



TVA Disposal Facility Assessment Phase 1 Plant Summary Cumberland Fossil Plant (CUF)

Location:	Cumberland Fossil Plant (CUF) 815 Cumberland City Road Cumberland City, Houston County, TN 37050
	Latitude: 36.3812 N Longitude: 87.6515 W
Plant Contact:	Carrie McCarty Program Administrator Phone: 931-827-6278 Email: csmccart@tva.gov
Facts and Figures:	The Cumberland Fossil Plant has two coal-fired generating units. Construction began in 1968 and was completed in 1973. The plant consumes approximately 20,000 tons of coal per day. It is located on the Cumberland River near river mile 103, and is about 22 miles southwest of Clarksville, TN.
Coal Combustion Byproduct Disposal:	Approximately 530,000 tons of dry fly ash is collected in silos each year. Approximately 70 percent of the fly ash is marketed offsite into the concrete industry and the remaining 30 percent is hauled to an onsite dry stack disposal area (Dry Ash Stack). Approximately 135,000 tons per year of bottom ash is wet-sluciced to the Active Ash Pond. Dewatered bottom ash is reclaimed from the Active Ash Pond and stacked within the Dry Ash Stack. Approximately 1,100,000 tons of gypsum is produced each year. Roughly 75 percent of the gypsum is marketed to the adjacent wallboard company and the remaining 25 percent is wet-sluciced to the Gypsum Storage Area.
Geology and Seismicity:	The Cumberland Fossil Plant is located in the northern portion of west-central Tennessee along the south bank of the Cumberland River, at the confluence of the river and Wells Creek. The plant is situated near the middle of the Wells Creek Structure, a roughly circular area approximately 4 miles in diameter thought to be the result of a meteor impact. The rock within the central portion of the feature is highly fractured to a depth of several thousand feet and a pattern of radial and longitudinal faults have been mapped for several miles in all directions. Bedrock of the Cambrian aged Knox Dolomite and Lower Ordovician aged limestones of the Stones River Group are exposed within the central portion of the structure with the limestones and shales of the more recent Silurian, Devonian and Mississippian Periods exposed in approximately parallel bands around the periphery. The plant itself is underlain by bedrock of the Knox Dolomite; Stones River



Group; Hermitage Formation; Fernvale Limestone; Brassfield Limestone; Osgood Formation, Laurel Limestone, Waldron Shale, Lego Limestone, and Dixon Formation of the Wayne Group; Brownsport Formation; Decatur Limestone; Rockhouse Limestone and Birdsong Shale Members of the Ross Formation; Camden and Harriman Formations; Chattanooga Shale; New Providence Shale; and Fort Payne Formation. Because of the complexity of the bedrock structure, foundation conditions across the site are somewhat unpredictable and may vary drastically over short distances requiring the need for the advancement of borings at specific locations to verify bearing conditions. Because the plant is situated along the banks of Wells Creek and the Cumberland River, a mantle of alluvial soils primarily consisting of silty lean clays overly bedrock across portions of the site.

Evaluations of seismic hazards affecting the western portion of middle Tennessee, 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 has 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. The "Geologic Hazards Map of Tennessee – Environmental Geology Series No. 5" developed and published by the Tennessee Department of Environment and Conservation (TDEC), Division of Geology and compiled by Robert Miller (1978) shows the plant to be located in Seismic Risk Zone 2.

Facilities Reviewed: Gypsum Storage Area
 Ash Pond
 Dry Ash Stack



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Gypsum Storage Area (GSA)**

1. General Facility Information

Facility Status:	Temporarily Inactive	NID Identification:	TN16110
Surface Area (inside dikes):	170 acres (estimated)	Maximum Height (toe to top of dike):	50 feet (estimated, current phase) 140 feet (Proposed)
Free Water Volume:	Currently drained	Maximum Water Storage:	Currently drained
Estimated CCB Storage:	1,825,579 CY	Dike Length:	9,000 feet (estimated)
Plant Discharge to Facility:	6,000 gpm when active	Current Pool Elevation:	Drained

2. Site Visit Information

Stantec Assessment Team:	Steve Bickel, PE, Nathan Bader, PE, Stan Harris, PE and Matthew Hoy, EIT
TVA Staff Present:	Stuart Harris and Carrie McCarty
Field Assessment Dates:	January 14, 2009 and February 3 - 4, 2009
Weather/Site Conditions:	Mid-30 degrees F, sunny, moist ground both days.

3. History/Description of Usage

History and Operation: The gypsum storage area was constructed during 1995-1996. It was built over Area No. 1, which was the original ash pond. Approximately 1,100,000 tons of gypsum is produced each year. Roughly 75 percent of the gypsum is marketed to the adjacent wallboard company and the remaining 25 percent is wet-sluided to the Gypsum Storage Area. The pond was constructed in several stages beginning with construction of a rock drainage blanket to collect and divert water away from the base. When gypsum is discharged to the pond intermittently, it is wet-sluided to the northeast corner of the pond. Currently the pond is separated into a north and south area. The pond consists of an upper gypsum dike being



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Gypsum Storage Area (GSA)**

constructed using rim-ditching operations, a lower perimeter ash dike, and an even lower clay dike which was the original perimeter dike for the disposal area. Discharge for the pond is through an RCP riser to outlet pipes in the northwest corner of the pond into the adjacent perimeter ditches. The perimeter ditches around the Gypsum Storage Area flow to the north along the neighboring Dry Stack and ultimately into the Ash Pond.

Past Failures/Releases:

A slope slough along the perimeter clay dike in the northwest corner of the Gypsum Storage Area reportedly occurred in 2005. The slope was temporarily repaired using rip rap and Stantec is currently evaluating slope stability. Seepage has also been reported in this area and along the Gypsum Storage Area to the east. As a result, the pond has also been drained until Stantec's evaluation is complete.

4. Owner's Operations, Maintenance and Inspection Information

Emergency Action Plan:

No EAP has been prepared for this facility.

Operations Manual:

"Operations Manual: Dry Ash and Gypsum Stacking Facility", prepared by Tennessee Valley Authority, October 10, 2003.

TVA Maintenance:

Exterior slopes mowed every two years.

TVA Inspections:

TVA Engineering performs annual inspections and prepares reports. Plant personnel recently started making daily observations, with documented inspections made weekly.

Problems Previously Identified During Past TVA Inspections:

Seepage areas around exterior dike, slope failure along northwest corner of perimeter dike.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Gypsum Storage Area (GSA)**

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:	10W300-1 through 19, 6314-W-C110200 through 224, 6314-W-C110300 through 316.
TVA As-Built Drawings:	None available.
TVA Construction Testing Records:	None available.
TVA Annual Inspection Reports:	TVA Annual Inspection Reports 1972-1984, 1986-1990, 1994-1995, 1997-2004, 2006-2008.
Geotechnical Data:	"TVA-Fly Ash, Bottom Ash, and Scrubber Gypsum Study", Law Engineering, Inc., October 1995. "Report of Geotechnical Exploration, Gypsum Area Seepage Study, Cumberland Fossil Plant, Cumberland City, Tennessee", prepared by MACTEC Engineering and Consulting, Inc., May 1, 2007. "Report of Preliminary Geotechnical Exploration, Proposed Gypsum Wallboard Plant, TVA Cumberland Fossil Plant, Cumberland City, Tennessee", Law Engineering and Environmental Services, Inc., January 3, 1997. "Report of Subsurface Exploration and Stability Analyses, Proposed Fly Ash/Scrubber Sludge Disposal Facility, Cumberland Fossil Plant, Cumberland City, Tennessee", Law Engineering, January 27, 1992. "Report of Hydrogeologic Evaluation, Proposed Dry Fly Ash and Gypsum Disposal Facility, TVA Cumberland City, Tennessee", Law Engineering, March 13, 1992. "Laboratory Test Results, Samples from Gypsum Pond at Cumberland Fossil Plant", MACTEC Engineering and Consulting, May 13, 2004.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Gypsum Storage Area (GSA)**

Project Update - Seepage Investigation and Repair, TVA Cumberland Fossil Plant, presented by Geosyntec Consultants to TVA, October 2007, May 2007, and July 2008.

Results of Laboratory Testing, TVA Fly Ash & Gypsum Disposal Facilities, Cumberland Fossil Plant, United Engineers and Constructors Inc., June 1992.

6. Stantec Field Observations

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

6.1. Interior Slopes

Vegetation:	None. Top dike consists of gypsum with no vegetation established.
Trees:	None observed.
Wave Wash Protection:	None observed.
Erosion:	None observed.
Instabilities:	Portions of the dike are currently being reconstructed using rim-ditching operations, but no evidence of instabilities were observed.
Animal Burrows:	None observed.
Freeboard:	Measured: Pond drained. Design: Not available on drawings.
Encroachments:	None observed.
Slope:	Measured: Currently being constructed, not measured. Design: Not available on drawings.

6.2. Crest

Crest Cover and Slope:	Gypsum cover from rim-ditching operations.
Erosion:	None observed.
Alignment:	Alignment appeared to agree with design drawings. No problem.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Gypsum Storage Area (GSA)**

Settlement/Cracking:	None observed.
Bare Spots/Rutting:	No rutting observed. Crest is bare with no vegetation established.
Width:	Measured: 23 feet at Section 5; 20 feet at Section 6 Design: Not available on drawings.

6.3. Exterior Slopes

Vegetation:	Upper Gypsum slopes are bare and lack vegetation. Phragmites and brush are present on the intermediate ash dike slopes. A grass cover is present along the lower perimeter dike slopes.
Trees:	Small trees were located in a few areas around the perimeter of the pond.
Erosion:	Areas of erosion were observed along the upper gypsum dike and the lower ash dike in several areas.
Instabilities:	A slope failure has been repaired in the northwest corner of the pond along the perimeter clay dike. Slope instability in the form of shallow sloughing was also observed along the ash dike along the northwest side of the pond.
Uniform Appearance:	Good.
Seepage:	Seepage observed in the past when pond was filled at the northernmost portion of the pond. Seepage was also observed at the southeast side of the perimeter clay dike.
Benches:	One bench that consists of the surrounding access road was observed along the toe of the upper gypsum dike. The bench is 20 feet wide at Section 5 and Section 6.
Foundations, Drains, Relief Wells, Instrumentation:	Drainage pipes extending from the base of the Gypsum Storage Area were reportedly installed on 200-foot intervals. These pipes outlet along the toe of the slope in the perimeter drainage ditches. Flow was observed in selected outlets similar to the flow reported in previous annual inspection reports.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Gypsum Storage Area (GSA)**

Animal Burrows:	None observed.
Slope:	<p>Measured: 3H:1V along upper gypsum dike at Section 5 and 6; 1.5H:1V to 2.3H:1V along the intermediate ash dike slope at Sections 5 and 6; 2.7H:1V along the perimeter clay dike at Section 5.</p> <p>Design: 3H:1V for the upper gypsum dikes, intermediate ash dike, and lower perimeter clay dike (from Drawing 10W300-16)</p>
Height:	<p>Measured: Approximately 50 feet at current phase.</p> <p>Design: Approximately 140 feet at final stage (from Drawing 10W300-16).</p>

6.4. Spillway Weirs/Riser Inlets

Number:	One located at northwest end of pond.
Size, Type and Material:	Unknown size, RCP
Height of Riser Inlets:	10 feet or less (estimated)
Access:	None
Joints:	Unknown, unable to observe.
Mis-Alignment:	Unknown, unable to observe.
Closed/Abandoned Conduits:	None reported or observed.

6.5. Outlet Pipes

Number:	Four
Size, Type and Material:	Outlets vary in size and range from steel pipe to corrugated metal pipe.
Headwall:	None was observed.
Joint Separations:	Unknown, could not observe.
Mis-Alignment:	Unknown, could not observe.
Closed/Abandoned Conduits:	None reported or observed.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Gypsum Storage Area (GSA)**

7. Notable Observations and Concerns

- The gypsum pond is formed by a lower perimeter clay dike, an intermediate ash perimeter dike above the lower clay dike, and an upper gypsum dike. The pond contains two active cells (north and south). Rim-ditching operations are currently on-going to construct the upper gypsum dike. Seepage areas and past slope failures have been noted. Some slopes are also relatively steep (1.5H:1V). Seepage, slope instability, and on-going rim-ditching operations are a concern for the Gypsum Storage Area.
- The absence of an Emergency Action Plan, Operation and Maintenance Plan, as-built drawings and construction testing records is a concern.
- Reconstructed upper gypsum dikes are lacking vegetation.
- Some trees were observed along the perimeter ash dike to the northeast of the Gypsum Storage Area.
- Erosion was observed along the crest and outslopes of the ash divider dike at several areas.
- The southwest and southeast sides of the perimeter ditch contain sediment build-up and standing water.
- Vegetation has not yet been re-established where trees have been removed from the downstream slope of the perimeter clay dike.
- Discharge pipes from interior pond drainage are elevated above a rip-rap channel. Over time, toe erosion will likely occur.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- It is recommended that the Gypsum Storage Area undergo further engineering study to evaluate the seepage, slope stability, and the on-going rim-ditching stacking plan. Remediation efforts to address these items will be developed based on the results. It is also recommended that a hydraulic and hydrologic analysis be performed to check freeboard and pond outlet adequacy relative to process flow and stormwater. The pond is scheduled to remain drained and temporarily inactive until Phase 2 studies and remedial construction activities, if needed, are performed.



TVA Disposal Facility Assessment Phase 1 Coal Combustion Product Disposal Facility Summary Cumberland Fossil Plant (CUF) Gypsum Storage Area (GSA)

- Based on the findings of Phase 2 and designs from Phase 3, if performed, Stantec recommends that the existing O&M Manual be reviewed and updated. These updates may include sections on routine monitoring and facility maintenance.
- 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

- The loosely stacked gypsum material around the perimeter of the Gypsum Storage Area should be spread in appropriate thicknesses and compacted properly wherever it is to be used as structural dike material. The material used for dikes at outlet areas should consist of coarser gypsum, which has higher strength. Efforts to establish vegetation on completed slopes should also be made.
- CUF plant personnel should continue to monitor the existing slope failure along the perimeter dike outslope at the northwest corner of the Gypsum Storage Area until Phase 2 evaluations are complete and permanent repairs executed.
- CUF plant personnel should continue to monitor the seepage area below the perimeter clay dike.
- CUF personnel have reported a seepage area along the north corner of the Gypsum Storage Area that could not be seen because the pond is currently drained. If this seep re-appears upon re-filling, a crushed stone French drain should be installed by excavating back to intercept the gravel drainage layer that underlies the gypsum disposal area.
- The discharge pipes that drain the interior portion of the Gypsum Storage Area should be extended to ground level and away from the toe of slope.
- Remove trees from noted locations.
- Cut and maintain heavy/tall phragmite growth on slopes and the perimeter drainage ditch to allow better inspection. Establish annual mowing program.
- Regrade and repair erosion areas where noted.
- Clean sedimentation and phragmites from Gypsum Storage Area perimeter ditches. Remove sedimentation, check grades and regrade the perimeter ditches as needed to promote positive drainage and alleviate standing water issues. Use of rip-rap to re-establish ditch side slopes should be considered.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Ash Pond (AP-1)**

1. General Facility Information

Facility Status:	Active	NID Identification:	TN16109
Surface Area (inside dikes):	50 acres (estimated)	Maximum Height (toe to top of dike):	35 feet (estimated)
Free Water Volume:	1,296,069 CY (9/2008)	Maximum Water Storage:	2,165,158 CY (9/2008)
Estimated CCB Storage:	1,305,346 CY	Dike Length:	5,600 feet (estimated)
Plant Discharge to Facility:	Not provided by TVA	Current Pool Elevation:	384 feet (estimated)

2. Site Visit Information

Stantec Assessment Team: Stephen Bickel, PE, Nathan Bader, PE, Stan Harris, PE and Matthew Hoy, EIT

TVA Staff Present: Stuart Harris and Carrie McCarty

Field Assessment Dates: January 14, 2009 and February 3 - 4, 2009

Weather/Site Conditions: Mid-30 degrees F, sunny, moist ground both days.

3. History/Description of Usage

History and Operation: This disposal area was constructed in 1969. As part of this construction, Wells Creek was relocated in order to construct what was initially known as Disposal Area 1. As a result, portions of the current Active Ash Pond and Dry Stack were constructed over the original location of Wells Creek. Area 1 was located within the perimeter dikes that now include the current ash and gypsum disposal areas. In 1977, the divider dike for the stilling pool to the north (interior divider dike) was constructed. In 1979, the dikes around the Ash Pond were raised to elevation 395 feet with clay. In 1986, approximately 300 feet of the west portion of the divider dike between the Ash Pond and the Dry Ash Stack was constructed. In 1995-96, the current divider dike between the Ash Pond and Dry Stack was constructed (exterior divider dike) to



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Ash Pond (AP-1)**

form the current configuration. Approximately 135,000 dry tons of bottom ash is wet sluiced to the Ash Pond annually. Dewatered bottom ash is reclaimed and stacked in the Dry Stack area. Outlet for the Ash Pond is through four 48-inch RCP riser pipe/weirs that discharge through four 36-inch RCP sections into an adjacent discharge channel.

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: "Operations Manual: Dry Ash and Gypsum Stacking Facility", prepared by Tennessee Valley Authority, October 10, 2003.

TVA Maintenance: Exterior slopes are mowed every two years.

TVA Inspections: TVA Engineering performs annual dike inspections and prepares reports. Plant personnel recently started making daily observations, with documented inspections made weekly.

Problems Previously Identified During Past TVA Inspections: Sloughed areas on interior divider dike, tree growth on dikes, animal burrows.

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: 10N212, 213, 214, 218, 224, 225, 10W287-1, 287-2, 6314-W-C110200 through 222

TVA As-Built Drawings: None available.

TVA Construction Testing Records: None available.

TVA Annual Inspection Reports: TVA Annual Inspection Reports 1972-1984, 1986-1990, 1994-1995, 1997-2004, 2006-2008.



TVA Disposal Facility Assessment Phase 1 Coal Combustion Product Disposal Facility Summary Cumberland Fossil Plant (CUF) Ash Pond (AP-1)

Geotechnical Data:

"Cumberland Steam Plant - Ash Dike Raising - Borrow Area B Expansion and Proposed Borrow Area D", Memorandum from Frank Van Meter to G.L. Buchanan, June 16, 1981.

"Cumberland Fossil Plant - Ash Disposal Area No. 1A", Power Engineering & Construction Calculations, K.W. Burnett, December 19, 1990.

"Ash Pond Dike - Recommended Engineering Properties for Slope Stability Analyses", Tennessee Valley Authority, December 12, 1986.

"Recommendations for Stability Improvement, Ash Pond Dike System, Cumberland Fossil Plant, Cumberland City, Tennessee", Law Engineering, March 13, 1992.

"Report of Site Investigation - Cumberland Fossil Plant Soils Investigation for Ash Pond Dike and Borrow Areas", Hall, Blake, and Associates, Inc., October 3, 1986.

6. Stantec Field Observations

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

6.1. Interior Slopes

Vegetation: Phragmites and brush, dense coverage.

Trees: Sparse small trees were noted in various areas on the majority of dikes.

Wave Wash Protection: The interior divider dike separating the Stilling Pond from the Ash Pond has riprap protection. None observed on other interior slopes.

Erosion: Erosion observed along divider dike to Dry Ash Stack around 36 inch HDPE pipe. The pipe is located at the west end of the divider dike; rill/gullies noted in various areas along this divider dike.

Instabilities: None observed.

Animal Burrows: None observed.



TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Ash Pond (AP-1)

Freeboard:	Measured: 10.9 feet at Section 2 Design: Not available on drawings provided.
Encroachments:	None observed.
Slope:	Measured: 1.8H:1V along divider dike at Section 1, 2.5H:1V along inner perimeter dike slope (Estimated), 2.2H:1V along Dry Stack divider dike at Section 3. Design: 2H:1V on interior divider dike (from Drawing 10N224), 2.5H:1V on perimeter dike (from Drawing 10N213).

6.2. Crest

Crest Cover and Slope:	Gravel-covered road on perimeter dike, crest appears relatively flat. Bottom ash and gravel-covered road on interior stilling pond divider dike, crest appears relatively flat. Bottom ash-covered road on divider dike between Dry Ash Stack and Ash Pond, crest appears relatively flat.
Erosion:	Minor erosion rill/gullies on divider dike to Dry Ash Stack.
Alignment:	Alignment appeared to agree with design drawings.
Settlement/Cracking:	None observed.
Bare Spots/Rutting:	None observed.
Width:	Measured: 19 feet on divider dike at Section 1; 20 feet on perimeter dike at Section 2; 31 feet on Dry Stack divider dike at Section 3. Design: 16 feet on interior divider dike and perimeter dike (from Drawings 10N224 and 10N213). No information available for Dry Stack divider dike.

6.3. Exterior Slopes

Vegetation:	Maintained grass, adequate coverage.
Trees:	None observed.
Erosion:	None observed.



TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Ash Pond (AP-1)

Instabilities:	None observed.
Uniform Appearance:	Good.
Seepage:	Standing water was observed along north portion of perimeter dike.
Benches:	None observed.
Foundations, Drains, Relief Wells, Instrumentation:	No provisions for drainage/seepage control, or instrumentation were observed.
Animal Burrows:	One burrow on exterior dike was observed.
Slope:	Measured: 2.7H:1V at Section 2. Design: 3H:1V (from Drawing 10N213).
Height:	Measured: 15 feet at Section 2 Design: 35 feet at outlet area (from Drawing 10N214).

6.4. Spillway Weirs/Riser Inlets

Number:	Four, located at the east end of the stilling pond.
Size, Type and Material:	48-inch RCP push-together riser sections with standard TVA steel skimmers.
Height of Riser Inlets:	23 feet (est. from Drawing 10N214)
Access:	All spillways accessible via steel catwalks.
Joints:	Unable to observe below inlet any joint leakage or sealant.
Mis-Alignment:	None reported or observed.
Closed/Abandoned Conduits:	None reported or observed.

6.5. Outlet Pipes

Number:	Four
Size, Type and Material:	36-inch RCP
Headwall:	None observed.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Ash Pond (AP-1)**

Joint Separations: Unknown, unable to observe.
Mis-Alignment: Unknown, unable to observe.
Closed/Abandoned Conduits: None reported or observed.

7. Notable Observations and Concerns

- The absence of an Emergency Action Plan, Operation and Maintenance Plan, as-built drawings and construction testing records is a concern.
- One animal burrow was noted along the perimeter dike.
- Standing water attributed to poor drainage was noted along the toe of the north perimeter dike.
- RCP push-together riser spillways are a concern.
- Some minor erosion was noted along the outslope of the perimeter roadway just east of the sluicing channel.
- A few small trees were noted along the stilling pond divider dike.
- Erosion was noted along the new 36-inch HDPE drain pipe along the west end of the Ash Pond-Dry Stack divider dike. Several other areas of minor erosion along this divider dike were also noted.
- Some erosion was noted along the north outslope of the bottom ash area.
- The steel angles within the standard skimmers were observed to be corroded and in poor condition. Walkways that are supported by the skimmers are putting eccentric loading on the structure.

8. Recommendations

8.1. Phase 2 Engineering and Programmatic Recommendations

- It is recommended that the perimeter dikes for the Ash Pond undergo further engineering study to evaluate slope stability and seepage. It is also recommended that a hydraulic and hydrologic analysis be performed to check freeboard and pond outlet adequacy relative to process flow and stormwater.
- Based on the findings of Phase 2 and designs from Phase 3, if performed, Stantec recommends that the existing O&M Manual be reviewed and updated. These updates may include sections on routine monitoring and facility maintenance.
- It is recommended that a program be established to develop as-built drawings and



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Ash Pond (AP-1)**

construction records for future maintenance and construction activities.

8.2. Maintenance Recommendations

- Remove trees from noted locations.
- Repair animal burrows where noted.
- Cut and maintain heavy/tall phragmite growth on slopes of ponds to allow better observation. Establish mowing program of ponds and disposal areas.
- Regrade and repair erosion areas where noted.
- The RCP riser spillway outlet system may ultimately be modified or replaced, pending Stantec-TVA assessment of replacement system. Monitor the spillway systems until that time.
- Monitor standing water along toe of perimeter dike. Regrade adjacent drainage ditch if conditions worsen.
- Continue annual inspection program and execute recommendations.
- Evaluate the structural condition of the skimmers and the way walkways are supported, and modify or replace as necessary.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Dry Ash Stack (DS-1)**

1. General Facility Information

Facility Status:	Active		
Surface Area:	110 acres (estimated)	Maximum Height (toe to top of stack):	35 feet Existing 200 feet Proposed

2. Site Visit Information

Stantec Assessment Team:	Stephen Bickel, PE, Nathan Bader, PE, Stan Harris, PE and Matthew Hoy, EIT
TVA Staff Present:	Stuart Harris and Carrie McCarty
Field Assessment Dates:	January 14, 2009 and February 3 - 4, 2009
Weather/Site Conditions:	Mid-30 degrees F, sunny, moist ground both days.

3. History/Description of Usage

History, Operation and Stacking Plan:	In 1972, Wells Creek was relocated in order to construct old Disposal Area 1. Old Area 1 was enclosed by the existing perimeter dike and contained sluiced ash. In the 1980s, sluicing operations ceased within Area 1 and began in the current Area 2 to the north. Divider dikes were constructed to separate the current pond from the gypsum and ash stacking operations. In 1995-96, the current divider dike between the Ash Pond and Dry Stack was constructed. In 1996, stacking within this area began. The Dry Stack is bordered by the Ash Pond to the north, by the bottom ash pond to the east, the Wet Gypsum Storage Area to the south, and by perimeter ditches and the old Area 1 perimeter dike to the west. There is a stacking plan available, and construction is currently proceeding to the north. The sequence consists of building the base and closing it, then moving up to the next level. The stack's maximum height is currently 35 feet. A small dredge cell was constructed within the northwest portion of the Dry Stack in 2007 to dispose of coal fines dredged to remove sediment build up in the Coal Yard Drainage Basin.
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**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Dry Ash Stack (DS-1)**

Stacking over Dredge Cells or CCB Ponds: Previous Area 1 (the original ash pond) is located beneath the Dry Ash Stack and was used as the original ash pond for the plant. This pond operated until the 1980s when sluicing to Area 2 (current active ash pond) began. The stack is being constructed over sluiced bottom and fly ash. It is unknown how much sluiced ash is beneath the stack. A small dredge cell within the Dry Ash Stack area was also filled with dredged coal fines from the Coal Yard Drainage Basin in 2007.

Past Failures/Releases: No failures or releases reported.

4. Owner's Operations, Maintenance and Inspection Information

TVA Maintenance: Mowing is performed every two years.

TVA Inspections: TVA Engineering performs annual dike inspections and prepares reports. Plant personnel recently started making daily observations, with documented inspections made weekly.

Problems Previously Identified During Past TVA Inspections: Lack of vegetation and erosion along stack, erosion along access road, seepage areas along Wells Creek, animal burrow on exterior perimeter dike, tree growth on exterior dike, standing water, sedimentation and heavy growth in perimeter ditch.

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: 10W288-1 through 5

TVA As-Built Drawings: None available.

TVA Construction Testing Records: None available.

TVA Annual Inspection Reports: TVA Annual Inspection Reports 1972-1984, 1986-1990, 1994-1995, 1997-2004, 2006-2008.



TVA Disposal Facility Assessment Phase 1 Coal Combustion Product Disposal Facility Summary Cumberland Fossil Plant (CUF) Dry Ash Stack (DS-1)

Geotechnical Data:

"Operations Manual: Dry Ash and Gypsum Stacking Facility", prepared by Tennessee Valley Authority, October 10, 2003.

"TVA-Fly Ash, Bottom Ash, and Scrubber Gypsum Study", Law Engineering, Inc., October 1995.

"Report of Subsurface Exploration and Stability Analyses, Proposed Fly Ash/Scrubber Sludge Disposal Facility, Cumberland Fossil Plant, Cumberland City, Tennessee", Law Engineering, January 27, 1992.

"Report of Hydrogeologic Evaluation, Proposed Dry Fly Ash and Gypsum Disposal Facility, TVA Cumberland Fossil Plant, Cumberland City, Tennessee", Law Engineering, July 3, 1992.

"Geotechnical Investigation Report, Dry Ash Conversion Project, CUF 1 & 2", Raytheon Engineers and Constructors, July 7, 1993.

Results of Laboratory Testing, TVA Fly Ash & Gypsum Disposal Facilities, Cumberland Fossil Plant, United Engineers and Constructors Inc., June 1992.

6. Stantec Field Observations

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

6.1. Exterior Slopes and Benches

Vegetation: Sparse to good vegetation coverage. Some areas of exposed soil present primarily along the southeast face and in areas to the north where the stack is just recently being constructed.

Trees: None observed.

Erosion: Several areas of erosion along the dry stack were noted where vegetation is sparse, primarily along the southeast face.

Instabilities: No evidence of instabilities were observed.

Uniform Appearance Good.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Dry Ash Stack (DS-1)**

Benches:	None observed.
Slope:	Design: 3H:1V along Dry Ash Stack (from Drawing 10W288-4); 3H:1V along outer perimeter dike to west (from Drawing 10N213). Measured: 2.25H:1V along Dry Ash Stack at Section 4. 2.7H:1V along perimeter dike to west at Section 2.
Height:	35 feet along Dry Ash Stack at Section 4. 15 feet along perimeter dike to west at Section 2.
Other:	None.

6.2. Perimeter Drainage Ditches and Down-Drains

Vegetation:	Phragmites/tall grass along majority of west perimeter ditch.
Rip-Rap Channel Lining:	None observed.
Erosion:	Some scarping of the ditch side slopes was observed along west perimeter ditch. In addition, sedimentation had accumulated in ditch at several areas along the adjacent stack faces.
Siltation in Ditches:	Sedimentation observed throughout majority of west perimeter ditch.
Standing Water in Ditches or on Benches:	Standing water noted within the perimeter ditch to the west.
Silted/Impeded Drainage Pipes:	The drainage pipe for the perimeter ditch along the northwest corner of the stack area to the Ash Pond had signs of erosion around the inlet and outlet.
Other:	None.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Dry Ash Stack (DS-1)**

7. Notable Observations and Concerns

- The area beneath the Dry Ash Stack was initially operated as a wet ash disposal pond. Constructing embankments over hydraulically placed ash is a potential slope stability concern and requires engineering analysis and geotechnical exploration.
- The southeast face of the stack consists of exposed soil cover which is eroded throughout. Other small areas of sparse vegetation or erosion were also observed. Further to the north, soil cover and vegetation have not yet been completed and the exposed ash slopes exhibit some erosion.
- Erosion was noted around the existing rock check within active portions of the stack.
- Areas of erosion and rutting were noted along the access road at the base of the stack.
- Eroded ash sedimentation, vegetation, poor drainage, and standing water were observed throughout the perimeter ditch. The side slopes of the ditch also exhibit shallow sloughs and scarps due to excavations made for cleaning of sedimentation.
- Vegetation has not yet been established where recent tree removal has occurred along the exterior west perimeter dike slope in the vicinity of the old bridge.
- Seepage was observed below the west perimeter dike along the banks of Wells Creek. The seepage does not appear to have changed from previous descriptions provided in inspection reports.
- 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

- It is recommended that the Dry Ash Stack undergo further engineering study to evaluate the stacking plan and slope stability. This should include test borings, installation of piezometers, and installation of slope inclinometers; followed by laboratory testing and slope stability analysis of critical cross-sections.
- It is recommended that a program be established to develop as-built drawings and construction records for future maintenance and construction activities.
- Based on the findings of Phase 2 and designs from Phase 3, if performed, Stantec recommends that the existing O&M Manual be reviewed and updated. These updates may include sections on routine monitoring and facility maintenance.



**TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal
Facility Summary
Cumberland Fossil Plant (CUF)
Dry Ash Stack (DS-1)**

8.2. Maintenance Recommendations

- CUF plant personnel should continue to monitor the seepage area below the west perimeter clay dike.
- Cut and maintain heavy/tall phragmite growth to allow better observation specifically in the perimeter ditches. Establish mowing program.
- Regrade and repair erosion areas where noted.
- Regrade, place new clay cover, and reseed the southeast face of the stack. Monitor other dry stack areas for erosion/sparse vegetation and repair as needed.
- Repair ruts and eroded areas along access road at base of stack if it is to remain in service.
- Clean sedimentation and phragmites from Dry Ash Stack perimeter ditches. Remove sedimentation, check grades and regrade the perimeter ditches as needed to promote positive drainage and alleviate standing water issues.
- Continue annual inspection program and execute recommendations.



Drawing Mark GP-1-1 Riprap placed in area to temporarily repair slope slough along the perimeter dike at the NW corner of the Gypsum Stack.



Drawing Mark GP-1-2 Small slope slough along ash divider dike outslope at NW side of the Gypsum Storage Area.



Drawing Mark GP-1-3 Trees and erosion along the perimeter ash dike at the northeast side of the Gypsum Storage Area.



Drawing Mark GP-1-4 Reconstructed gypsum dikes surrounding the two ponds lacking vegetation.



Drawing Mark GP-1-5 Heavy vegetation and sedimentation in perimeter drainage ditch along the southwest and southeast sides of the Gypsum Stack.



Drawing Mark GP-1-6 Seepage observed below the perimeter dike along the southeast side of the Gypsum Stack.



Drawing Mark GP-1-7 Discharge pipes and riprap channel along northwest corner of Gypsum Storage Area.



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TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Cumberland Fossil Plant (CUF)
Gypsum Storage Area
Photos, Concerns/Photo Log

Concerns/Photo Log		
Drawing Mark	Comments	Photo/GPS ID
GP-1-1	Riprap placed in area to temporarily repair slope slough along the perimeter dike at the NW corner of the Gypsum Stack.	Photo 27B
GP-1-2	Small slope slough along ash divider dike outslope at NW side of the Gypsum Storage Area.	Photo 65B
GP-1-3	Trees and erosion along the perimeter ash dike at the northeast side of the Gypsum Storage Area.	Photo 79B
GP-1-4	Reconstructed gypsum dikes surrounding the two ponds lacking vegetation.	Photo 76B
GP-1-5	Heavy vegetation and sedimentation in perimeter drainage ditch along the southwest and southeast sides of the Gypsum Stack.	Photo 31B
GP-1-6	Seepage observed below the perimeter dike along the southeast side of the Gypsum Stack.	Photo 30B
GP-1-7	Discharge pipes and riprap channel along northwest corner of Gypsum Storage Area.	Photo 70B



Drawing Mark AP-1-1 Crest and inside slopes of the perimeter dikes around the Ash Pond.



Drawing Mark AP-1-2 Animal burrow along north perimeter dike of Ash Pond.



Drawing Mark AP-1-3 Standing water along toe of north perimeter Ash Pond dike.



Drawing Mark AP-1-4 Spillways at northeast side of Stilling Pond.



Drawing Mark AP-1-5 Spillway discharge and channel.



Drawing Mark AP-1-6 Trees on stilling pond divider dike.



Drawing Mark AP-1-7 Erosion around 36" HDPE drain pipe along the west end of the divider dike.



Drawing Mark AP-1-8 Erosion along north outslope of Bottom Ash Area.



Drawing Mark AP-1-9 Erosion along divider dike between Dry Ash Stack and Ash Pond.



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TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Cumberland Fossil Plant (CUF)
Ash Pond
Photos, Concerns/Photo Log

Concerns/Photo Log		
Drawing Mark	Comments	Photo/GPS ID
AP-1-1	Crest and inside slopes of the perimeter dikes around the Ash Pond.	Photo 26B
AP-1-2	Animal burrow along north perimeter dike of Ash Pond.	Photo 21B
AP-1-3	Standing water along toe of north perimeter Ash Pond dike.	Photo 23B
AP-1-4	Spillways at northeast side of Stilling Pond.	Photo 25B
AP-1-5	Spillway discharge and channel.	Photo 24B
AP-1-6	Trees on stilling pond divider dike.	Photo 48B
AP-1-7	Erosion around 36" HDPE drain pipe along the west end of the divider dike.	Photo 38B
AP-1-8	Erosion along north outslope of Bottom Ash Area.	Photo 14B
AP-1-9	Erosion along divider dike between Dry Ash Stack and Ash Pond.	Photo 41B



Drawing Mark DS-1-1 Eroded ash from the adjacent dry stack deposited within the west perimeter ditch.



Drawing Mark DS-1-2 Seepage observed below the perimeter dike along the banks of Wells Creek.



Drawing Mark DS-1-3 Erosion around existing rock check in north portion of Dry Ash Stack



Drawing Mark DS-1-4 Exposed soil and erosion along southeast face of Dry Ash Stack.



Drawing Mark DS-1-5 Erosion and rutting along access road at the base of the Dry Ash Stack.



Drawing Mark DS-1-6 Uncompleted soil cover and vegetation along north end of Dry Ash Stack.



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TVA Disposal Facility Assessment
Phase 1 Coal Combustion Product Disposal Facility Summary
Cumberland Fossil Plant (CUF)
Dry Ash Stack
Photos, Concerns/Photo Log

Concerns/Photo Log		
Drawing Mark	Comments	Photo/GPS ID
DS-1-1	Eroded ash from the adjacent dry stack deposited within the west perimeter ditch.	Photo 20A
DS-1-2	Seepage observed below the perimeter dike along the banks of Wells Creek.	Photo 3B
DS-1-3	Erosion around existing rock check in north portion of Dry Ash Stack	Photo 37B
DS-1-4	Exposed soil and erosion along southeast face of Dry Ash Stack.	Photo 20B
DS-1-5	Erosion and rutting along access road at the base of the Dry Ash Stack.	Photo 35B
DS-1-6	Uncompleted soil cover and vegetation along north end of Dry Ash Stack.	Photo 36B



**Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Cumberland Fossil Plant (CUF)**

Date Reviewed	Reviewed by	File Name	File Type
4/8/2009	NB	01 CUF 1986 1987 Soils Evaluation.pdf	PDF
4/8/2009	NB	01 CUF 1991 Study Info - Basic Quantities Etc.pdf	PDF
4/8/2009	NB	01-27-09-Night Shift.pdf	PDF
4/8/2009	NB	01-27-09-Night Shift.pdf	PDF
4/8/2009	NB	01-28-09-Night Shift.pdf	PDF
4/8/2009	NB	01-29-09-Night Shift.pdf	PDF
4/8/2009	NB	01-31-09 Night Shift.pdf	PDF
4/8/2009	NB	02 CUF 1986 Raised Dike Fill.pdf	PDF
4/8/2009	NB	02 CUF 1990 Area li Raise Ash Dredge Cell.pdf	PDF
4/8/2009	NB	02-01-2009 Night Shift.pdf	PDF
4/8/2009	NB	02-04-2009 Days.pdf	PDF
4/8/2009	NB	02-09-09 Nights.pdf	PDF
4/8/2009	NB	02-09-2009 Day Shift.pdf	PDF
4/8/2009	NB	02-10-2009 Nights.pdf	PDF
4/8/2009	NB	02-13-09-Day Shift.pdf	PDF
4/8/2009	NB	02-13-2009 Night.pdf	PDF
4/8/2009	NB	02-14-09-Day Shift.pdf	PDF
4/8/2009	NB	02-15-09-Day Shift.pdf	PDF
4/8/2009	NB	02-15-2009 Nights.pdf	PDF
4/8/2009	NB	02-16-09-Day Shift.pdf	PDF
4/8/2009	NB	02-18-2009 Days.pdf	PDF
4/8/2009	NB	02-20-09-Night Shift.pdf	PDF
4/8/2009	NB	02-21-09-Night Shift.pdf	PDF
4/8/2009	NB	02-22-09-Night Shift.pdf	PDF
4/8/2009	NB	02-23-2009 Nights Shift.pdf	PDF
4/8/2009	NB	02-24-09-Day Shift.pdf	PDF
4/8/2009	NB	02-24-2009 Nights.pdf	PDF
4/8/2009	NB	03 CUF 1986 Fill - Original Dike.pdf	PDF
4/8/2009	NB	03 CUF 1990 Cost Estimate Area East Of Pond 1 - Construct Ash Dredge Cell.pdf	PDF
4/8/2009	NB	03-02-09 Night Shift.pdf	PDF
4/8/2009	NB	03-03-09 Night Shift.pdf	PDF
4/8/2009	NB	03-04-2009 Day Shift.pdf	PDF
4/8/2009	NB	03-04-2009 Night Shiftdoc.pdf	PDF
4/8/2009	NB	03-05-09 Days.pdf	PDF



**Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Cumberland Fossil Plant (CUF)**

Date Reviewed	Reviewed by	File Name	File Type
4/8/2009	NB	03-08-2009 Day Shift.pdf	PDF
4/8/2009	NB	04 CUF 1986 Soft Layer.pdf	PDF
4/8/2009	NB	04 CUF 1990 Cost Estimate Area East Of Pond 1 - Raise Ash Dredge Cell.pdf	PDF
4/8/2009	NB	05 CUF 1986 Ash.pdf	PDF
4/8/2009	NB	05 CUF 1990 Cost Estimate Area East Of Coal Pile - Construct Ash Dredge Cell.pdf	PDF
4/8/2009	NB	06 CUF 1986 Borrow.pdf	PDF
4/8/2009	NB	06 CUF 1990 Cost Estimate Area East Of Coal Pile - Raise Ash Dredge Cell.pdf	PDF
4/8/2009	NB	07 CUF 1986 Correspondence.pdf	PDF
4/8/2009	NB	07 CUF 1990 Ash Storage In Rock Quarry.pdf	PDF
4/8/2009	NB	08 CUF 1990 Area East Of Coal Pile.pdf	PDF
4/8/2009	NB	09 CUF 1990 Ash Pond Misc.pdf	PDF
4/8/2009	NB	10 CUF 1990 Fly Ash Misc.pdf	PDF
2/1/2009	NB	10W517-001.cal	CAL
2/1/2009	NB	10W517-002.cal	CAL
2/1/2009	NB	10W517-003.cal	CAL
2/1/2009	NB	10W517-004.cal	CAL
2/1/2009	NB	10W517-005.cal	CAL
2/1/2009	NB	10W517-006.cal	CAL
2/1/2009	NB	10W517-007.cal	CAL
2/1/2009	NB	10W517-008.cal	CAL
2/1/2009	NB	10W517-009.cal	CAL
2/1/2009	NB	10W517-010.cal	CAL
2/1/2009	NB	10W517-011.cal	CAL
2/1/2009	NB	10W517-012.cal	CAL
2/1/2009	NB	10W517-013.cal	CAL
2/1/2009	NB	10W517-014.cal	CAL
2/1/2009	NB	10W517-015.cal	CAL
2/1/2009	NB	10W517-016.cal	CAL
2/1/2009	NB	10W517-017.cal	CAL
2/1/2009	NB	10W517-018.cal	CAL
4/8/2009	NB	1-27-2009 Dayshift.pdf	PDF
4/8/2009	NB	1-28-2009 Day Shiftcopy Of Daily Shift Red H2O Seep Blank.pdf	PDF
4/8/2009	NB	1-29-2009 Dayshift.pdf	PDF
4/8/2009	NB	1-30-2009 Dayshift.pdf	PDF



**Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Cumberland Fossil Plant (CUF)**

Date Reviewed	Reviewed by	File Name	File Type
4/8/2009	NB	1-31-2009 Dayshift.pdf	PDF
4/8/2009	NB	2-07-2009 Day Shift.pdf	PDF
4/8/2009	NB	2-08-2009 Day Shift.pdf	PDF
4/8/2009	NB	2-10-2009 Dayshift.pdf	PDF
4/8/2009	NB	2-11-2009 Days.pdf	PDF
4/8/2009	NB	2-1-2009 Dayshift.pdf	PDF
4/8/2009	NB	2-12-2009 Dayshift.pdf	PDF
4/8/2009	NB	2-14-2009 Night.pdf	PDF
4/8/2009	NB	2-16-2009 Nightshift.pdf	PDF
4/8/2009	NB	2-17-2009 Nightshift.pdf	PDF
4/8/2009	NB	2-19-2009 Day Shift.pdf	PDF
4/8/2009	NB	2-19-2009 Nightshift.pdf	PDF
4/8/2009	NB	2-20-2009 Day Shift.pdf	PDF
4/8/2009	NB	2-21-2009 Dayshift.pdf	PDF
4/8/2009	NB	2-2-2009 Night Shift.pdf	PDF
4/8/2009	NB	2-2-2009 Night Shift.pdf	PDF
4/8/2009	NB	2-2-2009 Dayshift.pdf	PDF
4/8/2009	NB	2-2-2009 Dayshift.pdf	PDF
4/8/2009	NB	2-22-2009 Dayshift.pdf	PDF
4/8/2009	NB	2-23-2009 Day Shift.pdf	PDF
4/8/2009	NB	2-3-09 Day Shift.pdf	PDF
4/8/2009	NB	2-3-2009 Night Shift.pdf	PDF
4/8/2009	NB	2-3-2009 Night Shift.pdf	PDF
4/8/2009	NB	2-4-2009 Night Shift.pdf	PDF
4/8/2009	NB	2-5-2009 Day Shift.pdf	PDF
4/8/2009	NB	2-6-2009 Day Shift.pdf	PDF
4/8/2009	NB	2-6-2009 Nights.pdf	PDF
4/8/2009	NB	3-01-2009 Dayshift.pdf	PDF
4/8/2009	NB	3-02-2009 Dayshift.pdf	PDF
4/8/2009	NB	3-06-2009 Nightshift.pdf	PDF
4/8/2009	NB	3-07-2009 Nightshift.pdf	PDF
4/8/2009	NB	3-3-09 Days.pdf	PDF
4/8/2009	NB	3-5-2009 Night Shift.pdf	PDF
4/8/2009	NB	3-6-2009 Day Shift.pdf	PDF



**Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Cumberland Fossil Plant (CUF)**

Date Reviewed	Reviewed by	File Name	File Type
4/8/2009	NB	3-7-2009 Day Shift.pdf	PDF
2/1/2009	NB	6314-W-C110200.cal	CAL
2/1/2009	NB	6314-W-C110201.cal	CAL
2/1/2009	NB	6314-W-C110203.cal	CAL
2/1/2009	NB	6314-W-C110204.cal	CAL
2/1/2009	NB	6314-W-C110205.cal	CAL
2/1/2009	NB	6314-W-C110206.cal	CAL
2/1/2009	NB	6314-W-C110207.cal	CAL
2/1/2009	NB	6314-W-C110208.cal	CAL
2/1/2009	NB	6314-W-C110209.cal	CAL
2/1/2009	NB	6314-W-C110210.cal	CAL
2/1/2009	NB	6314-W-C110211.cal	CAL
2/1/2009	NB	6314-W-C110212.cal	CAL
2/1/2009	NB	6314-W-C110213.cal	CAL
2/1/2009	NB	6314-W-C110214.cal	CAL
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2/1/2009	NB	6314-W-C110223.cal	CAL
2/1/2009	NB	6314-W-C110224.cal	CAL
2/1/2009	NB	6314-W-D110222.cal	CAL
4/8/2009	NB	897 Cumberlandchemicaltreatmentponddesignandconstructchemtreatmentpond.pdf	PDF
4/8/2009	NB	Copy Of Daily Shift Red H2O Seep Blank.pdf	PDF
4/8/2009	NB	Cross Sections A-A & B-B.pdf	PDF
4/8/2009	NB	Cross Sections C-C & D-D.pdf	PDF
4/8/2009	NB	CUF- 10N212 - Main Plant Ash Disposal Areas Sheet No. 1 .cal	CAL
4/8/2009	NB	CUF- 10N212- Sh- Rev7.cal	CAL
4/8/2009	NB	CUF 1981 Borrow Area B Expansion & Proposed Borrow Area D.pdf	PDF
4/8/2009	NB	CUF 1981 Geo Report Borrow Area A & D.pdf	PDF
4/8/2009	NB	CUF 1986 Ash Pond Dike - Recommended Engg Properties For Teh Slope Stability Analysis.pdf	PDF



**Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Cumberland Fossil Plant (CUF)**

Date Reviewed	Reviewed by	File Name	File Type
4/8/2009	NB	CUF 1986 Geo Soils Investigation For Ash Pond Dike & Borrow Areas.pdf	PDF
4/8/2009	NB	CUF 1989 Calcs & Geotech.pdf	PDF
4/8/2009	NB	CUF 1991 - 1997 Misc Geotechnical & Calcs - Some Piping Etc.pdf	PDF
4/8/2009	NB	CUF 1991 Additional Raising Dredge Cell In Ash Disposal Area No 1.pdf	PDF
4/8/2009	NB	CUF 1991 Grout Logs Continued.pdf	PDF
4/8/2009	NB	CUF 1991 Grout Logs.pdf	PDF
4/8/2009	NB	CUF 1991 Report Of Preliminary Hydrogeological Assessment - Proposed Disposal Site - Site No. 10.pdf	PDF
4/8/2009	NB	CUF 1992 Appendix A.pdf	PDF
4/8/2009	NB	CUF 1992 Appendix B.pdf	PDF
4/8/2009	NB	CUF 1992 Appendix C.pdf	PDF
4/8/2009	NB	CUF 1992 Appendix D.pdf	PDF
4/8/2009	NB	CUF 1992 Ash & Gypsum Disposal Study Addendum - Dry Ash Conversion Project.pdf	PDF
4/8/2009	NB	CUF 1992 Draft Ash & Gypsum Disposal Study Addendum - Fgd Retrofit Project.pdf	PDF
4/8/2009	NB	CUF 1992 Raise Dredge Cell In Ash Disposal Area No 1.pdf	PDF
4/8/2009	NB	CUF 1992 Recommendations For Stability Improvement - Ash Pond Dike System.pdf	PDF
4/8/2009	NB	CUF 1992 Report Of Hydrogeologic Evaluation - Proposed Dry Fly Ash & Gypsum Disposal Facility.pdf	PDF
4/8/2009	NB	CUF 1992 Report Of Hydrogeologic Evaluation Continued Well Slug Test Data.pdf	PDF
4/8/2009	NB	CUF 1992 Report Of Subsurface Exploration & Stability Analyses - Proposed Fly Ash Scrubber Sludge Disposal Facility.pdf	PDF
4/8/2009	NB	CUF 1993 Geotechnical Investigation Report - Dry Ash Conversion Project - CUF 1 & 2 Phase Ii.pdf	PDF
4/8/2009	NB	CUF 1994 1995 Fly Ash Task Team.pdf	PDF
4/8/2009	NB	CUF 1996 1997 General Info Budgets Etc.pdf	PDF
4/8/2009	NB	CUF 1997 1998 Drilling Syn Mtls.pdf	PDF
4/8/2009	NB	CUF 1997 1998 Drilling Temple - Inland.pdf	PDF
4/8/2009	NB	CUF 1997 1998 Geotechnical & Project Stuff - Rr To Dry Fly Ash Silos.pdf	PDF
4/8/2009	NB	CUF 1997 1998 Law Report Of Geotechnical Drilling - Gypsum Processing Plant.pdf	PDF
4/8/2009	NB	CUF 1997 1998 Synmat.pdf	PDF
4/8/2009	NB	CUF 1997 1998 Wallboard.pdf	PDF
4/8/2009	NB	CUF 2004 Laboratory Testing Results - Samples From Gypsum Pond At CUF - Mactec Project 3043041009-0001.pdf	PDF
4/8/2009	NB	CUF 2007 Background & Geotechnical.pdf	PDF
4/8/2009	NB	CUF 2007 Geosyntec.pdf	PDF
4/8/2009	NB	CUF 2007 Mactec.pdf	PDF
4/8/2009	NB	CUF 2007 Report Of Geotechnical Exploration - Gypsum Area Seepage Study.pdf	PDF
4/8/2009	NB	CUF 2007 Tva Background.pdf	PDF
4/8/2009	NB	CUF 2007 Tva Misc.pdf	PDF



**Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Cumberland Fossil Plant (CUF)**

Date Reviewed	Reviewed by	File Name	File Type
4/8/2009	NB	CUF 2008 Gypsum Seepage Presentation.pdf	PDF
1/30/2009	NB	CUF Ash Pond Insp Fy00.pdf	PDF
1/30/2009	NB	CUF Ash Pond Insp Fy01.pdf	PDF
1/30/2009	NB	CUF Ash Pond Insp Fy02.pdf	PDF
1/30/2009	NB	CUF Ash Pond Insp Fy03.pdf	PDF
1/30/2009	NB	CUF Ash Pond Insp Fy04.pdf	PDF
1/30/2009	NB	CUF Ash Pond Insp Fy06.pdf	PDF
1/30/2009	NB	CUF Ash Pond Insp Fy72.pdf	PDF
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1/30/2009	NB	CUF Ash Pond Insp Fy96.pdf	PDF
1/30/2009	NB	CUF Ash Pond Insp Fy97.pdf	PDF
1/30/2009	NB	CUF Ash Pond Insp Fy98.pdf	PDF
1/30/2009	NB	CUF Ash Pond Insp Fy99.pdf	PDF
4/8/2009	NB	CUF Ash Pond Insp Summaries.doc	DOC
1/30/2009	NB	CUF Dike Report February 5, 2007.pdf	PDF
1/30/2009	NB	CUF Dike Report June 2, 2008.pdf	PDF



**Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Cumberland Fossil Plant (CUF)**

Date Reviewed	Reviewed by	File Name	File Type
1/30/2009	NB	CUF Dike Report March 19, 2007.pdf	PDF
1/30/2009	NB	CUF-10H229-7-Sht -Rev 0 Yard - Ash And Sump Discharge Piping Cast Iron Frames & Grates.cal	CAL
2/1/2009	NB	CUF-10H256-Sht -Rev 1 Channel From Coal Yd Pln & Profile.cal	CAL
2/1/2009	NB	CUF-10H257-Sht -Rev 1 Channel From Coal Yd Cross Sects.cal	CAL
2/1/2009	NB	CUF-10H258-Sht -Rev 1 Channel From Coal Yd Cross Sects.cal	CAL
2/1/2009	NB	CUF-10H259A-Sht -Rev 1 Channel From Coal Yard.cal	CAL
2/1/2009	NB	CUF-10H259-Sht -Rev 1 Channel From Coal Yd Cross Sects.cal	CAL
2/1/2009	NB	CUF-10N211-Sht -Rev 6 Main Plant General Grading Plan Coal Area.cal	CAL
1/30/2009	NB	CUF-10N212-Sht -Rev 11 Main Plant Ash Disposal Areas Sheet No 1.cal	CAL
1/30/2009	NB	CUF-10N213-Sht -Rev 6 Main Plant Ash Disposal Areas Sheet No 2.cal	CAL
1/30/2009	NB	CUF-10N214-Sht -Rev 2 Standard Drawing Ash Disposal Spillway.cal	CAL
1/30/2009	NB	CUF-10N218-Sht -Rev 2 Main Plant Ash Disposal Areas Sheet No 3.cal	CAL
1/30/2009	NB	CUF-10N224-Sht -Rev 4 Main Plant Ash Disposal Areas Sheet No 3.cal	CAL
1/30/2009	NB	CUF-10N225-Sht -Rev 2 Main Plant Ash Disposal Area Divider Dike & Floating Boom.cal	CAL
1/30/2009	NB	CUF-10N247-Sht -Rev 6 Main Plant Car Wash Finished Grading And Paving Plan.cal	CAL
2/1/2009	NB	CUF-10N249-Sht -Rev 3 Main Plant Coal Barge Dock Grading.cal	CAL
2/1/2009	NB	CUF-10N251-Sht -Rev 3 Yard Coal Yard Surfacing.cal	CAL
2/1/2009	NB	CUF-10N253-Sht -Rev 5 Coal Handling Facilities Units 1 & 2 Navigation Channel, Dock And Spoil Area.cal	CAL
2/1/2009	NB	CUF-10W226-1-Sht -Rev 1 Yard Chemical Treatment Pond Miscellaneous Sections And Details.cal	CAL
2/1/2009	NB	CUF-10W226-Sht -Rev 3 Main Plant Coal Yard Drainage Basin.cal	CAL
1/30/2009	NB	CUF-10W229-1-Sht -Rev 0 Yard - Ash And Sump Discharge Piping Plan Plant Road And Details.cal	CAL
1/30/2009	NB	CUF-10W229-2-Sht -Rev 0 Yard - Ash & Sump Discharge Piping Profile Ash And Sump Piping Roadway Ramps.cal	CAL
1/30/2009	NB	CUF-10W229-3-Sht -Rev 1 Yard - Ash & Sump Discharge Piping Plan Sections & Details Summary Of Quantities.cal	CAL
1/30/2009	NB	CUF-10W229-4-Sht -Rev 0 Yard - Ash & Sump Discharge Piping Retaining Walls Plan Sections And Details.cal	CAL
1/30/2009	NB	CUF-10W229-5-Sht -Rev 0 Yard - Ash & Sump Discharge Piping Catch Basins And Inlets.cal	CAL
1/30/2009	NB	CUF-10W229-6-Sht -Rev 0 Yard - Ash & Sump Discharge Piping Pipe Culvert Installation And Bedding Details.cal	CAL
1/30/2009	NB	CUF-10W239-Sht -Rev 4 Yard Paving Grading Under Fly Ash Precipitators Details.cal	CAL
1/30/2009	NB	CUF-10W287-1-Sht -Rev 0 Main Plant Ash Disposal Area No. 1A Temporary Spillways Typical Plans, Details And Sections.cal	CAL
1/30/2009	NB	CUF-10W287-2-Sht -Rev 0 Main Plant Ash Disposa Area No. 1A Typical Dike Sections.cal	CAL
2/1/2009	NB	CUF-10W288-1-Sht -Rev 0 Yard Ash Disposal Stack Plan-Final.cal	CAL
2/1/2009	NB	CUF-10W288-2-Sht -Rev 0 Yard Ash Disposal Stack Plan - 5 Year.cal	CAL
2/1/2009	NB	CUF-10W288-3-Sht -Rev 0 Yard Ash Disposal Stack Plan - 10 Year.cal	CAL
2/1/2009	NB	CUF-10W288-4-Sht -Rev 0 Yard Ash Disposal Stack Sections & Details Stack Details.cal	CAL
2/1/2009	NB	CUF-10W288-5-Sht -Rev 0 Yard Ash Disposal Stack Sections & Details Storm Drains.cal	CAL



**Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Cumberland Fossil Plant (CUF)**

Date Reviewed	Reviewed by	File Name	File Type
2/1/2009	NB	CUF-10W294-2-Sht -Rev 0 Yard Scr Ammonia Unloading Facility Phase 2 - Limestone Conveyor & Ammonia Facility Access Road.cal	CAL
2/1/2009	NB	CUF-10W294-3-Sht -Rev 0 Site Existing Limestone Access & Ammonia Facility Access Road Profiles And Details.cal	CAL
2/1/2009	NB	CUF-10W300-10-Sht -Rev 0.cal	CAL
2/1/2009	NB	CUF-10W300-11-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Proposed Final Contours Sheet 2 Of 4.cal	CAL
2/1/2009	NB	CUF-10W300-12-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Proposed Final Contours Sheet 3 Of 4.cal	CAL
2/1/2009	NB	CUF-10W300-13-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Proposed Final Contours Sheet 4 Of 4.cal	CAL
2/1/2009	NB	CUF-10W300-14-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Cross Section A14-A14.cal	CAL
2/1/2009	NB	CUF-10W300-15-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Cross Section B15-B15.cal	CAL
2/1/2009	NB	CUF-10W300-16-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Cross Section C16-C16.cal	CAL
2/1/2009	NB	CUF-10W300-17-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Cross Section D17-D17.cal	CAL
2/1/2009	NB	CUF-10W300-18-Sht -Rev 0 Proposed Waste Disposal Facility Details Sheet 1 Of 2.cal	CAL
2/1/2009	NB	CUF-10W300-19-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Details Sheet 2 Of 2.cal	CAL
2/1/2009	NB	CUF-10W300-1-Sht -Rev 0 Vicinity Map Dry Fly Ash And Gypsum Stacking, Area Stewart County, Tennessee.cal	CAL
2/1/2009	NB	CUF-10W300-2-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Existing Site Conditions Sheet 1 Of 4.cal	CAL
2/1/2009	NB	CUF-10W300-3-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Existing Site Conditions Sheet 2 Of 4.cal	CAL
2/1/2009	NB	CUF-10W300-4-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Existing Site Conditions Sheet 3 Of 4.cal	CAL
2/1/2009	NB	CUF-10W300-5-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Existing Site Conditions Sheet 4 Of 4.cal	CAL
2/1/2009	NB	CUF-10W300-6-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Construction Sequence Stage 1 Stage No. 1.cal	CAL
2/1/2009	NB	CUF-10W300-7-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Construction Sequence Stage No. 2 & 3.cal	CAL
2/1/2009	NB	CUF-10W300-8-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Construction Sequence Stage No. 4.cal	CAL
2/1/2009	NB	CUF-10W300-9-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Proposed Waste Disposal Facility Construction Sequence Stage No. 5.cal	CAL
2/1/2009	NB	CUF-10W410-1-Sht -Rev 1 Yard Units 1 & 2 Concrete & Misc. Steel Coal Yard Drainage Trench Outline & Reinforcement.cal	CAL
2/1/2009	NB	CUF-10W410-2-Sht -Rev 1 Yard Units 1 & 2 Concrete & Misc. Steel Coal Yard Drainage Trench Outline & Reinforcement.cal	CAL
1/30/2009	NB	CUF-10W411-Sht -Rev 1 Yard Concrete And Structural Steel Ash & Sump Pipe Supports.cal	CAL
2/1/2009	NB	CUF-10W504-20-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Site Preparation Service Road Along Limestone Belt Conveyor Sheet No.1.cal	CAL
2/1/2009	NB	CUF-10W504-21-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Site Preparation Service Road Along Limestone Belt Conveyor Sheet No.2.cal	CAL
2/1/2009	NB	CUF-10W504-25-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Cross Sections At Limestone Barge Unloading Area Sheet No.1.cal	CAL
2/1/2009	NB	CUF-10W504-26-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Cross Sections At Limestone Barge Unloading Area Sheet No.2.cal	CAL
2/1/2009	NB	CUF-10W504-27-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Centerline Profiles & Sections Road At Limestone Unloading Area.cal	CAL
2/1/2009	NB	CUF-10W504-28-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Site Preparation Serv Rd Along Limestone Belt Conv Centerline Profiles Sht 1.cal	CAL
2/1/2009	NB	Sh1.cal	CAL
2/1/2009	NB	Sheet 2.cal	CAL
2/1/2009	NB	Sht 2.cal	CAL
2/1/2009	NB	CUF-10W507-12-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Roadway Geometry Centerline Profiles - Sheet 3 Limestone Handling Areas.cal	CAL



**Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Cumberland Fossil Plant (CUF)**

Date Reviewed	Reviewed by	File Name	File Type
2/1/2009	NB	CUF-10W508-29-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Site Preparation Svc Rd Along Limestone Belt Conveyor Sections & Dtls Sh.1.cal	CAL
2/1/2009	NB	CUF-10W508-31-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Site Preparation Svc Rd Along Limestone Belt Conveyor Sections & Dtls Sht 2.cal	CAL
2/1/2009	NB	CUF-10W510-1-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Enlarged Plan Of Road At Limestone Barge Unloading Area.cal	CAL
2/1/2009	NB	CUF-10W510-2-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Limestone Barge Unloading Overall Cell Layout.cal	CAL
2/1/2009	NB	CUF-10W510-3-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Limestone Barge Unloading Partial Cell Layout Sheet No.1.cal	CAL
2/1/2009	NB	CUF-10W510-4-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Limestone Barge Unloading Partial Cell Layout Sheet No.2.cal	CAL
2/1/2009	NB	CUF-10W510-5-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Limestone Barge Unloading Partial Cell Layout Sheet No.3.cal	CAL
2/1/2009	NB	CUF-10W512-8-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Limestone Runoff Basin Plan And Sections.cal	CAL
2/1/2009	NB	CUF-10W514-7-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Site Preparation Enlarged Plan Of Coal Pile Run-Off Trench.cal	CAL
2/1/2009	NB	CUF-10W514-8-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Site Preparation Profiles On Coal Pile Run-Off Trench.cal	CAL
2/1/2009	NB	CUF-10W514-9-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Site Preparation Details Of Coal Pile Run-Off Trench.cal	CAL
2/1/2009	NB	CUF-10W516-1-Sht -Rev 0 Fgd Retrofit Project Units 1 & 2 Enlarged Plan Of Road At Coal Barge Unloading Area.cal	CAL
4/8/2009	NB	Cumberlandashdisposalareano1Ainternaldredgecelldec191990.pdf	PDF
4/8/2009	NB	Cumberlandashdisposalareano1Ainternaldredgecelldec191990.pdf	PDF
4/8/2009	NB	Cumberlandchemicaltreatmentponddesignandconstructchemtreatmentpond.pdf	PDF
4/8/2009	NB	Cumberlandfossilplantashstackingplan.pdf	PDF
4/8/2009	NB	Cumberlandfossilplantashstackingplan.pdf	PDF
4/8/2009	NB	Cumberlandoperationsmanualdryashandgypsumstackingfacilitydrawingssept2003.pdf	PDF
4/8/2009	NB	Cumberlandoperationsmanualdryashandgypsumstackingfacilitydrawingssept2003.pdf	PDF
4/8/2009	NB	Cumberlandoperationsmanualdryashandgypsumstackingfacilitysept2003.pdf	PDF
4/8/2009	NB	Cumberlandoperationsmanualdryashandgypsumstackingfacilitysept2003.pdf	PDF
4/8/2009	NB	Cumberlandoperatioonsmanualdryashandgypsumstackingfacility.pdf	PDF
4/8/2009	NB	Cumberlandoperatioonsmanualdryashandgypsumstackingfacility.pdf	PDF
4/8/2009	NB	Cumberlandstacking Planscopeofworkfeb92000.pdf	PDF
4/8/2009	NB	Cumberlandstacking Planscopeofworkfeb92000.pdf	PDF
4/8/2009	NB	Existing Site Conditions Sh 1 Of 4.pdf	PDF
4/8/2009	NB	Existing Site Conditions Sh 2 Of 4.pdf	PDF
4/8/2009	NB	Existing Site Conditions Sh 3 Of 4.pdf	PDF
4/8/2009	NB	Existing Site Conditions Sh 4 Of 4.pdf	PDF
4/8/2009	NB	Proposed Final Contours Sh 1 Of 4.pdf	PDF
4/8/2009	NB	Proposed Final Contours Sh 2 Of 4.pdf	PDF
4/8/2009	NB	Proposed Final Contours Sh 3 Of 4.pdf	PDF
4/8/2009	NB	Proposed Final Contours Sh 4 Of 4.pdf	PDF
4/8/2009	NB	Proposed Waste Disposal Sh 1 Of 2.pdf	PDF



**Coal Combustion Product Disposal Facility Assessment
Phase 1 Document Review Form
Cumberland Fossil Plant (CUF)**

Date Reviewed	Reviewed by	File Name	File Type
4/8/2009	NB	Proposed Waste Disposal Sh 2 Of 2.pdf	PDF
4/8/2009	NB	Rpt_Cumberlandtva_Yearlyinspection_Draft.pdf	PDF
4/8/2009	NB	Stage No 1 Disposal Area.pdf	PDF
4/8/2009	NB	Stage No 2 Disposal Area.pdf	PDF
4/8/2009	NB	Stage No 3 Disposal Area.pdf	PDF
4/8/2009	NB	Stage No 4 Disposal Area.pdf	PDF
4/8/2009	NB	Stage No 5 Disposal Area.pdf	PDF