard Drawing Ash Disposal Area Weir & Skimmer Details.cal	CAL
1/26/2009	RAD	PAF-10W3234-Sht -Rev 4 Main Plant Fly Ash Disposal.cal	CAL
2/26/2009	WRM / RJK	PAF-10W3257-3-Sht -Rev 1 Civil Standard Drawing Ash Disposal Area Spillways Type B.cal	CAL
2/26/2009	WRM / RJK	PAF-10W3257-4-Sht -Rev 2 Civil Standard Drawing Ash Disposal Area Weir & Skimmer Details.cal	CAL
1/26/2009	WRM	PAF-10W3264-Sht -Rev 0 Main Plant Jacobs Creek Ash Disposal Area Interior Dredge Pond B Spillway Plan And Sections Typical Dike Section.cal	CAL
1/26/2009	RAD	PAF-10W3265-1-Sht -Rev 10 Main Plant General Grading Plan Coal Yard - Sheet 2.cal	CAL
1/28/2009	RAD	PAF-10W3265-1-Sht -Rev 10 Main Plant General Grading Plan Coal Yard - Sheet 2.cal	CAL
1/26/2009	RAD	PAF-10W3265-2-Sht -Rev 3 Main Plant Coal Yard Drainage Basin Sections.cal	CAL
1/28/2009	RAD	PAF-10W3265-2-Sht -Rev 3 Main Plant Coal Yard Drainage Basin Sections.cal	CAL
1/26/2009	RAD	PAF-10W3265-3-Sht -Rev 6 Main Plant Coal Yard Drainage Basin Sections.cal	CAL
1/28/2009	RAD	PAF-10W3265-3-Sht -Rev 6 Main Plant Coal Yard Drainage Basin Sections.cal	CAL
1/26/2009	RAD	PAF-10W3265-4-Sht -Rev 0 Main Plant Coal Yard Drainage Basin Sections & Details.cal	CAL
1/28/2009	RAD	PAF-10W3265-4-Sht -Rev 0 Main Plant Coal Yard Drainage Basin Sections & Details.cal	CAL
1/26/2009	RAD	PAF-10W3265-5-Sht -Rev 0 Main Plant Coal Yard Drainage Basin Sections & Details.cal	CAL
1/28/2009	RAD	PAF-10W3265-5-Sht -Rev 0 Main Plant Coal Yard Drainage Basin Sections & Details.cal	CAL
1/24/2009	RAD	PAF-10W3266-Sht -Rev 2 Main Plant Chemical Treatment Pond And Divider Dike Sections And Details.cal	CAL
1/26/2009	RAD	PAF-10W3267-1-Sht -Rev 0 Yard Ash Disposal Areas 2A & 2B Sections & Details (Nldf).cal	CAL
1/26/2009	RAD	PAF-10W3267-2-Sht -Rev 1 Yard Ash Disposal Areas 2A & 2B Sections & Details (Nldf).cal	CAL
1/26/2009	RAD	PAF-10W3267-3-Sht -Rev 0 Yard Ash Disposal Areas 2A & 2B Sections & Details (Nldf).cal	CAL
1/26/2009	WRM	PAF-10W3269-Sht -Rev 3 Main Plant Jacobs Creek Fly Ash Disposal Area Walkway To Spillways.cal	CAL
1/26/2009	WRM	PAF-10W3270-Sht -Rev 4 Main Plant Ash Disposal Area Divider Dike & Floating Boom.cal	CAL
1/26/2009	WRM	PAF-10W3274-1-Sht -Rev 1 Yard Jacobs Creek Ash Disposal Area Extension General Plan.cal	CAL
1/26/2009	WRM	PAF-10W3274-2-Sht -Rev 1 Yard Jacobs Creek Ash Disposal Area Extension Stilling Pool.cal	CAL
1/26/2009	WRM	PAF-10W3274-3-Sht -Rev 0 Yard Jacobs Creek Ash Disposal Area Extension Sections & Details.cal	CAL
1/26/2009	WRM	PAF-10W3274-4-Sht -Rev 1 Yard Jacobs Creek Ash Disposal Area Extension Plan Discharge Spillways.cal	CAL
1/26/2009	WRM	PAF-10W3274-5-Sht -Rev 1 Yard Jacobs Creek Ash Disposal Area Extension Floating Boom - Dike El To 408.cal	CAL
1/26/2009	WRM	PAF-10W3274-6-Sht -Rev 1 Yard Jacobs Creek Ash Disposal Area Extension Floating Boom - Dike El To 420.cal	CAL
1/26/2009	WRM	PAF-10W3285-6-Sht -Rev 3 Yard Unit - 3 Ash Sluice Disposal Line Plan & Profile-1.cal	CAL
1/26/2009	WRM	PAF-10W3285-7-Sht -Rev 3 Yard Unit 3 Ash Sluice Disposal Line Plan & Profile - 2.cal	CAL
1/26/2009	WRM	PAF-10W3285-8-Sht -Rev 3 Yard Unit 3 Ash Sluice Disposal Line Grading Sections & Details.cal	CAL
1/26/2009	RAD	PAF-10W3290-Sht -Rev 1 Yard Ash Disposal Areas 2A, 2B & Stilling Pool Spwy Sections & Details.cal	CAL
3/10/2009	RJK	PAF-10W3420-1-Sht -Rev 4 Yard Unit 3 Vehicular Bridge Over Ash Sluice Trench Plan And Sections.cal	CAL
3/10/2009	RJK	PAF-10W3420-2-Sht -Rev 4 Yard Unit 3 Vehicular Bridge Over Ash Sluice Trench Abutments.cal	CAL
1/26/2009	RAD	PAF-10W410-Sht -Rev 4 Yard Units 1 & 2 Concrete Ash Sluice Pipe Trench & Supports Outline & Reinf-Sh 1.cal	CAL

Date Reviewed	Reviewed by	File Name	File Type
1/26/2009	RAD	PAF-10W411-Sht -Rev 3 Yard Units 1 & 2 Concrete Ash Sluice Pipe Trench & Supports Outline & Reinf - Sh 2.cal	CAL
1/26/2009	RAD	PAF-10W4203-Sht -Rev 2 Yard Location Of Structures Coal Receiving , Coal Washing, And Coal Handling Facility.cal	CAL
1/28/2009	RAD	PAF-10W4203-Sht -Rev 2 Yard Location Of Structures Coal Receiving , Coal Washing, And Coal Handling Facility.cal	CAL
2/26/2009	WRM	PAF-10W4271-1-Sht -Rev 2 Yard Units 1-3 Coal Washing Refuse Storage Area No. 1 Sheet 1.cal	CAL
2/26/2009	WRM	PAF-10W4271-2-Sht -Rev 2 Yard Units 1-3 Coal Washing Refuse Storage Area No. 1 Sheet 2.cal	CAL
2/26/2009	WRM	PAF-10W4271-3-Sht -Rev 1 Yard Units 1-3 Coal Washing Refuse Stroage Area No. 1 Sheet 3.cal	CAL
2/26/2009	WRM	PAF-10W4271-4-Sht -Rev 1 Yard Units 1-3 Coal Washing Refuse Storage Area No. 1 Sheet 4.cal	CAL
2/26/2009	WRM	PAF-10W4271-5-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Reclamation - Plan.cal	CAL
2/26/2009	WRM	PAF-10W4271-6-Sht -Rev 1 Yard Coal Washing Refuse Medium & Coarse Storage Reclamation - Details.cal	CAL
2/26/2009	WRM	PAF-10W4271-7-Sht -Rev 1 Yard Coal Washing Refuse Medium And Coarse Storage Reclamation - Details.cal	CAL
2/26/2009	WRM	PAF-10W4273-1-Sht -Rev 5 Yard Coal Washing Refuse- Fines Storage Area No. 2 Sheet 1.cal	CAL
2/26/2009	WRM	PAF-10W4273-2-Sht -Rev 5 Yard Coal Washing Refuse- Fines Storage Area No.2 Sheet 2.cal	CAL
2/26/2009	WRM	PAF-10W4273-3-Sht -Rev 6 Yard Coal Washing Refuse- Fines Storage Area No. 2 Sheet 3.cal	CAL
2/26/2009	WRM	PAF-10W4273-4-Sht -Rev 3 Yard Coal Washing Refuse - Fines Storge Area No. 2 Sheet 4.cal	CAL
2/26/2009	WRM	PAF-10W4273-5-Sht -Rev 2 Yard Coal Washing Refuse Storage Area No. 2 Sheet 5.cal	CAL
2/26/2009	WRM	PAF-10W4273-6-Sht -Rev 0 Yard Coal Washing Refuse - Fines Storage Area No. 2 Sheet 6.cal	CAL
2/26/2009	WRM	PAF-10W4274-1-Sht -Rev 1 Yard Coal Wash Refuse Area No. 2 Temporary Fines Ponds Modified Type B Spillway.cal	CAL
2/26/2009	WRM	PAF-10W4274-2-Sht -Rev 1 Yard Coal Wash Refuse Area No. 2 Skimmer Details.cal	CAL
2/26/2009	WRM	PAF-10W4276-14-Sht -Rev 4 Yard Coal Washing Refuse Medium & Coarse Storage Sections & Details Sheet 14.cal	CAL
2/26/2009	WRM	PAF-10W4276-1-Sht -Rev 4 Yard Coal Washing Refuse Medium & Coarse Storage Grading Plan - Sheet 1.cal	CAL
2/26/2009	WRM	PAF-10W4276-2-Sht -Rev 2 Yard Coal Washing Refuse Medium & Coarse Storage Grading Plan - Sheet 2.cal	CAL
2/26/2009	WRM	PAF-10W4276-3-Sht -Rev 3 Yard Coal Washing Refuse Medium & Coarse Storage Sections & Details Sheet 3.cal	CAL
2/26/2009	WRM	PAF-10W4276-4-Sht -Rev 2 Yard Coal Washing Refuse Medium & Coarse Storage Details & Sections - Sheet 4.cal	CAL
2/26/2009	WRM	PAF-10W4277-12-Sht -Rev 0 Yard-Permanent Fines Pond Ash Disposal Area Spillways Type A & B.cal	CAL
2/26/2009	WRM	PAF-10W4277-13-Sht -Rev 0 Yard - Permanent Fines Pond Ash Disposal Area Weir & Skimmer Details.cal	CAL
2/26/2009	WRM	PAF-10W4277-1-Sht -Rev 1 Yard Permanent Fines Pond Sh-1 General Plan.cal	CAL
2/26/2009	WRM	PAF-10W4277-2-Sht -Rev 3 Yard Permanent Fines Pond Sh-2 Discharge & Return Lines - Plan.cal	CAL
2/26/2009	WRM	PAF-10W4277-3-Sht -Rev 3 Yard Permanent Fines Pond Sh - 3 Discharge & Return Lines- Profile.cal	CAL
2/26/2009	WRM	PAF-10W4277-4-Sht -Rev 1 Yard Permanent Fines Pond Sh - 4 Discharge & Return Line Section & Details.cal	CAL
2/26/2009	WRM	PAF-10W4277-5-Sht -Rev 1 Yard Permanent Fines Pond Sh - 5 Main Dike-Plan & Sections.cal	CAL
2/26/2009	WRM	PAF-10W4277-6-Sht -Rev 1 Yard Permanent Fines Pond Sh - 6 Stilling Pool - Plan & Sections.cal	CAL
2/26/2009	WRM	PAF-10W4277-712-Sht -Rev 0 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10W4277-713-Sht -Rev 0 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10W4277-714-Sht -Rev 0 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10W4277-715-Sht -Rev 0 Paradise Steam Plant Permanent Fines Pond Discharge Lines.cal	CAL
2/26/2009	WRM	PAF-10W4277-7-Sht -Rev 2 Yard Permanent Fines Pond Sh - 7 Miscellaneous Details.cal	CAL
2/26/2009	WRM	PAF-10W4279-10-Sht -Rev 3 Yard Coal Wash Fines Disposal Area No. 3 Type B Spillway And Skimmer Detail.cal	CAL
2/26/2009	WRM	PAF-10W4279-11-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No. 3 Concrete Endwall Type Ii.cal	CAL

Date Reviewed	Reviewed by	File Name	File Type
2/26/2009	WRM	PAF-10W4279-13-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No. 3 Profiles-North Perimeter Ditch & Relocated Sluice Lines.cal	CAL
2/26/2009	WRM	PAF-10W4279-14-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No. 3 Profile-South Access Road.cal	CAL
2/26/2009	WRM	PAF-10W4279-15-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No. 3 Enlarged Plan At Pumping Station.cal	CAL
2/26/2009	WRM	PAF-10W4279-16-Sht -Rev 2 Yard Coal Wash Fines Disposal Area No. 3 Miscellaneous Sections & Details-Dike No. 1 & Type 6 Catch Basin.cal	CAL
2/26/2009	WRM	PAF-10W4279-17-Sht -Rev 2 Yard Coal Wash Fines Disposal Area No. 3 Miscellaneous Sections, South Access Road & Dike No. 4 Sta 56 To 70 & Fence Details.cal	CAL
2/26/2009	WRM	PAF-10W4279-18-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No. 3 Details Mat Lined Gutter.cal	CAL
2/26/2009	WRM	PAF-10W4279-19-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No.3 Modified Type B Spillway Outline Plan And Sections.cal	CAL
2/26/2009	WRM	PAF-10W4279-1-Sht -Rev 2 Yard Coal Wash Fines Disposal Area No.3 General Plan Stage No.1.cal	CAL
2/26/2009	WRM	PAF-10W4279-20-Sht -Rev 0 Yard Coal Wash Fines Disposal Area No.3 Modified Type B Spillway Reinforcement Plan And Sections.cal	CAL
2/26/2009	WRM	PAF-10W4279-21-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No.3 Dike Raisings General Plan.cal	CAL
2/26/2009	WRM	PAF-10W4279-22-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No.3 Dike Raisings Sections & Details.cal	CAL
2/26/2009	WRM	PAF-10W4279-23-Sht -Rev 0 Yard Coal Wash Fines Disposal Area No.3 Finished Grading Plan Area East Of Weir Cemetery.cal	CAL
2/26/2009	WRM	PAF-10W4279-24-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No.3 Dikes No. 6 & 8 And Closure East Of Weir Cemetery Sections & Details.cal	CAL
2/26/2009	WRM	PAF-10W4279-2-Sht -Rev 2 Yard Coal Wash Fines Disposal Area No. 3 Plan-Dike No. 1, Pump Station & South Access Road Station 27+50 To 41.cal	CAL
2/26/2009	WRM	PAF-10W4279-3-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No.3 Plan-Dike No. 2, South Access Road Sta 41 To 57+50 & North Access Road Sta 65 To 74+16.75.cal	CAL
2/26/2009	WRM	PAF-10W4279-4-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No.3 Plan - Dike No. 4 And South Access Road Sta 57+50 To 73.cal	CAL
2/26/2009	WRM	PAF-10W4279-4-Sht -Rev 1 Yard Coal Wash Fines Disposal Area No.3 Plan - Dike No. 4 And South Access Road Sta 57+50 To 73.cal	CAL
2/26/2009	WRM	PAF-10W4279-58-Sht -Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W4279-5-Sht -Rev 2 Yard Coal Wash Fines Disposal Area No.3 Plan - North Access Road East Extension; Miscellaneous Sections And Details.cal	CAL
2/26/2009	WRM	PAF-10W4279-60-Sht -Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W4279-61-Sht -Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W4279-62-Sht -Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W4279-6-Sht -Rev 2 Yard Coal Wash Fines Disposal Area No.3 Plan - North Access Road, Dike No. 9, Dike No. 6 & Dike No.3 Sta 0+00 - 10+71.21_.cal	CAL
2/26/2009	WRM	PAF-10W4279-7-Sht -Rev 3 Yard - FGD System Units 1 & 2 Ash Disposal Area Weir Skimmer Dets. Sh. 7.cal	CAL
2/26/2009	WRM	PAF-10W4279-9-Sht -Rev 3 Yard Coal Wash Fines Disposal Area No.3 Plan-Dike No.7, North Access Road And Dike No. 3 & Dike No.3 Ext. Sta 31 To 45+58.cal	CAL
2/26/2009	WRM	PAF-10W4279-Sht 10-Rev 2.cal	CAL
2/26/2009	WRM	PAF-10W4279-Sht 19-Rev 0.cal	CAL
1/26/2009	WRM	PAF-10W4280-12-Sht -Rev 1 (.dwg Files).pdf	PDF
1/26/2009	WRM	PAF-10W4280-12-Sht -Rev 1.dwg	DWG
1/26/2009	WRM	PAF-10W4280-13-Sht -Rev 1 (.dwg Files).pdf	PDF

Date Reviewed	Reviewed by	File Name	File Type
1/26/2009	WRM	PAF-10W4280-13-Sht -Rev 1.dwg	DWG
1/26/2009	WRM	PAF-10W4280-14-Sht -Rev 0 (.dwg Files).pdf	PDF
1/26/2009	WRM	PAF-10W4280-14-Sht -Rev 0.dwg	DWG
1/26/2009	WRM	PAF-10W4280-15-Sht -Rev 0 Yard FGD System Units 1 & 2 Wet Scrubber System Gypsum Stacking Final Grading Plan.cal	CAL
1/26/2009	WRM	PAF-10W4280-15-Sht -Rev 0.dwg	DWG
1/26/2009	WRM	PAF-10W4280-16-Sht -Rev 0 Yard FGD System Units 1 & 2 Wet Scrubber System Gypsum Stacking Section And Details.cal	CAL
1/26/2009	WRM	PAF-10W4280-16-Sht -Rev 0.dwg	DWG
1/26/2009	WRM	PAF-10W4280-17-Sht -Rev 0 (.dwg Files).pdf	PDF
1/26/2009	WRM	PAF-10W4280-17-Sht -Rev 0.dwg	DWG
1/26/2009	WRM	PAF-10W4280-1-Sht -Rev 1 Yard FGD System Units 1 & 2 Wet Scrubber System Gypsum Ponding Plan & Grading Sh. 1.cal	CAL
1/26/2009	WRM	PAF-10W4280-1-Sht -Rev 1.cal	CAL
1/26/2009	WRM	PAF-10W4280-2-Sht -Rev 1 Yard FGD System Units 1 & 2 Wet Scrubber Sgypsum Ponding Plan Sections & Dets. Sh. 2.cal	CAL
1/26/2009	WRM	PAF-10W4280-2-Sht -Rev 1.cal	CAL
1/26/2009	WRM	PAF-10W4280-3-Sht -Rev 1 Yard FGD System Units 1 & 2 Wet Scrubber Systemgypsum Ponding Sections & Dets. Sh. 3.cal	CAL
1/26/2009	WRM	PAF-10W4280-3-Sht -Rev 1.cal	CAL
1/26/2009	WRM	PAF-10W4280-4-Sht -Rev 1 Yard FGD System Units 1 & 2 Wet Scrubber Systgypsum Ponding Sections & Details Sh. 4.cal	CAL
1/26/2009	WRM	PAF-10W4280-4-Sht -Rev 1.cal	CAL
1/26/2009	WRM	PAF-10W4280-5-Sht -Rev 1 Yard FGD System Units 1 & 2 Wet Scrubber Systgypsum Ponding Borrow Area - Plan Sh. 5.cal	CAL
1/26/2009	WRM	PAF-10W4280-5-Sht -Rev 1.cal	CAL
1/26/2009	WRM	PAF-10W4280-6-Sht -Rev 1 Yard - FGD System Units 1 & 2 Ash Disposal Area Spillways Type A & B - Sh. 6.cal	CAL
1/26/2009	WRM	PAF-10W4280-6-Sht -Rev 1.cal	CAL
1/26/2009	WRM	PAF-10W4280-7-Sht -Rev 1 Yard - FGD System Units 1 & 2 Ash Disposal Area Weir Skimmer Dets. Sh. 7.cal	CAL
1/26/2009	WRM	PAF-10W4280-7-Sht -Rev 1.cal	CAL
1/24/2009	RAD	PAF-10W4289-1-Sht -Rev 1 Yard - Chemical Treatment Pond Grading Plan.cal	CAL
1/24/2009	RAD	PAF-10W4289-2-Sht -Rev 1 Yard - Chemical Treatment Pond Sections & Details.cal	CAL
2/26/2009	WRM	PAF-10W4290-10-Sht -Rev 0 Yard North Rail Loop Ash Disposal Facility Details.cal	CAL
2/26/2009	WRM	PAF-10W4290-Sht 1-Rev 3.cal	CAL
2/26/2009	WRM	PAF-10W4290-Sht 2-Rev 2.cal	CAL
2/26/2009	WRM	PAF-10W4290-Sht 3-Rev 2.cal	CAL
2/26/2009	WRM	PAF-10W4290-Sht 8-Rev 2.cal	CAL
2/26/2009	WRM	PAF-10W4290-Sht 9-Rev 2.cal	CAL
2/26/2009	WRM	PAF-10W4291-Sht 1-Rev 2.cal	CAL
2/26/2009	WRM	PAF-10W4291-Sht 2-Rev 1.cal	CAL
2/26/2009	WRM	PAF-10W4291-Sht 3-Rev 2.cal	CAL
2/26/2009	WRM	PAF-10W4291-Sht 4-Rev 2.cal	CAL
2/26/2009	WRM	PAF-10W4292-5-Sht -Rev 1.cal	CAL
2/26/2009	WRM	PAF-10W4292-6-Sht -Rev 1.cal	CAL
2/26/2009	WRM	PAF-10W4292-Sht 03-Rev 1.cal	CAL

Date Reviewed	Reviewed by	File Name	File Type
2/26/2009	WRM	PAF-10W4292-Sht 04-Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W4292-Sht 04-Rev 1.cal	CAL
2/26/2009	WRM	PAF-10W4292-Sht 05-Rev 0.cal	CAL
2/26/2009	WRM	PAF-10W4292-Sht 06-Rev 0.cal	CAL
1/26/2009	RAD	PAF-10W5250-Sht -Rev 3 Coal Handling Facilities Units 1-3 Barge Unloading Dock Channel Excavation - Plan.cal	CAL
2/26/2009	WRM	PAF-10W5250-Sht -Rev 3 Coal Handling Facilities Units 1-3 Barge Unloading Dock Channel Excavation - Plan.cal	CAL
1/28/2009	RAD	PAF-10W5380-4-Sht -Rev 2 Coal Handling Facilities Units 1-3 Barge Unloading Dock Harbor Boat Dock Cells 1 & 2.cal	CAL
3/10/2009	RJK	PAF-10W800-9-Sht -Rev 0 Yard Drainage Improvement Near Coal Hopper Building.cal	CAL
3/10/2009	RJK	Paradise Aerial Mapping - All Areas.pdf	PDF
3/10/2009	RJK	Paradise Aerial Mapping - Scrubber Sludge Area.pdf	PDF
3/10/2009	RJK	Paradise Inspection Reports Summary.Xls	XLS
1/26/2009	WRM	Peabody Ash And Stilling Pond Drawings (From Cal).pdf	PDF
3/10/2009	RJK	Proposed East Dredge Cell 1988 (Jcap_Dredging_Cont[1].).pdf	PDF
3/10/2009	RJK	Proposed East Dredge Cell 1989 (Jcap_Dredging).pdf	PDF
3/10/2009	RJK	Red Water Management Document (Red_H20_Mngmt).pdf	PDF
3/10/2009	RJK	Red Water Seep Coordinates At Slag Mountain Ponds 1998 (Red_Wtr_Seeps).pdf	PDF
3/10/2009	RJK	Red Water Seepage Report 1996 (Red_Wtr_Seep_1996).pdf	PDF
3/10/2009	RJK	Red Water Seepage Report 1997 (Grd_Wtr_1997).pdf	PDF
3/10/2009	RJK	Red Water Seepage Report 1997 (Rw Seeps_1997).pdf	PDF
3/10/2009	RJK	Red Water Seepage Report 1998 - 2002 (Rw_Anual_Insp_1).pdf	PDF
3/10/2009	RJK	Red Water Seepage Report 1998 (Rw_Amual_Insp).pdf	PDF
3/10/2009	RJK	Red Water Seepage Report 2008A (Rw_Anual_Insp-001).pdf	PDF
3/10/2009	RJK	Red Water Seepage Report 2008B (Rw_Anual_Insp).pdf	PDF
3/10/2009	RJK	Reed Minerals Contract With Tva (Reed_Min_Contract).pdf	PDF
3/10/2009	RJK	Scrubber Sludge Complex (.cal Files).pdf	PDF
3/10/2009	RJK	Scrubber Sludge Complex Aerial (4843123).pdf	PDF
3/10/2009	RJK	Scrubber Sludge Disposal Permit 1984B (Scrubber_Sludge).pdf	PDF
3/10/2009	RJK	Scrubber Sludge Disposal Permit 1984B (Scrubber_Sludge-001).pdf	PDF
3/10/2009	RJK	Scrubber Sludge Dry Stacking Permit 1984 (Solide_Waste_Ds).pdf	PDF
3/10/2009	RJK	Scrubber Sludge Stilling Pond Drawings (From Cal).pdf	PDF
2/26/2009	WRM	Sk-1.pdf	PDF
2/26/2009	WRM	Sk-2.pdf	PDF
3/10/2009	RJK	Slag Ponds 2A And 2B - Original Fly Ash Disposal Area.pdf	PDF
3/10/2009	RJK	Slag Ponds 2A And 2B (.cal Files).pdf	PDF
2/26/2009	WRM	Slag Rejects Grading Plan.pdf	PDF
3/10/2009	RJK	Topo Mapping - Partial Facility (484312Dtm).dwg	DWG
3/10/2009	RJK	Topo Mapping - Partial Facility (484312Uc).dwg	DWG

Appendix C

Shawnee Fossil Plant

TVA Disposal Facility Assessment
Phase 1 Plant Summary
Shawnee Fossil Plant (SHF)

Location:	Shawnee Fossil Plant (SHF) 7900 Metropolis Lake Road Paducah, McCracken County, KY 42086 Latitude: 37.1607 N Longitude: 88.7950 W
Plant Contact:	Allen Stephens Program Administrator Phone: 270-488-3133 Email: arstephe@tva.gov
Facts and Figures:	The Shawnee Fossil Plant has ten coal-fired generating units. Construction began in 1951 and was completed in 1957. The plant consumes approximately 9,600 tons of coal per day. It is located on the Ohio River near river mile 946, and is about 13 miles west of downtown Paducah, KY.
Coal Combustion Byproduct Disposal:	Approximately 600,000 tons of dry ash is collected in silos each year and hauled to an onsite dry stack disposal area (Consolidated Waste Dry Stack). Approximately 40,000 tons per year of bottom ash is wet-sluiced to the Active Ash Disposal Area No. 2. Dewatered bottom ash is reclaimed from the Active Ash Disposal Area No. 2 and stacked within the Consolidated Waste Dry Stack.
Geology and Seismicity:	The Shawnee Fossil Plant is located in western Kentucky along the south shore of the Ohio River just east (upstream) of the confluence of the river and Bayou Creek. Quaternary age alluvium, loess, and silt and sand deposits are mapped as being exposed at the surface within the vicinity of the plant. The geologic mapping indicates these materials are underlain by Quaternary age continental deposits and the Upper Cretaceous and Tertiary age Clayton and McNairy Formations. The mapping describes the alluvium as consisting of clean fine sands to sandy clays varying from about 0 to 40 feet in thickness. The loess deposits consist of eolian silty clays and clayey silts and the contact with the underlying silt and sand deposits is gradational and irregular. The silt and sand deposits contain sparse gravel and are thought to be either slack water or partly lacustrine and partly alluvial in origin. The continental deposits consist of gravel and poorly sorted fine to coarse quartz and chert sand, exhibit cemented zones, vary from clean to clayey, and are locally

micaceous. The Clayton and McNairy Formations consist of fine to medium quartz sand interbedded with black or brown clay that is commonly micaceous.

Evaluations of seismic hazards affecting western Kentucky, and thus the plant site, are dominated by events emanating from the New Madrid Seismic Zone (NMSZ) of the central Mississippi Valley. The NMSZ is the most active seismic zone east of the Rocky Mountains and the continuing seismicity of the zone is thought to be associated with the reactivation of faults within the Reelfoot Rift System. Although the majority of the events emanating from this zone are too small to be felt at the surface, this zone did produce a series of four earthquakes between December 1811 and early February 1812 each exhibiting estimated magnitudes on the order of 7.0 to 8.0.

Facilities Reviewed:

Active Ash Disposal Area No. 2
Intake Channel Dredge Cell
Consolidated Waste Dry Stack
Inactive Dredge Cell

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Shawnee Fossil Plant (SHF)
Active Ash Pond No. 2 (AP2)

1. General Facility Information

Facility Status:	Active	NID Identification:	KY15014
Surface Area (inside dikes)	142.3 Acres	Maximum Height (toe to top of dike):	25 feet
Free Water Volume:	Not provided by TVA	Maximum Water Storage:	Not provided by TVA
Estimated CCB Storage:	4,712,407 CY	Dike Length:	7,600 feet
Plant Discharge to Facility:	31.8 MGD	Current Pool Elevation:	346 feet

2. Site Visit Information

Stantec Assessment Team:	Stephen Bickel, PE, Nathan Bader, PE, Stan Harris, PE, and Matt Hoy, EIT
TVA Staff Present:	Allen Stephens
Field Assessment Dates:	January 15, 2009 and February 4 - 5, 2009
Weather/Site Conditions:	Mid 30 degrees F, clear, moist ground both assessments

3. History/Description of Usage

History and Operation:	Approximately 40,000 tons per year of bottom ash is wet-sluiced to the Active Ash Disposal Area No. 2. Dewatered bottom ash is reclaimed from the Active Ash Disposal Area No. 2 and stacked within the Consolidated Waste Dry Stack. Outlet is through five 48-inch RCP riser pipe/weirs that discharge through five 36-inch RCP sections into an open discharge channel. Ash Pond No. 2 was initially constructed in 1971 with 14-foot tall clay dikes (Crest Elevation 340 feet). The dikes were reportedly raised 10 feet in 1979 (crest Elevation 350 feet) using an upstream method with clay material The raised dikes were constructed over bottom ash placed within the pond as a base.

Past Failures/Releases:	Tall RCP push-together riser structure spillways are present at the pond. The riser pipes at the two southernmost spillways failed in 1984 due to a wave in the stilling pond. The wave was caused by a failure of the interior dike separating the adjacent Inactive Dredge Cell from the stilling pond. Reportedly the top 11 feet was reconnected. The limits of the release and information relative to the volume of material released is unknown.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Shawnee Fossil Plant covering active facilities.
TVA Maintenance:	Exterior slopes mowed twice annually.
TVA Inspections:	TVA Engineering performs annual dike inspections and prepares reports for repair/maintenance activities. Plant personnel recently started making daily observations and performing weekly reviews of the disposal facilities at this plant.
Problems Previously Identified During Past TVA Inspections:	Seepage along toe of northeast dike, animal paths on exterior slopes, isolated trees along inner slope at various areas around pond.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	Drawing numbers 10N206, 209, 271-274, 284, 10W229, 269.
TVA As-Built Drawings:	None available.
TVA Construction Testing Records:	None available.
TVA Annual	TVA Annual Inspection Reports 1971 to 2008.

Inspection Reports:	
Geotechnical Data:	None available.

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	Tall grass, phragmites, dense coverage.
Trees:	Trees ranging in size from saplings to trees up to 8-inch diameter observed in various areas throughout inner perimeter dike slope and interior divider dike slopes.
Wave Wash Protection:	Rip-rap slope protection present within portions of the pond (primarily within stilling pond and divider dikes).
Erosion:	Few locations of wave erosion, size and length vary.
Instabilities:	None observed.
Animal Burrows:	None observed.
Freeboard:	**Measured:** 5.2 feet at Section 3 5.6 feet at Section 2 (See drawing for section locations) **Design:** 4 feet (from Drawing 10N271)
Encroachments:	None observed.
Slope:	**Measured:** 2.0H:1V at Section 3 1.7H:1V at Section 2 (both sides of divider dike) **Design:** 2.0H:1V for both perimeter and divider dikes (from drawing 10N271)

6.2. Crest

Crest Cover and Slope:	Gravel access road, crest appeared relatively flat.
Erosion:	None observed.
Alignment:	Alignment appeared consistent with design drawings.
Settlement/Cracking:	None observed.

Bare Spots/Rutting:	None observed.

Width:	**Measured:**	19 feet at Section 1 22 feet at Section 3 23 feet at Section 2 (Divider Dike)
	Design:	16 feet for perimeter and divider dikes (from drawing 10N271)

6.3. Exterior Slopes

Vegetation:	Mostly grass, adequate coverage. Thick phragmites within seepage area to northeast where mowing can not be done due to soft ground conditions.	
Trees:	Area is wooded below the toe of the slope but no trees were observed along the exterior slopes.	
Erosion:	None observed.	
Instabilities:	No evidence of instability was observed.	
Uniform Appearance:	Good.	
Seepage:	Yes, along toe of slope in northeast corner of pond. Several wet areas are present but no significant flow was observed. Seepage areas contain tall phragmite and cannot be mowed due to soft ground conditions.	
Benches:	None observed.	
Foundations, Drains, Relief Wells, Instrumentation:	No provisions for drainage/seepage control or instrumentation were observed.	
Animal Burrows:	None observed.	
Slope:	**Measured:**	2.7H:1V at Sections 1 and 3
	Design:	3.0H:1V (from drawing 10N271)
Height:	**Measured:**	20 feet at Section 1 15 feet at Section 3
	Design:	25 feet (from drawing 10N271)

6.4. Spillway Weirs/Riser Inlets

Number:	Five (5) located in the stilling pond at the SW corner of facility.
Size, Type and Material:	48-inch RCP push-together riser sections with standard TVA steel skimmers.
Height of Riser Inlets:	31.3 Feet
Access:	All spillways accessible via single moveable floating catwalk.
Joints:	Unable to observe joints or leakage below inlet level. Reportedly, the riser pipes at the two southernmost spillways failed in 1984 due to a wave in the stilling pond. Reportedly the top 11 feet was reconnected.
Mis-Alignment:	Tilt measured at top of risers ranging from 0.03 to 0.13 ft.
Closed/Abandoned Conduits:	None reported or observed.

6.5. Outlet Pipes

Number:	Five (5)
Size, Type and Material:	36-inch RCP
Headwall:	Yes, appears to be in good shape. Slight separation between top of discharge pipe and headwall at two northernmost pipes.
Joint Separations:	Separation in last section of northernmost discharge pipe reported resulting in sinkhole on exterior slope. Slope and discharge pipe were reportedly repaired. No evidence of the previous separation was observed during this assessment.
Mis-Alignment:	Unknown, could not observe.
Closed/Abandoned Conduits:	None reported.

7. Notable Observations and Concerns

- Two of the five tall RCP push-together riser structure spillways have failed in the past. In addition, some separation in the discharge pipes has been previously reported. In the spillway evaluation performed in 2007, some minor tilting was also measured along the tops of the riser structures.
- Seepage along northeast dike along the toe of the slope is a concern. It has been reportedly ongoing for more than 20 years and has been monitored various times a year by TVA with little or no change being reported through the years.
- Raising the dikes by using upstream construction over sluiced ash is a potential slope stability concern.
- Tall brush and phragmites are present on interior slopes and at exterior slope seepage areas where ground is soft.
- Trees are located along the inner perimeter dike slopes and on the divider dike slopes in various portions of the pond.
- Animal paths were observed in several areas along the outer dike slope.
- Separation was observed at the spillway outlets between the headwall and the two northernmost discharge pipes.
- Previous inspection reports appear adequate, but there is a trend of not all maintenance recommendations being executed.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- The RCP riser spillways at Ash Pond 2 may ultimately be modified or replaced, pending Stantec-TVA assessment of replacement system. Continue routine repairs and monitoring of the spillway systems until that time.
- It is recommended that the perimeter dikes for Active Ash Pond 2 undergo further geotechnical engineering study to evaluate slope stability and seepage. In addition, a hydraulic and hydrologic analyses should be performed to evaluate pond conditions.

- It is recommended that an Operations and Maintenance Plan, and an Emergency Action Plan be developed for this facility.
- It is recommended that a program to develop as-built drawings and construction records for future maintenance and construction activities be established.

8.2. Maintenance Recommendations

- The seepage observed along the toe of the perimeter dike at the northeast side of Ash Pond 2 should continue to be monitored. A seepage monitoring point consisting of a collection system and weir box or similar structure should be installed.
- Remove trees from interior slopes and divider dikes of pond and repair slopes as needed following tree removal.
- Cut and maintain heavy phragmite and vegetation growth on interior slopes to permit better assessment.
- Cut tall phragmite and vegetation from seepage area to permit better assessment and observation.
- The separation observed between the headwall and the two northernmost discharge pipes should be monitored. If the separation becomes greater and begins to cause erosion at the headwall and pipe interface, repairs should be made.
- The animal paths present on the outer perimeter dike slopes of Ash Pond 2 should be monitored and repaired if erosion begins.
- Continue annual inspection program and execute recommendations.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Shawnee Fossil Plant (SHF)
Consolidated Waste Dry Stack (DS)

1. General Facility Information

Facility Status:	Active		
Surface Area:	110 Acres	Maximum Height (toe to top of stack):	100 feet Existing 270 feet Proposed

2. Site Visit Information

Stantec Assessment Team:	Stephen Bickel, PE, Nathan Bader, PE, Stan Harris, PE, and Matt Hoy, EIT
TVA Staff Present:	Allen Stephens
Field Assessment Dates:	January 15, 2009 and February 4 - 5, 2009
Weather/Site Conditions:	Mid 30 degrees F, clear, moist ground both assessments

3. History/Description of Usage

History, Operation and Stacking Plan:	Construction of the Consolidated Waste Dry Stack began in 1984. The disposal area was the original Ash Pond No. 1 for the plant, which was taken out of service following construction of the current Ash Pond No. 2. A perimeter dike for the old Ash Pond No. 1 is situated on the southwest side of the stack, but due to concerns relative to the old perimeter dike stability, the toe of the stack was offset roughly 50 to 70 feet from the perimeter dike. Currently, dry fly ash is collected in silos and hauled for placement into the stack. In addition, bottom ash is excavated and dewatered from Ash Pond No. 2 and placed within the stack. The dry stacking operation is following a stacking plan believed to be developed in 1984 (no drawings available) and updated in 2000. The existing stack is approximately 80 to 100 feet in height with the new horizontal expansion currently being constructed to the north. The ultimate height of the expansion stack will range from 80 to as much as 270 feet. The expansion will be constructed on 3H:1V slopes with benches every 50 feet in height.

Stacking over Dredge Cells or CCB Ponds:	Previous Ash Pond No. 1 is located beneath the Consolidated Waste Dry Stack and was used as the original ash pond for the plant. This pond operated until about 1971 when construction of Ash Pond No. 2 was completed and the new pond was brought into service.
Past Failures/Releases:	No failures or releases reported.

4. Owner's Operations, Maintenance and Inspection Information

TVA Maintenance:	Exterior slopes mowed twice annually.
TVA Inspections:	TVA Engineering performs annual dike inspections which include the stack area and prepares reports for repair/maintenance activities. Plant personnel recently started making daily observations and performing weekly reviews of the disposal facilities at this plant.
Problems Previously Identified During Past TVA Inspections:	Throughout the years, areas of erosion, washouts, sedimentation in drainage features, and lack of vegetative cover have been identified around various areas of the existing stack.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	Drawing numbers 10W220-01 through 220-52 and 10W221-1 through 221-18.
TVA As-Built Drawings:	Drawings 10W221-1 through 221-18 show portions of the stack that have been completed through 2008.
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA Annual Inspection Reports 1984 to 2008.
Geotechnical Data:	Some geotechnical information available within the Special Waste Landfill Permit for the Horizontal Expansion prepared by FMSM (now Stantec) in 2006.

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Exterior Slopes and Benches

Vegetation:	Grassy vegetation established throughout majority of existing stack to the south with the exception of areas recently repaired or eroded. The newly completed areas to the north have been seeded but vegetation has not yet been established in these areas. The old Ash Pond No. 1 perimeter dike to the southwest is heavily vegetated and wooded throughout.
Trees:	The old perimeter dike, which is offset 50 feet or more to the southwest, is heavily wooded with numerous mature trees present throughout. No trees were observed along the Consolidated Waste Dry Stack.
Erosion:	Numerous areas of erosion were reported in the 2009 annual inspection report and were observed around the stack. These areas included numerous washouts and erosion rills and gullies along the slopes, benches and drainage features.
Instabilities:	Several areas of shallow sloughing and instability are present throughout the old Ash Pond No. 1 perimeter dike to the southwest.
Uniform Appearance	Good along stack, except for areas where erosion has occurred. Poor along majority of old Ash Pond No. 1 perimeter dike to the southwest, where erosion and sloughing has occurred.
Benches:	Benches along the existing closed portion of the stack area at approximate Elevation 380 feet and 405 feet The benches are sloped toward the stack and towards down-drains at various locations around stack. Some erosion and sedimentation was observed at various locations along the benches.

Slope:	Design: 3H:1V for dry stack slopes, 3H:1V for old perimeter dike (from drawing 10N206). Measured: 2.7H:1V to 3.0H:1V or flatter along dry stack at Sections 4 and 5. 1.5H:1V or flatter estimated along perimeter dike.
Height:	80 to 100 feet (Estimated) at existing dry stack. 15 to 20 feet (Estimated) along old perimeter dike.
Other:	None.

6.2. Perimeter Drainage Ditches and Down-Drains

Vegetation:	Some grassy vegetation in perimeter ditches and down-drains.
Rip-Rap Channel Lining:	Rip-rap observed in down-drains only, no rip-rap in perimeter ditches or benches.
Erosion:	Erosion including washouts and rills/gullies noted at various areas along selected down-drains.
Siltation in Ditches:	Some siltation present in lower perimeter ditch and entrances to down-drains.
Standing Water in Ditches or on Benches:	Standing water noted along lower perimeter ditch at base of stack.
Silted/Impeded Drainage Pipes:	Siltation at outlet drainage pipe between the Inactive Dredge Cell and the Consolidated Waste Dry Stack has resulted in impeded flow and some standing water in the ditch.
Other:	None.

7. Notable Observations and Concerns

- The area beneath the current dry stack was initially operated as the ash pond for the plant. A design for the horizontal expansion was prepared by FMSM (now Stantec) which included geotechnical explorations and slope stability analyses for the final phase of the stacking operations to the northeast. However, no analyses or exploration for the existing portion of the stack to the south were reported.

- Numerous areas requiring maintenance activities were observed throughout the Consolidated Waste Dry Stack. The majority of the deficiencies were observed on the west side primarily above the second bench and on the bottom slope. Erosion rills were observed in several areas and along portions of the downdrains. Some siltation was also observed along the benches near several of the downdrains. Significant washouts were observed at various locations along the slopes. Since last year, several areas have been regraded, repaired, covered with soil, and seeded as recommended. The vegetation is not yet established in these areas and some minor erosion is continuing to occur. Finally, the newer areas of the stack to the northeast have only recently been completed and these slopes lack vegetation. Areas of minor erosion are present throughout this area.
- The old ash pond was located in the area currently being used for the Consolidated Waste Stack. The stack was built over the old ash pond and is set back approximately 50 feet or more from the old pond perimeter dike to the west. The slopes along the old perimeter dike are as steep as about 1.5H:1V in parts and are heavily overgrown. Some shallow sloughing and fallen trees are present throughout.
- The absence of detailed as-built drawings and construction testing records is a concern.
- Previous inspection reports appear adequate, and the majority of the recommendations for repairs to the stack were attempted. Due to the drainage conditions and erosive nature of the materials used to construct the stack and final cover, continued erosion has occurred even after the previous repairs were made. It is expected that maintenance to the stack will need to be executed each year to repair eroded areas, washouts, etc.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- It is recommended that the perimeter dike and exterior slopes for the original portions of the Consolidated Waste Dry Stack undergo further engineering study to evaluate slope stability. (not included in the FMSM 2006 work)
- It is recommended that an Operations and Maintenance Plan be developed for the facility.
- It is recommended that a program be established to develop as-built drawings and construction records for future maintenance and construction activities.

8.2. Maintenance Recommendations

- Refer to the 2009 Annual Inspection Report for repair locations and instructions for the Consolidated Waste Dry Stack. These repairs include areas of erosion, sedimentation, washouts, and areas lacking vegetation at numerous locations around the stack. The plant should continue best management practice of covering and seeding side slopes of the stack before major erosion takes place.
- Continue annual inspection program and execute recommendations.

TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Shawnee Fossil Plant (SHF)
Inactive Dredge Cell (CDA)

1. General Facility Information

Facility Status:	Inactive and closed.	NID Identification:	Not Available
Surface Area (inside dikes)	29 Acres	Maximum Height (toe to top of dike):	20 feet (Estimated)
Free Water Volume:	N/A - Drained and Inactive	Maximum Water Storage:	N/A - Drained and Inactive
Estimated CCB Storage:	750,000 cubic yards	Dike Length:	4,700 feet
Plant Discharge to Facility:	N/A - Inactive	Current Pool Elevation:	Currently drained.

2. Site Visit Information

Stantec Assessment Team:	Stephen Bickel, PE, Nathan Bader, PE, Stan Harris, PE, and Matt Hoy, EIT
TVA Staff Present:	Allen Stephens
Field Assessment Dates:	January 15, 2009 and February 4 - 5, 2009
Weather/Site Conditions:	Mid 30 degrees F, clear, moist ground both assessments

3. History/Description of Usage

History and Operation: The Inactive Dredge Cell is currently closed and is located northeast of the Consolidated Waste Dry Stack. This internal dredge cell was constructed around 1983 and received dredged ash from Ash Pond No. 2. Approximately 750,000 cubic yards of ash were dredged to this area until it was closed in 1984/1985. The interior dikes were constructed of ash with the only exterior dike existing along the southwest side. This dike was constructed of ash above the outer clay perimeter dike on 3H:1V slopes to elevation 365 feet. A decanting structure for this cell was located in the north side of the cell which is interior to Ash Pond No. 2. The area was closed with a soil cover.

Past Failures/Releases:	The interior ash dike separating the Inactive Dredge Cell from the stilling pond for Ash Pond No. 2 failed in 1984. The failure caused a wave in the stilling pond which ultimately resulted in failure of the two southernmost spillway risers. The interior dike was repaired and flattened following the event and the cell was closed soon after.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:	No EAP has been prepared for this facility.
Operations Manual:	A coal combustion products operations manual is available for the Shawnee Fossil Plant covering active facilities.
TVA Maintenance:	None reported.
TVA Inspections:	TVA Engineering performs annual dike inspections and prepares reports for repair/maintenance activities. Plant personnel recently started making daily observations and performing weekly reviews of the disposal facilities at this plant.
Problems Previously Identified During Past TVA Inspections:	None reported.

5. Documents Reviewed

See attached Document Log for complete list of documents provided by TVA for review. In particular, the following provided pertinent information for the assessment of this facility:

TVA Design Drawings:	None available.
TVA As-Built Drawings:	None available.
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA Annual Inspection Reports 1982 to 2008.
Geotechnical Data:	None available.

6. Stantec Field Observations

See attached Concerns/Photo Log, Photos, and Site Plan Drawing.

6.1. Interior Slopes

Vegetation:	None observed (interior of closed cell is filled/graded).
Trees:	Trees present at various areas throughout interior of closed cell.
Wave Wash Protection:	N/A.
Erosion:	N/A
Instabilities:	N/A
Animal Burrows:	N/A
Freeboard:	**Measured:** N/A - Cell currently closed. **Design:** Not available.
Encroachments:	None observed.
Slope:	**Measured:** N/A -Cell is closed **Design:** Not available.

6.2. Crest

Crest Cover and Slope:	Vegetation is established throughout the majority of old crest of perimeter dike.
Erosion:	Minor erosion throughout.
Alignment:	No drawings for comparison.
Settlement/Cracking:	None observed.
Bare Spots/Rutting:	Some bare spots observed along top of closed cell.
Width:	**Measured:** N/A **Design:** Not available.

6.3. Exterior Slopes

Vegetation:	The shared ash dikes along the north and west sides of the inactive dredge cell have a heavy stand of vegetation throughout the majority of the perimeter. The southern perimeter dike consists of ash with a soil cover on slopes of 3H:1V. The area has been seeded but vegetation is not yet established on this slope.	
Trees:	The shared ash dike slopes are heavily wooded with mature trees throughout. Fallen trees also observed in various areas throughout. No trees were observed along the southern exterior dike.	
Erosion:	Erosion was observed throughout the shared ash dike exterior slopes. The southern exterior dike has only recently been seeded and lacks vegetation with some minor erosion observed. Along the southwest corner of this dike, some erosion was observed due to runoff to the adjacent Consolidated Waste Stack outlet pipes.	
Instabilities:	Scarps, fallen trees and slope instability were observed in several areas along the shared interior ash dikes along the north and west sides.	
Uniform Appearance:	Exterior slopes are not uniform.	
Seepage:	Cell closed and drained, no seepage was observed.	
Benches:	None observed.	
Foundations, Drains, Relief Wells, Instrumentation:	No provisions for drainage/seepage control, or instrumentation were observed	
Animal Burrows:	None observed.	
Slope:	**Measured:**	1.5H:1V to 2.0H:1V along north and west interior ash dikes (Estimated) 3.0H:1V on southern exterior dike at Section 1.
	Design:	3.0H:1V (taken from discussions in annual inspection reports).
Height:	**Measured:**	11 to 15 feet at Section 1
	Design:	To El. 365 feet

6.4. Spillway Weirs/Riser Inlets

Number:	Unknown.
Size, Type and Material:	Temporary decanting structure used along north portion of cell.
Height of Riser Inlets:	Unknown.
Access:	Unknown.
Joints:	Unknown.
Mis-Alignment:	Unknown.
Closed/Abandoned Conduits:	Unknown.

6.5. Outlet Pipes

Number:	Unknown.
Size, Type and Material:	Unknown.
Headwall:	Unknown
Joint Separations:	None reported, unknown.
Mis-Alignment:	None reported, unknown.
Closed/Abandoned Conduits:	None reported, unknown.

7. Notable Observations and Concerns

- The shared ash dikes along the north and west sides of the inactive dredge cell have a heavy stand of vegetation and trees throughout the majority of the perimeter. Some scarps, fallen trees, and slope instability were observed in several areas along these interior dikes.
- The southern perimeter dike consists of ash with a soil cover on slopes of 3H:1V. The area has been seeded but vegetation is not yet established on this slope and some minor erosion was observed.
- Along the southwest corner of the southern perimeter dike, some erosion was observed due to runoff of the adjacent Consolidated Waste Stack outlet pipes.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- Phase 2 engineering is not recommended for this closed facility at this time.

8.2. Maintenance Recommendations

- The southern perimeter dike of the Inactive Dredge Cell and the area extending to the adjacent Consolidated Waste Stack outlet pipes should be re-seeded to establish vegetation. Areas of erosion should be repaired as needed prior to seeding. The remaining perimeter dikes where sloughing, trees, and heavy vegetation was observed should continue to be monitored and repaired as needed.
- Continue annual inspection program and execute recommendations.

Drawing Mark AP-2-1 Top of RCP stacked riser spillway (Typ.).

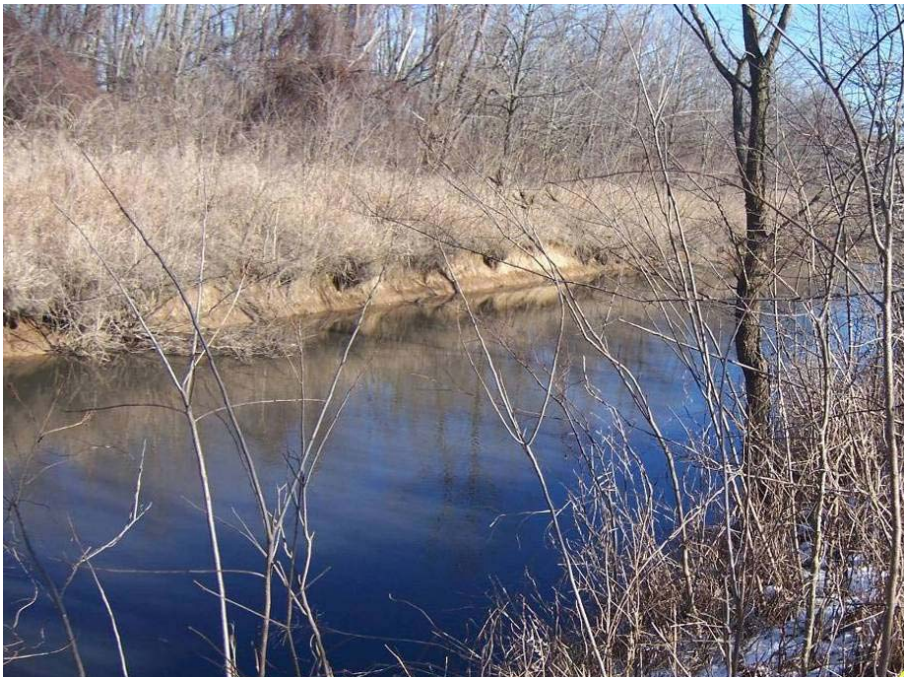
Drawing Mark AP-2-2 Seepage along toe of northeast perimeter dike.

Drawing Mark AP-2-3 Trees along inner perimeter dike slope on north side.

Drawing Mark AP-2-4 Smaller trees along various inner perimeter and divider dike slopes (Typ.).

Drawing Mark AP-2-5 Animal paths at various locations along exterior perimeter dike slopes (Typ.).

Drawing Mark AP-2-6 Separation of northernmost discharge pipe from headwall.



Drawing Mark AP-2-7 Discharge Channel (Typ.).

Drawing Mark AP-2-8 Heavy phragmite and vegetation on interior perimeter slope (Typ.).

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
AP-2-1	Top of RCP stacked riser spillway (Typ.).	Photo 50B
AP-2-2	Seepage along toe of northeast perimeter dike.	Photo 73B
AP-2-3	Trees along inner perimeter dike slope on north side.	Photo 78B
AP-2-4	Smaller trees along various inner perimeter and divider dike slopes (Typ.).	Photo 83B
AP-2-5	Animal paths at various locations along exterior perimeter dike slopes (Typ.).	Photo 46B
AP-2-6	Separation of northernmost discharge pipe from headwall.	Photo 12B
AP-2-7	Discharge Channel (Typ.).	Photo 45B
AP-2-8	Heavy phragmite and vegetation on interior perimeter slope (Typ.).	Photo 8B

Drawing Mark DS-1-1 Fallen trees, scarps and steep slopes along old perimeter dike southwest of stack (Typ.).

Drawing Mark DS-1-2 Toe of old perimeter dike slope along Little Bayou Creek (Typ.).

Drawing Mark DS-1-3 Typical erosion rill along exterior slope of stack (Typ.).

Drawing Mark DS-1-4 Sedimentation and erosion along bench at top of down-drain (Typ.).

Drawing Mark DS-1-5 Lack of vegetation in previously repaired area with some minor erosion (Typ.).

Drawing Mark DS-1-6 Scarps due to erosion along toe of slope and bench (Typ.).

Drawing Mark DS-1-7 Deep washout along second bench (Typ.).

Drawing Mark DS-1-8 Washout and erosion on south face of newly completed area with lack of vegetation (Typ.).

Drawing Mark DS-1-9

Erosion and standing water in perimeter ditch between stack and Inactive Dredge Cell (Typ.).

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
DS-1-1	Fallen trees, scarps and steep slopes along old perimeter dike southwest of stack (Typ.).	Photo 16B
DS-1-2	Toe of old perimeter dike slope along Little Bayou Creek (Typ.).	Photo 17B
DS-1-3	Typical erosion rill along exterior slope of stack (Typ.).	Photo 51B
DS-1-4	Sedimentation and erosion along bench at top of down-drain (Typ.).	Photo 19B
DS-1-5	Lack of vegetation in previously repaired area with some minor erosion (Typ.).	Photo 21B
DS-1-6	Scarps due to erosion along toe of slope and bench (Typ.).	Photo 28B
DS-1-7	Deep washout along second bench (Typ.).	Photo 30B
DS-1-8	Washout and erosion on south face of newly completed area with lack of vegetation (Typ.).	Photo 135B
DS-1-9	Erosion and standing water in perimeter ditch between stack and Inactive Dredge Cell (Typ.).	Photo 138B

Drawing Mark CDA-1-1 Scarps along west shared ash dike (Typ.).

Drawing Mark CDA-1-2 Lack of established vegetation on exterior south dike slope.

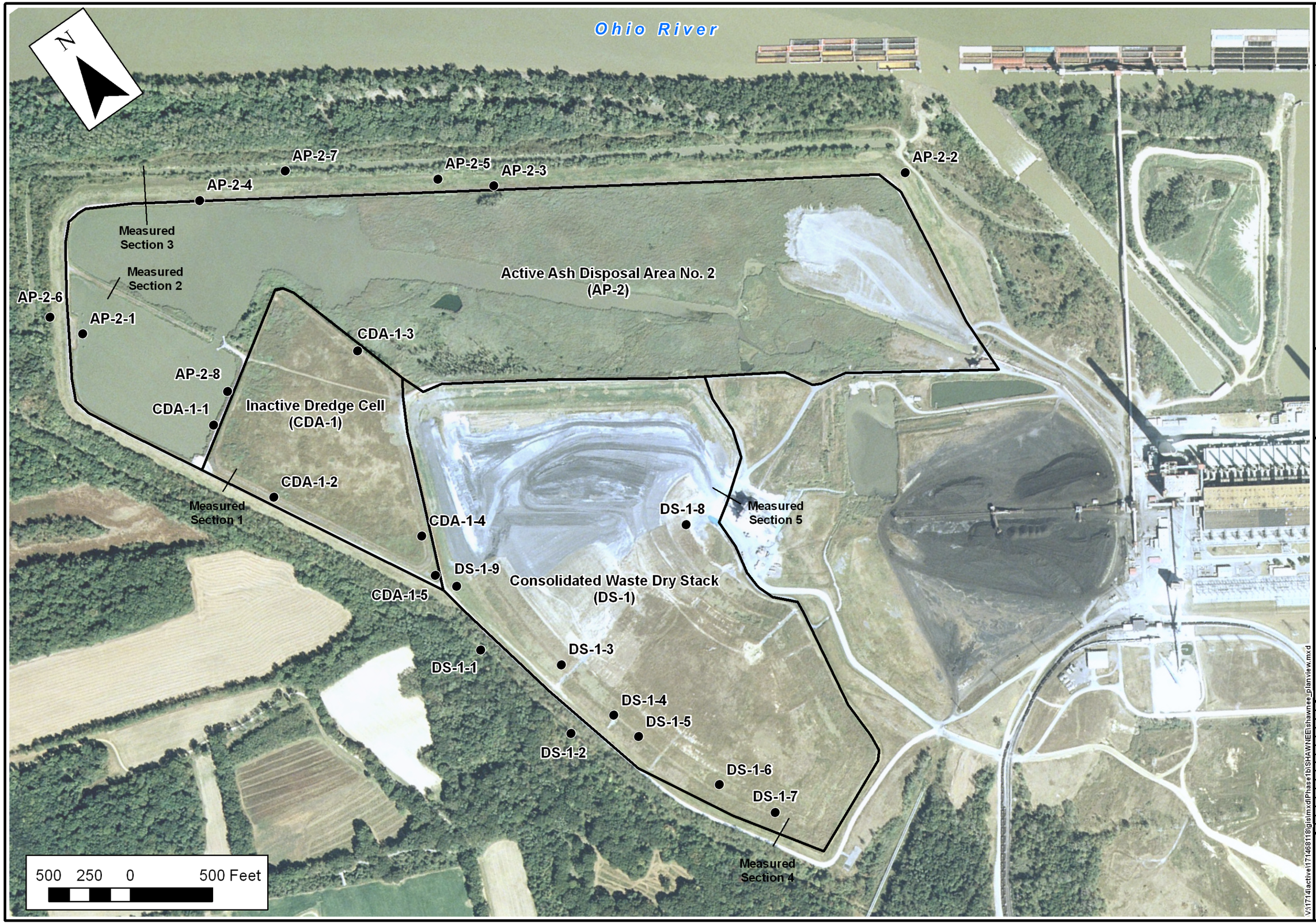
Drawing Mark CDA-1-3 Landslide and fallen trees on north shared ash dike slope.

Drawing Mark CDA-1-4 Steep slopes along southeast exterior dike.

Drawing Mark CDA-1-5

Erosion due to runoff along southwest corner dike near adjacent Consolidated Waste Stack outlet pipes.

Concerns/Photo Log		
Drawing Mark	**Comments**	**Photo/GPS ID**
CDA-1-1	Scarps along west shared ash dike (Typ.).	Photo 9B
CDA-1-2	Lack of established vegetation on exterior south dike slope.	Photo 1B
CDA-1-3	Landslide and fallen trees on north shared ash dike slope.	Photo 4B
CDA-1-4	Steep slopes along southeast exterior dike.	Photo 3B
CDA-1-5	Erosion due to runoff along southwest corner dike near adjacent Consolidated Waste Stack outlet pipes.	Photo 2B



STANTEC CONSULTING SERVICES INC.
1409 N. Forbes Rd.
Lexington, Kentucky
40511-2050
859-422-3000

Stantec

Plan View - SHF

Tennessee Valley Authority
Shawnee Fossil Plant
Paducah, McCracken County, Kentucky

PROJECT NO.	171468118
DATE	MARCH 2009
DRAWN BY	AMS
CHECKED BY	DAG
CHECKED BY	
SCALE	AS SHOWN
REVISED	
1:	
2:	
3:	
4:	
5:	
6:	
7:	
8:	

SHEET

1 OF 1

V:\1714\active\171468118\gis\mxd\Phase1b\SHAWNEE\shawnee_planview.mxd

Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Shawnee Fossil Plant (SHF)

Date Reviewed	Reviewed By	File Name	File Type
3/10/2009	NB	Rpt_Shawneeinsp_20090206_Draft.pdf	PDF
3/10/2009	NB	Shawnee Ash Density And Gradation Report.pdf	PDF
3/10/2009	NB	Shawnee Ash Disposal And Dike Interim Soils Report.pdf	PDF
3/10/2009	NB	Shawnee Ash Disposal Dike Raising Additional Soils Investigation.pdf	PDF
3/10/2009	NB	Shawnee Ash Disposal Dike Raising Soils Investigation.pdf	PDF
3/10/2009	NB	Shawnee Pulverized Fly Ash Permeability Tests Final Report.pdf	PDF
3/10/2009	NB	Shawnee Pulverized Fly Ash Permeability Tests Three Mixes Final Report.pdf	PDF
3/10/2009	NB	Shawnee Pulverized Fly Ash Permeability Tests.pdf	PDF
3/10/2009	NB	Shawnee Waste Stack Lateral Expansion Geotech Report.pdf	PDF
3/10/2009	NB	Shawnee Waste Stack Lateral Expansion Geotech Report2.pdf	PDF
3/10/2009	NB	Shawnee Waste Stack Phase 1A Lateral Expansion Construction Report.pdf	PDF
1/29/2009	NB	Shawnee.pdf	PDF
3/10/2009	NB	Shawnee160Mwafbcdemonstrationplantatshawneesoilinvestigation.pdf	PDF
3/10/2009	NB	Shawnee16Mwafbcdemonstrationprojectwastehandlingsystemsoilsinvestigationprogram.pdf	PDF
3/10/2009	NB	Shawneefossilplantashpond1969.pdf	PDF
3/10/2009	NB	Shawneefossilplantchemicaltreatmentpondforironenggdescriptionapril1983.pdf	PDF
3/10/2009	NB	Shawneefossilplantdrystackarea.pdf	PDF
3/10/2009	NB	Shawneefossilplantflyashdrystackareainactivepondslopestability.pdf	PDF
3/10/2009	NB	Shawneefossilplantlawreportofdrillingservicesjuly102000.pdf	PDF
3/10/2009	NB	Shawneefossilplantmactecreportofgeotechnicalinvestigationmarch102006.pdf	PDF
3/10/2009	NB	ShawneefossilplantSHF328Drystackphase1Construction.pdf	PDF
3/10/2009	NB	Shawneefossilplantsingletonlabsborrowareasabandctvacontracttv75528Adecember191988.pdf	PDF
3/10/2009	NB	Shawneefossilplantspillwayanalysisjuly52007Enggdesignservicescocteamcivilengg.pdf	PDF
3/10/2009	NB	Shawneefossilplantstackerreclaimerturnkeyinstallation.pdf	PDF
3/10/2009	NB	Shawneefossilplantstantecashdisposalareaslopestabilityanalysisrtestel360And355.pdf	PDF
3/10/2009	NB	Shawneefossilplantwastedisposalpermitandashstackingplanvol1Of2December22005.pdf	PDF
3/10/2009	NB	Shawneefossilplantwastedisposalpermitandashstackingplanvol2Of2December22005.pdf	PDF
3/10/2009	NB	Shawneesteamplant160Mwafbcdemonstrationplantwastetestingsingletonlab.pdf	PDF
3/10/2009	NB	Shawneesteamplantashpondsoilandfoundationexploration.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy00.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy01.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy02.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy03.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy04.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy05.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy06.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy67.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy68.pdf	PDF

Date Reviewed	Reviewed By	File Name	File Type
1/28/2009	NB	SHF Ash Pond Insp Fy69.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy70.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy71.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy72.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy73.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy74.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy75.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy76.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy77.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy78.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy79.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy80.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy81.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy82.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy83.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy84.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy85.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy86.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy87.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy88.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy91.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy94.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy95.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy96.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy97.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy98.pdf	PDF
1/28/2009	NB	SHF Ash Pond Insp Fy99.pdf	PDF
1/28/2009	NB	SHF Ash Rp 2008 Final 2008 Recommendation Summary.doc	DOC
1/28/2009	NB	SHF Inspection.pdf	PDF
1/29/2009	NB	SHF Spillwayeval_March2007.pdf	PDF
1/29/2009	NB	SHF-10A240-Sht -Rev 2 Main Plant Proposed Ash Disposal Area.cal	CAL
1/29/2009	NB	SHF-10H660-1A-Sht -Rev 3 Yard-Ash Disposal Area Dredge Pond Plan & Sections.cal	CAL
1/29/2009	NB	SHF-10H660-1B-Sht -Rev 4 Yard Ash Disposal Area Dredge Pond Plan & Sections.cal	CAL
1/29/2009	NB	SHF-10H660-2A-Sht -Rev 2 Yard - Ash Disposal Area Dredge Pond Plan & Sections.cal	CAL
1/29/2009	NB	SHF-10H660-2B-Sht -Rev 2 Yard - Ash Disposal Area Dredge Pond Plan & Sections.cal	CAL
1/29/2009	NB	SHF-10H660-3A-Sht -Rev 1 Yard - Ash Disposal Area Dredge Pond Closure Plan.cal	CAL
1/29/2009	NB	SHF-10H660-3B-Sht -Rev 3 Yard Ash Disposal Area Dredge Pond Closure Sections & Details.cal	CAL
3/10/2009	NB	SHF-10Hu270-Y7-03A-Sht -Rev 2.cal	CAL

Date Reviewed	Reviewed By	File Name	File Type
3/10/2009	NB	SHF-10Hu270-Y7-04A-Sht -Rev 3.cal	CAL
3/10/2009	NB	SHF-10Hu270-Y7-04B-Sht -Rev 3.cal	CAL
1/30/2009	NB	SHF-10L215-Sht -Rev 1 Gen Grdg Coal Yd.tif	TIF
1/30/2009	NB	SHF-10L216-Sht -Rev 1 Gen Grdg Coal Yd.tif	TIF
1/30/2009	NB	SHF-10L217-Sht -Rev 3 Gen Grdg Coal Yd.tif	TIF
1/30/2009	NB	SHF-10L221-Sht -Rev 3 Gen Grading Coal Yd.cal	CAL
1/30/2009	NB	SHF-10L222-Sht -Rev 2 Gen Grading Coal Yd.cal	CAL
1/30/2009	NB	SHF-10L223-Sht -Rev 2 Gen Grading Coal Yd.cal	CAL
1/29/2009	NB	SHF-10N204-Sht -Rev 5 Main Plant Access Roads For Servicing Ash Sluice, Dikes And Car Retarder.cal	CAL
1/29/2009	NB	SHF-10N206-Sht -Rev 7 Main Plant Dike For Ash Disposal Area.cal	CAL
1/29/2009	NB	SHF-10N209-Sht -Rev 1 Main Plant Discharge Channel For Ash Disposal Area.cal	CAL
3/10/2009	NB	SHF-10N271-Sht -Rev 7.cal	CAL
1/29/2009	NB	SHF-10N271-Sht -Rev 9 Main Plant Plan Ash Disposal Area No. 2 Sheet 1.cal	CAL
1/29/2009	NB	SHF-10N272-Sht -Rev 5 Main Plant Plan Ash Disposal Area No. 2 Sheet 2.cal	CAL
1/29/2009	NB	SHF-10N273-Sht -Rev 3 Main Plant Ash Disposal Area No. 2 Sections And Details.cal	CAL
1/29/2009	NB	SHF-10N274-Sht -Rev 0 Standard Drawing Ash Disposal Spillway.cal	CAL
1/29/2009	NB	SHF-10N284-Sht -Rev 2 Main Plant Ash Disposal Areas Divider Dike & Floating Skimmer.cal	CAL
1/29/2009	NB	SHF-10N400-Sht -Rev 5 Yard Units 1-10 Concrete Ash Disposal Trench Outline & Reinf - Sh 1.cal	CAL
1/29/2009	NB	SHF-10N401-Sht -Rev 5 Yard Units 1-10 Concrete Ash Disposal Trench Outline & Reinf - Sh 2.cal	CAL
1/29/2009	NB	SHF-10N402-Sht -Rev 3 Yard Units 1 - 5 Concrete Bottom Ash Disposal Trench Sheet 1.cal	CAL
1/29/2009	NB	SHF-10N403-Sht -Rev 2 Yard Units 1-5 Concrete Bottom Ash Disposal Trench Sheet 2.cal	CAL
1/29/2009	NB	SHF-10N404-1-Sht -Rev 3 Yard Units 1-10 Ash Sluice Relocation Outline & Reinf.cal	CAL
1/29/2009	NB	SHF-10N404-2-Sht -Rev 3 Yard Units 1-10 Concrete Ash Sluice Relocation Outline & Reinf.cal	CAL
1/29/2009	NB	SHF-10N407-Sht -Rev 2 Yard Units 1-5 Concrete Ash Disposal Trench Outline & Reinf Sheet 1.cal	CAL
1/29/2009	NB	SHF-10N408-Sht -Rev 1 Yard Units 1-5 Concrete Ash Disposal Trench Outline & Reinf. Sheet 2.cal	CAL
3/10/2009	NB	SHF-10W200-1-Sht -Rev 22.cal	CAL
3/10/2009	NB	SHF-10W200-2-Sht -Rev 3.cal	CAL
1/29/2009	NB	SHF-10W202-Sht -Rev 1 Main Plant - Units 1-10 Fly Ash Collecting System Yard Adjustments.cal	CAL
1/30/2009	NB	SHF-10W212-Sht -Rev 21 Main Plant General Grading Plan Coal Yard.cal	CAL
3/10/2009	NB	SHF-10W215-1-Sht -Rev 0.cal	CAL
1/30/2009	NB	SHF-10W220-10-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-11-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-12-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-13-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-14-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-15-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-16-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-17-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL

Date Reviewed	Reviewed By	File Name	File Type
1/30/2009	NB	SHF-10W220-18-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-19-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-1-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cover Sheet.cal	CAL
1/30/2009	NB	SHF-10W220-20-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-21-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-22-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-23-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-24-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-25-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-26-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-27-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-28-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-29-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-2-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Existing Conditions.cal	CAL
1/30/2009	NB	SHF-10W220-30-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-31-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-32-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-33-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-34-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-35-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-36-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-37-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-38-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-39-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-3-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Subgradesubbaseworking Platform Plan.cal	CAL
1/30/2009	NB	SHF-10W220-40-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-41-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-42-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Construction Sequence-Phase 1.cal	CAL
1/30/2009	NB	SHF-10W220-43-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Construction Sequence-Phase 2.cal	CAL
1/30/2009	NB	SHF-10W220-44-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Construction Sequence-Phase 3.cal	CAL
1/30/2009	NB	SHF-10W220-45-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Construction Sequence-Phase 4.cal	CAL
1/30/2009	NB	SHF-10W220-46-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Construction Sequence-Phase 5.cal	CAL
1/30/2009	NB	SHF-10W220-47-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Construction Sequence-Phase 6.cal	CAL
1/30/2009	NB	SHF-10W220-48-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Details.cal	CAL
1/30/2009	NB	SHF-10W220-49-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Details.cal	CAL
1/30/2009	NB	SHF-10W220-4-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Waste Fill Plan.cal	CAL
1/30/2009	NB	SHF-10W220-50-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Details.cal	CAL
1/30/2009	NB	SHF-10W220-51-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Details.cal	CAL

Date Reviewed	Reviewed By	File Name	File Type
1/30/2009	NB	SHF-10W220-52-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Stability Analysis Section A-A'.cal	CAL
1/30/2009	NB	SHF-10W220-5-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Final Grade (Capped) Plan.cal	CAL
1/30/2009	NB	SHF-10W220-6-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Baseline Profile.cal	CAL
1/30/2009	NB	SHF-10W220-7-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-8-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W220-9-Sht -Rev 0 Yard Consolidated Waste Stack Disposal Area Cross Sections.cal	CAL
1/30/2009	NB	SHF-10W221-10-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Ditch, Flume And Pipe Profiles.cal	CAL
1/30/2009	NB	SHF-10W221-11-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Cross Sections, Sheet 1 Of 3.cal	CAL
1/30/2009	NB	SHF-10W221-12-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Cross Sections, Sheet 2 Of 3.cal	CAL
1/30/2009	NB	SHF-10W221-13-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Cross Sections, Sheet 3 Of 3.cal	CAL
1/30/2009	NB	SHF-10W221-14-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Details, Sheet 1 Of 5.cal	CAL
1/30/2009	NB	SHF-10W221-15-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Details, Sheet 2 Of 5.cal	CAL
1/30/2009	NB	SHF-10W221-16-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Details, Sheet 3 Of 5.cal	CAL
1/30/2009	NB	SHF-10W221-17-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Details, Sheet 4 Of 5.cal	CAL
1/30/2009	NB	SHF-10W221-18-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Details, Sheet 5 Of 5.cal	CAL
1/30/2009	NB	SHF-10W221-1-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Cover Sheet.cal	CAL
1/30/2009	NB	SHF-10W221-2-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area General Notes.cal	CAL
1/30/2009	NB	SHF-10W221-3-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area - Existing Conditions And Baseline Layout.cal	CAL
1/30/2009	NB	SHF-10W221-4-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area - Subgrade Subbaseworking Platform Plan.cal	CAL
1/30/2009	NB	SHF-10W221-5-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Waste Fill Plan.cal	CAL
1/30/2009	NB	SHF-10W221-6-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Final Grade Plan.cal	CAL
1/30/2009	NB	SHF-10W221-7-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Sediment & Erosion Control Plan.cal	CAL
1/30/2009	NB	SHF-10W221-8-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Ditch Profiles.cal	CAL
1/30/2009	NB	SHF-10W221-9-Sht -Rev 0 Yard Phases 1 & 2 Consolidated Waste Stack Disposal Area Road Profiles.cal	CAL
1/29/2009	NB	SHF-10W229-Sht -Rev 0 Main Plant Ash Disposal Area Discharge Sump.cal	CAL
1/29/2009	NB	SHF-10W230-Sht -Rev 3 Main Plant Miscellaneous Sections Coal Yard Area.cal	CAL
3/10/2009	NB	SHF-10W240-1-Sht -Rev 5.cal	CAL
3/10/2009	NB	SHF-10W248-Sht -Rev 4.cal	CAL
1/30/2009	NB	SHF-10W262-3-Sht -Rev 0 East & West Stack Cems Slab Layout.cal	CAL
1/29/2009	NB	SHF-10W269-Sht -Rev 1 Main Plant Ash Disposal Area Discharge Channel.cal	CAL
1/30/2009	NB	SHF-10W410-4-Sht -Rev 8 Yard Units 1-10 Baghouse Concrete Dry Fly Ash Piping Trench.cal	CAL
1/30/2009	NB	SHF-10W410-5-Sht -Rev 8 Yard Units 1-10 Baghouse Concrete Dry Fly Ash Piping Trench.cal	CAL
1/30/2009	NB	SHF-10W410-6-Sht -Rev 4 Baghouse Units 1-10 Concrete Conc. Supports For Ash Piping Plans And Details.cal	CAL
1/30/2009	NB	SHF-10W626-1-Sht -Rev 0 Yard Units 7-10 Facilities Location For Dry Flue Gas Desulfurization Project.cal	CAL
1/30/2009	NB	SHF-10W626-2-Sht -Rev 0 Yard Units 7-10 Facilities Location For Dry Flue Gas Desulfurization Project.cal	CAL
1/30/2009	NB	SHF-10W627-1-Sht -Rev 0 Yard Existing Facilities Stacker - Reclaimer Conveyor Project.cal	CAL
1/30/2009	NB	SHF-10W627-2-Sht -Rev 0 Yard Existing Facilities Stacker - Reclaimer Conveyor Project.cal	CAL
1/30/2009	NB	SHF-10W650-1-Sht -Rev 3 Yard Units 1-10 Dfgd, Afbc, 10 Mw Test Scrubber & Stacker - Reclaim Construction Facilities.cal	CAL

Date Reviewed	Reviewed By	File Name	File Type
1/30/2009	NB	SHF-10W650-2-Sht -Rev 2 Yard Units 1-10 Dfgd, Afbc, 10 Mw Test Scrubber & Stacker Reclaim Construction Facilities.cal	CAL
1/29/2009	NB	SHF-10W660-1-Sht -Rev 0 Yard - Ash Disposal Area Superseded By 10H660-1A & 1B.cal	CAL
1/29/2009	NB	SHF-10W660-2-Sht -Rev 0 Yard - Ash Disposal Area Superseded By 10H660-2A & 2B Wooden Spillway - Skimmer.cal	CAL
3/10/2009	NB	SHF-47W5300-4-Sht -Rev 0.cal	CAL
1/28/2009	NB	Status Update On SHF Fy2008 Annual Dike Stability Inspection.pdf	PDF