

**Tennessee Valley Authority  
Regulatory Submittal for Kingston Fossil Plant**

**Documents submitted:**

90% Design for Ash Pond Ash Stacking  
RDP-0114-D

**Date Submitted:**

July 17, 2012

**Submitted to whom**

Craig Zeller, EPA

**Concurrence**

Received      Not Applicable      TVA

Kathryn Nash  
Michelle Cagley *mc*

Received      Not Applicable      Jacobs

Jack Howard  
Bruce Haas

\_\_\_\_\_  
\_\_\_\_\_

**Approvals**

TVA

Kathryn Nash

Date

7/17/12

EPA

Craig Zeller

Date

8/02/12



**Stantec**

**90% ISSUED FOR REVIEW**

**Stantec Consulting Services Inc.  
One Team. Infinite Solutions**

1409 North Forbes Road  
Lexington, KY 40511-2050  
Tel: (859) 422-3000 • Fax: (859) 422-3100  
[www.stantec.com](http://www.stantec.com)

Quality Control Plan

Ash Pond Ash Stacking  
Kingston Fossil Plant  
Harriman, Roane County,  
Tennessee

Document Control Number  
RDP-0114-D

Prepared for:  
Tennessee Valley Authority  
Kingston, Tennessee

July 6, 2012

**Quality Control Plan**  
**Ash Pond Ash Stacking**  
**Kingston Fossil Plant**  
**Harriman, Roane County, Tennessee**

**1. Purpose and Scope**

This document is a site specific Quality Control (QC) Plan that addresses construction and monitoring in association with the Ash Pond Ash Stacking. The QC Plan is intended to present minimum project requirements and shall serve as an outline for use in developing site specific protocols based on conditions encountered during the work.

**2. Responsibility and Authority**

A summary of QC personnel and associated responsibilities is presented below.

**2.1. Regulatory Agency**

Work conducted under this project shall be coordinated with, the U.S. Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC). Designated EPA and TDEC personnel shall serve as the regulatory contact.

**2.2. Quality Control Manager and Team**

A professional engineer licensed in the state of Tennessee shall be designated as the QC Manager and shall be responsible for overall management of construction monitoring, testing and related documentation as outlined herein. The QC Manager shall be the Engineer of Record for project construction. The QC Manager shall determine appropriate test standards and methods for designated field observations and/or laboratory testing and shall be responsible for review of QC data to assess conformance with project requirements.

The QC Team shall consist of qualified personnel working under the direct supervision of the QC Manager. The QC Team shall be familiar with the materials used and the functional intent of the respective QC Plan components.

**2.3. Owner**

The plant and its ancillary functions are owned by the Tennessee Valley Authority (Owner). The Owner shall be responsible for overall management of construction activities to include but not be limited to contracting, administration and retaining the services of qualified consultants as required during the project.

The Owner and/or their Designee shall appoint one representative to serve as the Construction Manager. The Construction Manager shall be responsible for the overall planning, coordination and control of project construction. This includes but is not limited to the character and sequence of work, coordination, scheduling, and management of cost,

time and contract administration as related to the execution of the project. The Owner shall be responsible for providing qualified professionals to establish and enforce safety protocols related to the project.

## **2.4. CONTRACTOR**

The CONTRACTOR will be the entity with which the TVA has entered into an agreement to construct the Ash Pond Ash Stacking Design project. The CONTRACTOR shall designate a Site Superintendent responsible for construction activity and communication with the QC Manager and Construction Manager. Any portion(s) of the work designated to others shall be conducted under the direct supervision of the CONTRACTOR.

## **3. Quality Control Activities**

### **3.1. Meetings**

Meetings shall be coordinated and conducted by the QC Manager and/or the Construction Manager on a weekly basis. The primary purpose of these meetings shall be to confirm that all parties involved are familiar with the project, required procedures and associated QC objectives along with any safety issues related to construction. Specific safety issues shall be the responsibility of designated safety professionals. Minutes of each meeting shall be documented for inclusion with the project records.

Pre-construction meetings shall be held prior to initiating individual phases of construction. The QC Manager, Construction Manager, Site Superintendent, and other parties that will actively participate in the construction activities shall attend these meetings.

### **3.2. Alternative Methods**

Consistent with the overall objectives of the project, alternative construction and QC methods may be used during the course of the work. Proposed modifications shall be developed by the QC Manager and submitted to the Owner for review prior to incorporation into the project. Documentation of these alternative methods shall be prepared with copies retained for inclusion with the project records.

### **3.3. CONTRACTOR Submittals**

CONTRACTOR submittals shall be submitted to TVA procurement and distributed to the QC Manager and Construction Manager unless otherwise directed by TVA. These submittals shall be reviewed and approved by the QC Manager prior to delivery and/or use of the respective construction materials. Copies of all submittals shall be included with the project records.

### **3.4. Conformance Testing**

Conformance testing consists of periodic testing of materials and/or constructed products. Conformance testing shall be conducted by the QC Team as required by this plan and additional testing may be added at the discretion of the QC Manager. Results of

conformance testing shall be reviewed by the QC Manager to assess conformance with project requirements. Copies of all conformance testing results shall be included with the project records.

### **3.5. Field Observations**

The QC Team shall observe and document (as outlined herein) all construction activities associated with the project. Results shall be reported to the QC Manager and Construction Manager (with the Owner copied) on a daily basis.

## **4. Subgrade Improvements**

### **4.1. General**

The term subgrade references the prepared surface accomplished by excavation and embankment upon which the ash stacking is constructed. The prepared surface of the subgrade generally meets the lines and grades for the Subgrade Plan as shown in the Drawings. The present lines and grades of the project area vary from that shown on the Existing Conditions Plan. Since the date of the December 31, 2011 LIDAR survey, saturated materials have been placed in areas of the site.

### **4.2. Excavation**

Existing surfaces shall be excavated to the lines and grades shown in the Drawings. The Owner shall establish grade stakes for use in excavation and embankment activities. The CONTRACTOR shall make arrangements through the Construction Manager to schedule survey activities.

### **4.3. Subgrade Embankment**

Prior to placement of fill and/or construction of other embankment components, exposed surfaces shall be stripped of all vegetation as well as any other deleterious materials. Lifts of subgrade embankment shall be placed to the maximum horizontal extent practicable to allow pore water dissipation. "Wet" ash stockpile rates shall not exceed two feet per day (24 hour period) as per Section 02300, Paragraph 2 of the Technical Specifications. These rates shall be controlled by the CONTRACTOR and confirmed by the QC Team.

### **4.4. Quality Control Requirements**

Prior to subgrade improvements in the Ash Pond Ash Stacking area, the QC Team shall verify the following:

- a. A subgrade improvement work plan has been submitted and reviewed.
- b. Materials utilized for subgrade improvements have been submitted with necessary certifications or testing in accordance with Section 02400 of the Technical Specifications.

Prior to ash stacking on the subgrade improvements, the QC Team shall verify the following:

- a. The subgrade was constructed in accordance with the performance goals stated in Section 02400 of the Technical Specifications.
- b. Materials incorporated into the subgrade conform to those for which certifications have been obtained or for which testing has been performed as applicable.
- c. The exposed surface was inspected to:
  - i. Confirm the subgrade is properly compacted and uniform and is suitable to support subsequent construction;
  - ii. Observe a proofroll using appropriate equipment as noted in Section 02400 of the Technical Specifications or alternative equipment as approved by the QC Manager. Significant pumping or rutting (greater than three inches) or lateral displacement observed during proofrolls shall be corrected using methods approved by the QC Manager until satisfactory proofroll results are attained. Each proofroll shall be documented for inclusion with the project records; and
  - iii. Confirm that elevations and grades are consistent with the design.

## **5. Ash Stacking**

### **5.1. General**

Lifts shall be placed to the maximum horizontal extent practicable to allow pore water dissipation. The daily rate of placement within discrete (or localized) areas shall not exceed two feet per day unless otherwise approved by the QC Manager based on response of the material and monitoring of geotechnical instrumentation. Grading shall conform to the lines and grades shown in the accompanying Drawings.

### **5.2. Placement**

The sequence of filling shall commence at the lowest section (in elevation) of the subject footprint and proceed upward in maximum 12-inch loose lifts in a manner to maintain positive drainage at all times. Positive drainage shall be maintained on all fill surfaces. The fill sequence shall also be performed in a manner that reduces the potential for uncontrolled sediment runoff and adequately controls runoff from the embankment area. Ash placement shall be performed uniformly across the cell and result in slopes no steeper than the design grades.

### **5.3. Compaction**

Each embankment lift shall be compacted with an appropriate roller or rubber tired equipment as approved by the QC Manager for the subject material. Materials shall be compacted to a minimum of 90 percent of standard Proctor maximum dry density at a moisture content within minus four percent and plus six percent of optimum. The QC Manager may make adjustments to this moisture range based on field observations and testing.

Following initial compaction, the surface shall be sealed with a smooth drum roller to reduce the potential for surface water infiltration. Prior to placement of subsequent lifts the surface shall be lightly scarified to promote lift bonding.

Although compaction will be confirmed visually by the QC Team based on the response of materials to loaded equipment, field conformance testing shall also be performed and include periodic in-place density and device calibration testing to provide documentation of the compaction operations at the prescribed intervals indicated in the attached testing schedule or as established by the QC Manager. Device calibration/confirmation testing shall consist of in-situ density tests performed at intervals as established by the QC Manager.

#### **5.4. QC Requirements**

Embankment placement and compaction methods shall be monitored by the QC Team to assess conformance with project requirements.

Evaluation criteria shall include overall compaction results. Appropriate modifications to embankment placement and compaction methodology shall be developed by the QC Manager if compacted materials do not meet project requirements.

The rate of embankment construction shall be measured by the QC Team every 24-hour period in which work has been performed as well as for a weekly total. Measurement methods shall be as approved by the QC Manager.

Field conformance testing shall include periodic in-place density and device calibration testing to provide documentation of the compaction operations at prescribed intervals as directed by the QC Manager. Moisture testing will include both nuclear density readings and laboratory moistures.

Drive tube samples will be taken at random locations corresponding to nuclear density tests. These samples will be subjected to laboratory density and moisture testing to calibrate the nuclear density gauge.

Shelby tube samples will be collected in conjunction with drive tube samples at a limited number of locations in order to perform a testing comparison. These Shelby tube samples will likewise be subjected to laboratory density and moisture testing.

## **6. Non-Woven Geotextile Filter Fabric**

### **6.1. General**

Geotextile materials shall be unloaded and stored in accordance with manufacturer recommendations. The CONTRACTOR shall provide to the QC Manager a copy of receipts from incoming delivery of geotextile. This can be performed by forwarding receipts from TVA procurement or during unloading of material shipments. Geotextile used for ditch lining shall conform to the requirements in Section 02410 of the Technical Specifications and as outlined below. Geotextile used for Subgrade Improvements may vary from the list of fabrics shown.

Requirements for geotextile used in ditches are as follows:

- a. Geotextile shall be a 16-ounce weight, non-woven, polyester or polypropylene fabric. Acceptable geotextile fabrics include:
  - Skaps Industries GE 116;
  - Propex Geosynthetics Geotex 1701;
  - Agru American Agrutex 1161;
  - Dalco Nonwovens Dultex 11610;
  - GSE Lining Technology NW 16;
  - Tencate Geosynthetics Mirafi S1600; and
  - US Fabrics, Inc. US380 NW.
- b. Geotextile shall be protected from direct sunlight, ultraviolet rays, temperature greater than 140 degrees Fahrenheit, mud, dirt, dust and debris. During storage, geotextile filter fabric shall be wrapped in a heavy duty protective covering.
- c. Installation shall be in accordance with manufacturer recommendations.
- d. Surfaces to receive geotextile shall be prepared to a relatively smooth condition, free of obstructions, depressions and debris.
- e. Geotextile shall be placed with the long dimension parallel with the centerline of ditches and roads, and/or parallel to embankment slopes, as applicable. Geotextile shall be laid smooth, and free of tension, stress, folds, wrinkles or creases. Perpendicular seams shall be avoided.
- f. Geotextile shall be covered with designated materials within 15 days of deployment to protect the geotextile from ultraviolet degradation.
- g. Geotextile shall be overlapped one foot. Care shall be taken during riprap placement to avoid displacement/damage of geotextile.
- h. Geotextile used in subgrade improvements shall be subject to large scale direct shear testing as described in Section 02400 of the Technical Specifications.

## 6.2. QC Requirements

QC requirements are as follows:

- a. Prior to delivery, manufacturer and supplier certifications shall be submitted to the QC Manager indicating that all materials meet, or exceed, the minimum established properties. Certifications shall be accompanied by supporting QC testing.
- b. Conformance testing and procedures shall be performed as shown in the testing schedule.

- c. Construction monitoring and field acceptance of geotextile installation shall be documented by the QC Team. Laps shall be visually inspected for conformance.

## **7. Erosion Control**

Erosion Control shall conform to the site wide Storm Water Management Plan (SWMP). Erosion and sediment control measures shall be provided as field conditions dictate and approved by the Construction Manager, or as directed by the appropriate Regulatory Agency.

The Construction Manager shall periodically monitor these structures as well as overall site drainage conditions. Appropriate adjustments to site drainage and related sediment control structures shall be made as necessary based on current site conditions during the project.

## **8. As-built Documentation**

### **8.1. General**

The CONTRACTOR will grade stake the existing configuration and provide cut/fill stakes on an appropriate interval as needed for construction. The location (northing and easting) and elevation of the existing surface shall be recorded and provided to the QC Manager. Other surveys shall include:

- Monthly progress survey of stacking;
- As-needed to provide support to QC activities;
- Top of Subgrade Improvements Stacking and Top of Ash Stacking;
- Location of ditches and drainage structures; and
- Cross sections on 100 foot centers on the project baseline of each work item noted above with maximum survey point incremental distance of 50 feet.

### **8.2. Quality Control Requirements**

- a. All survey activities shall be performed under the direction of a Tennessee licensed Land Surveyor or Professional Engineer.
- b. Survey data shall be provided to the QC Manager within 10 days of survey completion in survey point files with a description for each of the points. Survey shots shall be performed along cross sections and along breaks in slopes.
- c. The QC Manager will develop as-built Drawings from the provided data.

## **9. TDOT Class A-3 Machined Riprap**

Riprap materials are utilized for rock check dam construction and ditches, and shall conform to the requirements in Section 709.03 of the TDOT "Standard Specifications for Road and

Bridge Construction.” Prior to delivery, supplier certification shall be submitted to the QC Manager that all materials meet or exceed the minimum established properties.

## **10. TDOT Machined Riprap and Shot Rock**

Riprap or shot rock imported to the site for use in the subgrade improvements shall consist of quarry stone meeting the physical and chemical requirements of Section 709 of the Tennessee Department of Transportation “Standard Specifications for Road and Bridge Construction” latest edition. Prior to delivery, the gradation of the shot rock and supplier certification shall be submitted to the TVA that all materials meet or exceed the minimum established properties. Riprap or shot rock already on site that has been used in other applications and reclaimed for use for subgrade improvements is not subject to this requirement.

## **11. Geogrid**

A sample of the proposed geogrid and the product specifications shall be submitted to the TVA for documentation purposes prior to installation. For quality control purposes the QC Team should document that installation occurs in accordance with the manufacturer’s recommendation. The use of geogrid that exhibits shear at junctions when subjected to typical construction conditions shall be discontinued and another product utilized.

## **12. Bottom Ash**

Bottom Ash if utilized for subgrade improvements shall meet site and EPA/TDEC requirements for sourcing. Bottom Ash shall not be imported to the site.

## **13. Aggregate**

Aggregate imported to the site for use in the subgrade improvements shall consist of quarry stone meeting the physical and chemical requirements of Section 903 of the Tennessee Department of Transportation “Standard Specifications for Road and Bridge Construction” latest edition. Prior to delivery, the gradation of the aggregate and supplier certification shall be submitted to the TVA that all materials meet or exceed the minimum established properties. Aggregate already on site that has been used in other applications and reclaimed for use for subgrade improvements is not subject to this requirement.

## **14. Instrumentation**

### **14.1. General**

Instrumentation monitoring has been established for the Ash Pond Ash Stacking project embankment area to monitor the embankment slopes and the underlying foundation materials. Instrumentation for geotechnical monitoring shall be installed or extended according to the attached Plan and Detail Sheets. The instrumentation program includes the prescribed use of the instrumentation and the specific monitoring of these devices as further, detailed. T-posts and orange safety fence or other protective barriers or high visibility measures approved by the QC Manager shall be installed by the CONTRACTOR around instrumentation.

## 14.2. Types

- a. Piezometers shall be installed and monitored to characterize the increase and dissipation of pore pressures within the existing ash and native foundation soil-layers due to embankment loading.
- b. Slope inclinometers shall be used to measure lateral displacements within the embankment and foundation materials due to loading. The inclinometers shall be anchored a minimum of 10 feet into bedrock.
- c. Settlement plates shall be utilized to measure the vertical deformation of the foundation soils due to embankment loading.

If any instruments are damaged during construction, they shall be repaired/replaced as directed by the QC Manager.

## 14.3. Measurements

Baseline data shall be confirmed prior to embankment loading. Piezometers, inclinometers and settlement plates shall be measured once a day in active areas and weekly elsewhere, unless directed otherwise by the QC Manager. The rate of embankment construction shall be varied by the QC Manager as part of the overall program objectives. Measured instrumentation responses shall be reviewed and evaluated by the QC Manager.

## 14.4. Thresholds

Embankment loading models have been analyzed which take into account the existing subsurface conditions and the proposed embankment heights. The following threshold limits shall be used for the stacking embankment.

- a. Piezometers – Embankment filling may continue, with regular monitoring frequency, as long as the ratio of excess pore pressure to the applied embankment load is 10 percent or below. When the excess pore pressure ratio within **native foundation soil layers** ranges from 10 to 15 percent, embankment filling may continue, but with an increase in instrumentation monitoring specified by the QC Manager. All fill placements shall stop immediately when the excess pore pressure ratio is above the 15 percent level within **native foundation soil layers**. Embankment filling shall stop immediately when the excess pore pressure ratio is above the 10 percent level within **wet (foundation) ash layers**. All excess pore pressure measurements shall be evaluated from baseline data values.
- b. Slope Inclinometers and Settlement Plates – Embankment filling may continue with regular monitoring frequency, as long as the displacement ratio of lateral inclinometer movement to vertical settlement plate movement is 20 percent or below. When the displacement ratio ranges from 20 to 30 percent, embankment filling may continue, but with an increase in instrumentation monitoring specified by the QC Manager. All fill placements shall stop immediately when the displacement ratio is above the 30 percent level.

Following a stoppage, embankment filling in affected areas may resume based on the discretion of the QC Manager and engineering considerations on embankment stability. It should be noted that embankment loading may be restricted and/or modified at the discretion of the QC Manager based on other potentially unstable conditions not outlined herein.

## **15. Project Documentation**

Documentation shall be collected and maintained by the QC Manager (copied to the Owner) during the project. This documentation shall include but not be limited to the following:

- Daily construction field reports;
- Observation reports;
- CONTRACTOR submittals;
- Material conformance data;
- Photographic documentation in accordance with site SOP;
- Survey data;
- As-Built Drawings;
- Construction issue and solution reports;
- Weekly summary reports (for regulatory submittal);
- Plan modifications; and
- Meeting minutes.

**Ash Pond Ash Stacking**  
Kingston Fossil Plant  
Harriman, Roane County, Tennessee

**Quality Control Plan - Material Testing and Product Certification Schedule**

Material	Property	Test Method	Value	Minimum Conformance Test Frequency
<b>Ash Fill Stacking Operations</b>				
Ash Fill	Nuclear Density and Moisture	ASTM	Minimum 90% standard Proctor and -4% to +6% optimum moisture	5 tests / acre / lift
	Calibration	ASTM	Drive Tube / Shelby Tube	Random
	Classification and Proctor	ASTM	Varies to be approved by QC Manager	1 / 50,000 CY loose volume
<b>Rate of Embankment Construction</b>	Height in Feet		Measured	Daily/Weekly/Monthly
<b>Non-Woven Geotextile Filter Fabric</b>	Project Requirements	ASTM	Project Requirements	1/ manufacturer / year visual
<b>TDOT Class A-3 Riprap</b>	Gradations	ASTM	Project Requirements	1 / 30,000 tons delivered
<b>Instrumentation</b>				
Readings	Measurements		Observations	Daily in active areas/Weekly elsewhere
Extensions	TVA Protocols		Manufacturer's Recommendations	

<p><b>Subgrade Improvements</b></p> <p>Geotextile</p> <p>Geogrid</p> <p>Riprap</p> <p>Shot Rock</p> <p>Aggregate</p>	<p>Shear Interface</p> <p>Sample and Specifications</p> <p>Gradation</p> <p>Gradation</p> <p>Gradation</p>	<p>ASTM D5321</p> <p>ASTM</p> <p>ASTM</p> <p>ASTM</p>	<p>Project Requirements</p> <p>Project Requirements</p>	<p>1 / manufacturer / type / year</p> <p>1 / manufacturer / year</p> <p>1 / 30,000 tons delivered</p> <p>1 / 30,000 tons delivered</p> <p>1 / 30,000 tons delivered</p>
<p><b>Erosion Control and Stabilization</b></p> <p>Site Inspections and Evaluations</p>	<p>Project Requirements</p>		<p>Site Wide SWMP</p>	<p>Bi-Weekly inspections</p>
<p><b>Thresholds</b></p>	<p>Pore Pressure Ratios</p> <p>Displacement Ratio</p>	<p>Measurement</p> <p>Measurement</p>	<p>Project Requirements</p> <p>Project Requirements</p>	<p>Daily in active areas/Weekly elsewhere</p> <p>Daily in active areas/Weekly elsewhere</p>
<p><b>QA/QC Documentation</b></p>	<p>Project Requirements</p>		<p>Project Requirements</p>	

## Ash Pond Ash Stacking Quality Control Task Summary<sup>(1)</sup>

### A. General Site and Construction Tasks

Task	Responsible Personnel <sup>(4)</sup>	Task Description/Itemization
QC Testing	QC Manager	-Designate appropriate test standards and methods to maintain quality standards outlined in the project requirements -Calibration of nuclear density gauges -Review all QC data for conformance with project standards and requirements -Collection and maintenance of all QC documentation -Generation of all QC related reports
Project Meetings	QC Manager / Construction Manager	-Organize meetings as necessary to ensure construction related personnel are familiar with design, construction procedures, and QA/QC requirements.
Contractor Submittals	QC Manager (QC Team)	-Approval of contractor submittals a minimum of 10 days before materials arrive on site -Verify materials utilized in site construction meet or exceed project requirements
Scheduling	Construction Manager	-Develop and maintain construction schedule and verify construction progress
Site Inspections	Construction Manager	-Site observations for indications of slope failure and/or instability
Surveying	Construction Manager	-Schedule surveying

### B. Embankment

Task	Responsible Personnel	Task Description/Itemization
Ash Fill Placement and Compaction	QC Manager	-Verify and document ash fill placement and compaction per project requirements -Verify ash fill meets or exceeds project requirements -Confirm proper lift thickness -Verify proper lift surface preparation and scarification techniques -Establish and record elevations

### C. Non-Woven Geotextile Filter Fabric

Task	Responsible Personnel	Task Description/Itemization
Submittals	QC Manager	-Approval of material samples and certified material specifications a minimum of 10 days prior to product arrival on site
Conformance Testing	QC Manager	-Collection, organization and maintenance of delivery tickets and all available documentation that supplied materials meet or exceed project requirements -Verification of minimum conformance tests
Installation	QC Team	-Monitor geotextile deployment and covering operations -Documentation that operations performed per project requirements, manufacturer recommendations, and industry practice

<b>D. TDOT Class A-3 Machined Riprap</b>		
<b>Task</b>	<b>Responsible Personnel</b>	<b>Task Description/Itemization</b>
<b>Submittals</b>	QC Manager	-Approval of documentation regarding conformance and TDOT <sup>(3)</sup> acceptance of proposed riprap supplier and riprap materials for TDOT projects a minimum of 10 days prior to material arrival on site
<b>Conformance Testing</b>	QC Manager	-Verify minimum conformance testing per current QC Plan
<b>E. Subgrade Improvements</b>		
<b>Task</b>	<b>Responsible Personnel</b>	<b>Task Description/Itemization</b>
<b>Submittals</b>	QC Manager	-Approval of material samples and certified material specifications a minimum of 10 days prior to product arrival on site
<b>Conformance Testing</b>	QC Manager	-Observe proofrolls and verify that performance standards are met
<b>Installation</b>	QC Team	-Monitor deployment of imported materials -Document materials conform to submittals
<b>F. Instrumentation</b>		
<b>Task</b>	<b>Responsible Personnel</b>	<b>Task Description/Itemization</b>
<b>Extensions</b>	QC Manager	-Extend existing instrumentation
<b>New Installations</b>	QC Manager	-Install new geotechnical instrumentation
<b>Readings</b>	QC Manager	-QC Team takes readings for threshold analyses
<b>Protection</b>	Construction Manager	-Arrange and coordinate installation of protective barriers around instrumentation
<b>G. Erosion and Sediment Control</b>		
<b>Task</b>	<b>Responsible Personnel</b>	<b>Task Description/Itemization</b>
<b>Site Inspections and Evaluations</b>	Construction Manager	-Periodic erosion and sediment control structure inspections and overall site drainage evaluations -Adjustments to site drainage and structures as necessary, based upon prevalent site conditions -Documentation of sediment control observations and modifications
<b>H. QA/QC Documentation</b>		
<b>Task</b>	<b>Responsible Personnel</b>	<b>Task Description/Itemization</b>
<b>Documentation</b>	QC Manager AND Construction Manager	-Overall organization and maintenance of QA/QC documentation of items outlined above as well as those designated in the QA/QC Plan

**Notes:**

1) The task summary is an itemized list of the general responsibilities to be administered by the Construction Manger and the QC Manger/QC Team per the current Quality Control Plan and the associated testing schedule.

2) All materials testing and site observations are to be conducted in accordance with the current Quality Control Plan and the associated testing schedule to assure that minimum project requirements are maintained on the site during the construction of the special waste disposal facility. Frequency stated when applicable. Many manager or team tasks, such as subgrade inspection, have no quantifiable testing frequency but are required during work progress.

3) TDOT- "Tennessee Department of Transportation"

4) Responsible Personnel Definitions:

Construction Manager - A TVA employee or consultant designated to be the Owner representative on the construction site. Responsibilities involve overall management of site operations including construction administration tasks, waste disposal, contracting and retaining the services of all necessary personnel (including a qualified engineer) for the life of the facility. The Construction Manager is also a liaison for the Owner to the QC Manager and Contractors.

QC Manager - Registered Professional Engineer in the State of Tennessee that becomes the Engineer of Record for construction. Responsibilities generally include the management of the QC Team as well as determining conformance of submittals and test results with project requirements, review of data, construction monitoring and/or testing, and construction document preparation.

QC Team - Personnel qualified in construction quality assurance/quality control (QA/QC) testing procedures pertinent to the Kingston Fossil Plant facility working under the direct supervision of the QC Manager.



**Stantec**

**ISSUED FOR REVIEW 90%**

**Stantec Consulting Services Inc.**  
**One Team. Infinite Solutions.**  
1409 North Forbes Road  
Lexington KY 40511-2050  
Tel: (859) 422-3000 • Fax: (859) 422-3100  
[www.stantec.com](http://www.stantec.com)

Technical Specifications

Ash Pond Ash Stacking  
Kingston Fossil Plant  
Harriman, Roane County,  
Tennessee

Prepared for

Tennessee Valley Authority  
Kingston, Tennessee

July 6, 2012

**TECHNICAL SPECIFICATIONS  
TABLE OF CONTENTS**

Section 02100	Erosion Control and Stabilization
Section 02150	Site Preparation
Section 02200	Excavation
Section 02300	Backfill and Embankment
Section 02400	Subgrade Improvements
Section 02410	Surface Drainage Ditches
Section 02936	Revegetation

**TECHNICAL SPECIFICATIONS**  
**DIVISION 2 – SITE WORK**  
**SECTION 02100 – EROSION CONTROL AND STABILIZATION**

**PART 1 - GENERAL**

**1.1. DESCRIPTIONS**

1.1.1. This Section includes provisions for erosion control and stabilization. All construction activities shall be conducted in accordance with applicable environmental requirements. Install sediment and erosion control measures prior to disturbance where applicable.

1.1.2. The CONTRACTOR shall become familiar with the construction work occurring in the North and Central Dredge Cell (Cells 2 and 3), Lateral Expansion (Cell 4) and Perimeter Containment construction across the site. These other projects and the Ash Pond Ash Stacking shall be integrated into the Best Management Practices Plan. Work performed on one project may impact another.

1.1.3. This Work may be proceeding concurrently with other construction packages involving ash stacking, perimeter containment and final closure. The CONTRACTOR shall also be familiar with the Site Wide Storm Water Management Plan (SWMP), as well as the Erosion and Sediment Control Details, and Best Management Practices (BMP) for this Work and shall anticipate, and therefore plan in advance for each construction activity.

**1.2. RELATED DOCUMENTS**

1.2.1. The Quality Control (QC) Plan, Technical Specifications, Engineering Drawings, and the SWMP apply to the work of this section.

1.2.2. Related Sections include the following:

- Section 02150 – Site Preparation
- Section 02200 – Excavation
- Section 02300 – Backfill and Embankment
- Section 02400 – Subgrade Improvements
- Section 02410 – Surface Drainage Ditches
- Section 02936 – Revegetation

## **PART 2 - MATERIALS**

**2.1.** Refer to the SWMP, the BMP Plan at the end of this Specification, the Sediment and Erosion Control Details, and Sediment and Erosion Control features noted on the various Plans for products and materials to be employed in erosion control and stabilization efforts.

**2.2.** This section provides material requirements for silt fence, rock check dams, fiber rolls, and references temporary seeding.

## **PART 3 - EXECUTION**

### **3.1. CONSTRUCTION PHASE OPERATIONS**

**3.1.1.** The CONTRACTOR shall evaluate the progress of work on the project and determine phasing of work. Sediment and Erosion Control Measures shall be in place to the extent practicable prior to commencement of excavation or embankment activities in a discrete area.

**3.1.1.1.** Perform excavation or grading, in such a manner as to route sediment laden runoff through installed sediment control measures. Excavate and place ash fill material during dry weather, when possible.

**3.1.1.2.** Establish final grade in a given area as quickly as practical in order to allow application of protective measures while still maintaining construction rate protocols established under Technical Specifications Section 02300, Paragraph 5.2.1 and the QC Plan.

**3.1.2.** The CONTRACTOR shall control fugitive dust emissions.

**3.1.2.1.** Control dust generation on roads by wetting haul roads or by applying approved (by TVA Environmental) chemical soil binders, as needed.

**3.1.2.2.** Control dust generation on graded areas that won't be disturbed again for 14 days or more by spraying with Flexterra or equivalent hydromulch at a rate of 2000 pounds per acre. For lesser periods of time, spray with water.

**3.1.3.** The CONTRACTOR shall not discharge raw silt and sediment laden water from the site without providing for removal of soil particles. Flow is designed to be routed from this area and into the sediment ponds downstream of the project area.

**3.1.3.1.** Use rock check dams, fiber rolls and/or silt fencing as pretreatment areas to avoid siltation of the ditches.

**3.1.3.2.** Rock check dams shall be constructed of the materials noted on the Drawings and installed at locations deemed necessary by the Construction Manager. Rock check dams may be placed by mechanical means using an excavator or loader. Larger rocks shall be uniformly distributed with the small rocks and spalls filling the voids between the larger rock

**3.1.3.3.** The Construction Manager shall provide inspection and maintenance of Best Management Practices in accordance with the SWMP.

**3.1.3.4.** Maintain all best management devices by removing accumulated silt, repairing or replacing damaged devices and by cleaning up any excess discharges, or mud on gravel roads.

## **3.2. SEDIMENT BARRIERS**

**3.2.1.** The CONTRACTOR shall install silt fences, and/or fiber rolls or other suitable measures as practicable along the contour above benches, at the toe of the slopes and along ditches. Silt fence may also be required at other locations based upon field conditions.

### **3.2.2. Silt Fences**

Silt fences shall conform to the material requirements shown on the Drawings. Install below proposed disturbed areas in accordance with the plans and details and as needed in other areas. Embed silt fence as shown on the Drawings. Turn ends of silt fence slightly toward the uphill side to help reduce bypassing by runoff around the fence ends. Silt fences may also be utilized to protect subgrade and embankment.

### **3.2.3. Fiber Rolls**

Fiber rolls and other commercial products made from coconut fiber, rice straw, plastic, wood shavings, or other material can also be used as sediment barriers along streams. Follow manufacturers' installation instructions and ensure that sediment filter spacing on slopes is correct. Make sure runoff does not bypass barriers, coconut rolls, or other barriers underneath or around the ends.

### **3.2.4. Maintenance**

Inspect silt fences, rock check dams and other installed manmade barriers in accordance with the site wide SWMP. Remove sediment before it reaches ½ the height of the silt fence. Reinstall sections of fence which have washed out underneath the fence. Replace broken, torn or worn fences. Rebuild or replace damaged rock check dams. Make repairs within three days of discovery.

### **3.3. SLOPE PROTECTION**

**3.3.1.** The CONTRACTOR shall take measures as necessary to minimize sheet, rill and gully erosion prior to stacking and in areas outside the grading limits affected by this work. Slopes shall be stabilized immediately after grading with measures as described below.

- A. Divert Upland Runoff – Use diversion berms as practicable to control flow and route around work areas.
- B. Tracking – Track a dozer up and down the slopes to create horizontal breaks which will slow the overland flow of water.
- C. Sediment Barriers – See paragraph 3.2.

**3.3.2.** The ash is a highly erosive material that does not tolerate long slopes without headcuts and piping issues developing. Even relatively gentle slopes have exhibited erosion features. Follow short to medium term slope protection as stipulated in Section 02936 of these specifications. It is imperative that once an area achieves final grade, the area shall be revegetated using long-term measures in accordance with Section 02936 of the Specifications. Avoid creating large areas with long slopes that have not been subject to revegetation efforts.

**3.3.3** Inspect slopes for erosion in accordance with the site wide SWMP. Repair gullied areas and any upslope areas contributing large volumes of sediment. Install berms, fiber coils or other measures as needed. Remove sediment from sediment control devices as discussed in paragraph 3.2.

**3.3.3.1** Daily inspect equipment and hydraulic oil systems at the beginning of the day. Repair or replace frayed or damaged lines or hoses before use in or near water and provide containment measures if required.

**3.3.3.2** Keep erosion and sediment controls in good working order until the project is completed. Brush and other debris should be removed from work areas. Sediment accumulating behind silt fences or other sediment filters should be removed regularly. All structures that have become dislodged or damaged (such as silt fences, etc.) should be repaired within three days of discovery.

**3.3.3.3** Make sure that waste materials, building materials, and supplies are properly tied down or contained so that wind and storm water runoff cannot carry the materials away. Fuel, lubricants, and hazardous waste products should be stored in an approved tank or other structure to avoid spills and runoff. Provide spill kits and containment material on-site, especially near fueling or equipment service areas. Maintain vehicles and equipment away from the site if possible. If maintenance must occur on-site, ensure that spills are cleaned up quickly.

## Best Management Practices Plan ASH POND ASH STACKING DESIGN

### Purpose of the Best Management Practices Plan

The purpose of the Best Management Practices (BMP) Plan is to evaluate potential sources of sediment and other pollutants at the project site and put controls in place that will effectively prevent pollutant discharges to surface and ground waters. Construction activities shall be performed in accordance with the Kingston site wide SWMP. This BMP is a guideline for the Ash Pond Ash Stacking Design work activities. The following general pollution control requirements have been addressed in the BMP Plan, as applicable:

1. Control limited threat discharges to minimize impacts to water quality;
2. Prevent the discharge of pollutants associated with construction activities to surface waters;
3. Retain soil and sediment on site; and
4. Permanently stabilize disturbed soils.

This plan has been developed based on an understanding of the current conditions of the watershed, a general knowledge of the previous activities at the site, and an anticipation of the proposed remediation activities scheduled for the site. This plan is intended to be a "living" document, in that as the Work at the site progresses, this plan must be periodically reviewed and adjusted to suit the actual conditions and situations as they develop. The CONTRACTOR and all SUBCONTRACTORS shall become familiar with this plan, and shall constantly monitor the site conditions, making appropriate modifications as needed.

### Site Description:

The Kingston Fossil Plant is located adjacent to the Emory River / Watts Bar Lake in Roane County, Tennessee. The Ash Pond project area as described in these documents was once the southern portion of the Ash Pond with the Northern Portion becoming the Lateral Expansion (Cell 4). This project area is south of the Lateral Expansion, west of the Divider Dike, east of Dike D and northeast of the Ball Field area. It is generally east of the Dredge Cell 1 and west of the Stilling Pond.

### Construction Activities and Work Sequence:

This project entails stacking ash and dredged materials to the lines and grades shown in the Drawings. The Work also includes drainage improvements within the Ash Pond area to promote storm water control. Work measures required to stabilize the site include:

- A. Installation of sediment and erosion control measures for the site in accordance with the Drawings and this section of the Technical Specifications.

- B. Protection of existing instrumentation in accordance with the Drawings and Section 02150 of these Technical Specifications.
- C. Construction of subgrade improvements as described in Section 02400 of these Technical Specifications.
- D. Placement of flyash, bottom ash, trench materials from perimeter construction and river sand in an engineered fill to meet the design template shown in the Drawings. This work shall also be performed in accordance with Sections 02200 and 02300 of these Technical Specifications.
- E. Construction of new drainage paths including ditches and flumes to collect surface runoff and route it to the previously constructed perimeter ditches in accordance with the Drawings and Sections 02410 of these Technical Specifications.
- F. Removal of temporary sediment control measures in a time and manner as deemed appropriate by the Construction Manager.

**Sediment and Erosion Control Measures:**

Runoff from the Ash Pond Stacking is conveyed to an outlet that discharges to the Stilling Basin. Pre-treatment will be employed to decrease Total Suspended Solids (TSS) in the runoff to help reduce sediment deposition in the Ash Pond. Measures to reduce TSS for the remainder of the site are described below:

- 1. Tracking slopes with cleat marks parallel to the contour of slopes to reduce runoff velocity and decrease erosion.
- 2. Placement of silt fence and fiber coils at toe of slopes, and above ditches and benches and other areas as needed.
- 3. Installation of rock check dams in drainways.
- 4. The construction of berms and installation of temporary pipe drains as needed to shorten slope lengths and convey flow around active work areas.
- 5. Revegetation of areas as they achieve final grade or if no disturbance is planned for 21 days or more.

**Other Control Measures:**

Dust generation shall be minimized by spraying with water, hydromulch or other TVA, SWMP Manager or Construction Manager approved liquid.

**Other State or Local Plans:**

Work on-site shall adhere to all applicable state and local laws.

**Maintenance:**

All silt fences, fiber coils, berms, pipe drains and other sediment control devices shall be inspected as described below. Tears in the fence shall be repaired or portions of the fence replaced within three days of discovery. Rock check dams shall be cleaned of accumulated sediment when sediment depths exceed ½ the height. The CONTRACTOR shall likewise ensure that all roads maintain adequate gravel cover and replace same.

**Inspections:**

Qualified personnel shall inspect storm water control measures, discharge locations, vehicle exits, disturbed areas of the site and material storage areas as noted in the SWMP. Areas that have been temporarily stabilized shall be inspected in accordance with the approved SWMP. Revisions to the BMP Plan based on the results of these inspections shall be implemented within seven days.

A report summarizing the scope of the inspection, names and qualifications of the inspecting personnel, the date of the inspection, observations as they relate to the BMP Plan and corrective actions shall be noted in the report. All reports shall be kept for at least three years after the date of the inspection or for one year after coverage under the site specific SWMP. Each report shall be signed, and shall be available at the site for review.

**Non-Storm Water Discharges:**

All on-site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Preventive maintenance such as changing oil shall be performed off-site. Any spills of hydraulic fluid or oil from machinery shall be immediately cleaned up using rags, mops, kitty litter, sand or sawdust and placed in plastic cans before being disposed of in a legal manner. Containment of any spill using dikes, plastic liners or other methods will be used as necessary. Manufacturer's methods for spill cleanup will be posted on-site and site personnel will be made aware of the location of the procedural information and cleanup supplies. Any spill of toxic or hazardous substances will be immediately reported to the TVA Environmental Compliance Officer who will determine notification procedures. The Construction Manager will be the spill prevention and cleanup coordinator.

Materials expected to be on-site include: petroleum based products, fertilizer, grass seed, mulch, geotextiles, stone, coal combustion products and agricultural lime.

**CONTRACTOR, Subcontractors and Owner:**

The CONTRACTOR and each subcontractor shall implement the appropriate control measures outlined in this BMP plan and the SWMP. The project Owner for the purpose of this work is the Tennessee Valley Authority.

**END OF SECTION 02100**

**TECHNICAL SPECIFICATIONS**  
**DIVISION 2 – SITE WORK**  
**SECTION 02150 – SITE PREPARATION**

**PART 1 - GENERAL**

**1.1. RELATED DOCUMENTS**

The conditions and description of work shown in other sections of these Technical Specifications as well as the Engineering Drawings and Quality Control (QC) Plan apply to this Section.

**1.2. SUMMARY**

**1.2.1.** This Section includes the following:

- Stockpiling and protection of materials to be incorporated in the work.
- Protection and extension of geotechnical instrumentation.
- Temporary ditching, access roads or other items needed to facilitate the work.
- Construction stakeout.
- Placement of road gravel as needed to facilitate the work.
- Site Safety Plan.

**1.2.2.** Related Sections include the following:

- Section 02100 – Erosion Control and Stabilization
- Section 02200 – Excavation
- Section 02300 – Backfill and Embankment
- Section 02400 – Subgrade Improvement
- Section 02410 – Surface Drainage Ditches
- Section 02936 – Revegetation

### **1.3. DEFINITIONS**

#### **1.3.1. Lateral Expansion**

The Lateral Expansion project area as described in these documents was once the northern portion of the Ash Pond and is now designated as Cell 4. This project area is south of Dike C, west of the Divider Dike and east of Dike D. The active Ash Pond is located south of the Lateral Expansion. It is generally east of the Dredge Cells 2 and 3 and west of the Stilling Pond.

#### **1.3.2. Dredge Cell**

The Dredge Cell is the portion of the former ash storage area that is located between Dike D and Swan Pond Road. It includes Cells 2 and 3 or the North and Central Dredge Cells.

#### **1.3.3. Dike C**

Dike C is the existing embankment constructed of earth and ash materials along Swan Pond Embayment extending to the east and south around the Stilling Pond and Ash Pond before tying into Dike D. Portions of Dike C from Dike 2 to the south have been armored with rock buttress.

#### **1.3.4. Divider Dike**

This is an existing dike constructed of ash materials that separate the Lateral Expansion/Ash Pond area from the Stilling Pond.

#### **1.3.4 Dike D**

An existing dike constructed of ash and earth materials located between the Dredge Cell and the Lateral Expansion and Ash Pond.

#### **1.3.5 Ash Pond**

The Ash Pond was until recently, the active area of sluicing for fly ash and bottom ash disposal for the power plant. The Ash Pond project area is located south of the Lateral Expansion, east of Dike D, and west of the Stilling Basin.

#### **1.3.6 Filter**

A layer of geotextile fabric placed on subgrade upon which ditches will be constructed.

#### **1.3.7 Ash**

Ash is a mixture of fly ash, bottom ash, sand, silt and incidental earthen materials recovered during excavation activities within the embayment area that are used in stack construction. For the purposes of this project it shall also include materials excavated from trenches associated with the perimeter stabilization construction, and material from ditch excavation and rock contaminated with ash.

## **PART 2 - EXECUTION**

### **2.1. PRELIMINARY SUBMITTALS**

**2.1.1.** The CONTRACTOR shall prepare and present a Safety Plan that has been approved by a TVA Safety Professional. This requirement is waived if the site specific safety and health plan address construction in or around water and soft ash conditions. No excavation or embankment work is allowed prior to submittal of the plan and the approval document.

**2.1.2.** The CONTRACTOR and Construction Manager shall propose laydown and stockpile areas for discussion with TVA and other entities. The areas and extents of stockpiles are subject to approval by the QC Manager and the TVA. The location of the laydown area is subject to approval by TVA.

**2.1.3** The Construction Manager shall provide a work schedule showing anticipated milestones for completion of the depicted phases.

### **2.2. SITE PREPARATION**

**2.2.1.** The QC Manager shall arrange for the installation of geotechnical instrumentation by a party other than the CONTRACTOR. The CONTRACTOR shall protect and maintain geotechnical instrumentation from disturbance during construction. This shall be accomplished using protective T-posts installed in a closed pattern around the instrument. Orange safety fence shall be installed around the perimeter defined by the T-posts. Other QC Manager approved means and methods for protecting instrumentation may be used. These methods shall define a visible or hard barrier. The extension of instrumentation shall be in accordance with established TVA protocols and the Drawings.

**2.2.2.** Geotextile fabric shall be protected in accordance with the manufacturer's recommendations. Stockpile aggregates in an area away from concentrated flows and establish diversion of run-on away from stockpiles. Stockpile locations shall be proposed by the CONTRACTOR and approved by the QC Manager and the Construction Manager as a concurrence measure prior to any material placement.

**2.2.3.** Construction stakeout and as-built surveys shall be performed by the CONTRACTOR. As a minimum construction staking shall identify locations of drainage facilities, cut/fill, check profiles of installed items and confirm lines and grades. As-built surveys shall be performed of new ditch and flume layout and profiles, top of subgrade improvement, top of ash stacking and at completion of other items as may be deemed necessary. The as-built survey data shall be provided to the QC Manager for review. Staking/survey shots are anticipated at maximum 50 foot horizontal increments and at slope breaks along cross sections taken at the 100 foot stations and provided to the QC Manager for approval and final formatting.

**2.2.4.** The CONTRACTOR shall construct temporary roads as needed to accomplish the work.

**2.2.5.** The CONTRACTOR shall construct temporary diversions or install berms/pipes as needed to divert runoff away from active work areas, stockpiles or temporary roads.

**2.2.6.** Installations and extensions shall be performed by the QC Team in accordance with TVA protocols and manufacturer's recommendations. Drawings of instrumentation extensions shown are for information purposes. Proposed instrumentation is a QC Team function, however the CONTRACTOR shall coordinate activities with the QC Team to allow extension or installation prior to avoid interference with the work and also to protect instrumentation. The CONTRACTOR shall install t-posts and safety fence or remove and re-use t-posts and safety fence or other QC Manager approved instrument protection method.

### **PART 3 - EXECUTION**

#### **3.1. CLEARING AND DISPOSAL**

The CONTRACTOR shall remove vegetation to permit installation of new construction. Removal of grassed areas shall be performed by initial mowing for organic materials six inches or greater in height followed by scraping of the surface to a minimum depth of one-inch. The organic materials shall be temporarily stockpiled in discrete areas following the same procedures as noted for wet ash in Section 02300, Part 2. Organic materials shall be disposed of within the dredge cell in areas approved by the QC Manager. The removal of root hairs and fine grass roots is not required.

#### **3.2. SURFACE PREPARATION**

Areas to receive embankment shall be prepared with harrow, scarifier or other suitable equipment as noted in Section 02300, Paragraph 7.1.1 of these Specifications.

**END OF SECTION 02150**

**TECHNICAL SPECIFICATIONS**  
**DIVISION 2 – SITE WORK**  
**SECTION 02200 – EXCAVATION**

**PART 1 - GENERAL**

**1.1. RELATED DOCUMENTS**

The provisions of the Drawings and Quality Control (QC) Plan Contract apply to the Work specified in this Section. Related Sections of the Technical Specifications include:

- Section 02100 – Erosion Control and Stabilization
- Section 02150 – Site Preparation
- Section 02300 – Backfill and Embankment
- Section 02400 – Subgrade Improvement
- Section 02410 – Surface Drainage Ditches
- Section 02936 – Revegetation

**1.2. DESCRIPTION OF WORK**

This Section covers the required excavation, the removal of all excavated materials, and the shaping and finishing of all excavation Work to the required lines, grades and cross-sections.

**1.3. LINES AND GRADES**

The QC Manager as Engineer of Record reserves the right to increase or decrease the excavation widths and depths or make such other changes in sections as may be deemed necessary based on site conditions encountered. Such changes will be formally documented by the QC Manager and routed through appropriate TVA and regulatory agencies.

**1.4. DUST CONTROL**

The CONTRACTOR shall provide dust control using water for these operations. The CONTRACTOR shall provide a water truck and operator and have them continuously available throughout the course of the Work. The CONTRACTOR shall make every effort to control dust emissions and shall adhere to all applicable rules and regulations of pertinent governmental agencies concerning fugitive dust emissions. The CONTRACTOR shall be able to readily supply water to the water truck and shall perform additional watering for dust control during transportation and placement of materials onto the active area of the work or as directed by the Construction Manager. Water shall be obtained from a source approved by TVA.

## **PART 2 - CLASSIFICATION**

- 2.1.** Without regard to the materials encountered, all excavation shall be unclassified, unless noted otherwise.
- 2.2** Materials expected to be encountered are bottom ash, fly ash, silts and sands. No rock excavation is envisioned.

## **PART 3 - TYPES OF EXCAVATION**

### **3.1. GENERAL**

- 3.1.1.** Excavation shall include grading work necessary to promote positive drainage between sections of the site previously brought to grade. The CONTRACTOR shall utilize excavated material and stockpile the same until ready to use within the appropriate zone of embankment.
- 3.1.2.** Excavation shall include grading of materials in the Ash Pond that were temporarily placed in order to achieve the re-contouring plan geometry (subgrade).
- 3.1.3.** Excavations carried below the indicated depths, except when otherwise directed by the QC Manager, shall be replaced with material satisfactory to the QC Manager.

### **3.2. COMMON EXCAVATION**

Common excavation shall consist of and include the removal of all materials encountered or involved in the construction of ditches or shaping of areas to promote positive drainage at the locations shown on the Drawings or as directed by the QC Manager.

### **3.3. DITCH EXCAVATION**

Ditch excavation includes excavation for the flumes and ditches as shown in the Drawings or as directed by the QC Manager. This Work may also include grading and shaping to promote drainage accomplished by embankment.

## **PART 4 - CONSTRUCTION METHODS**

### **4.1. UTILIZATION OF EXCAVATED MATERIALS**

Excavation shall include excavation to the designated depths, and the shaping and finishing of all excavation to the required lines and grades as shown on the Drawings or as directed by the QC Manager. Classification and utilization of respective materials is defined in Section 02300. Upon excavation, satisfactory materials shall be stockpiled at a location approved by the QC Manager until such time that embankment construction commences. Ash materials excavated from the work area which contain excessive moisture shall be stockpiled, bladed and disked as necessary to permit adequate drying. No temporary wet ash stockpile shall exceed five feet in height without approval of the QC Manager. See Section 02300, Part 2 for stockpiling limitations.

#### **4.2. SHEETING AND BRACING**

Sheeting and bracing or use of trench box as needed to safely support the sides of excavations shall comply with current OSHA and TVA site requirements and the safety precautions as outlined in current and accepted safety manuals, such as "Associated General Contractors Manual of Accident Prevention in Construction." Where sheeting and bracing are necessary to prevent caving of the walls of excavation and to safeguard the workmen, the excavations shall be dug to such widths that proper allowance is made for the space occupied by the sheeting and bracing.

The CONTRACTOR shall perform the additional excavation required, furnish and install the necessary sheeting and bracing and trench box and shall remove the same as the excavation is filled.

#### **4.3. REMOVAL OF WATER**

The CONTRACTOR shall construct and maintain all necessary channels, flumes and/or other temporary diversion and protective works; shall furnish all materials required therefore; and shall furnish, install, maintain, and operate all pumping and other equipment for dewatering and maintaining the Work free from water as required. After having served their purpose, temporary protective works shall be removed, or leveled, to give a slightly appearance and so as not to interfere in any way with the operation, usefulness or stability of the permanent structures.

**END OF SECTION 02200**

**TECHNICAL SPECIFICATIONS**  
**DIVISION 2 – SITE WORK**  
**SECTION 02300 – BACKFILL AND EMBANKMENT**

**PART 1 - GENERAL**

**1.1. RELATED DOCUMENTS**

The provisions of the Drawings and Quality Control (QC) Plan apply to the Work specified in this Section. Related Sections of the Technical Specifications include:

- Section 02100 – Erosion Control and Stabilization
- Section 02150 – Site Preparation
- Section 02200 – Excavation
- Section 02400 – Subgrade Improvements
- Section 02410 – Surface Drainage Ditches
- Section 02936 – Revegetation

**1.2. DESCRIPTION OF WORK**

The Work shall consist of performing all operations in connection with construction of ash stacking including embankment construction associated with subgrade improvements. The Work also includes the transportation and placement of all materials in embankment areas to include spreading, moisture control, compaction and preparation of bonding surfaces, to the lines and grades shown on the Drawings.

**1.3. LINES AND GRADES**

Embankments and subgrade shall be constructed to the lines, grades and cross sections indicated on the Drawings, unless otherwise directed by the QC Manager. The QC Manager reserves the right to increase or decrease embankment slopes or make such other changes in embankment sections as may be deemed necessary based on site conditions encountered.

**1.4. CONDUCT OF THE WORK**

The CONTRACTOR shall maintain and protect the embankment in a satisfactory condition at all times until final acceptance of the Work. If, in the opinion of the QC Manager, equipment causes horizontal shears or slickensides, rutting, quaking, heaving, cracking or excessive deformation of the embankment, the CONTRACTOR shall limit the type, load or travel speed of the equipment on the subgrade or embankment. Any approved embankment material which is lost in transit or rendered unsuitable after being placed in the embankment and before final acceptance of the Work, shall be replaced by the CONTRACTOR in a satisfactory manner. The CONTRACTOR shall excavate and remove from the embankment any material which the QC Manager considers objectionable and shall

dispose of such material in accordance with these Technical Specifications and refill the excavated areas as directed. Objectionable materials are defined as rock larger than six inches in its greatest dimension, tree limbs or branches greater than one inch in diameter, frozen materials, and man-made or manufactured materials that are not designed specifically for incorporation into the work. Objectionable materials shall be segregated from general embankment and processed and placed per established protocols in designated zones established by the QC Manager.

All such work shall be performed in accordance with the approved safety plan.

## **PART 2 - STOCKPILING**

If wet ash is excavated within the project limits, it shall be dried prior to incorporation into the Work. Such material shall be dewatered and stockpiled at approved locations adjacent to the Work until its use is authorized by the QC Manager. Stockpiled ash materials shall be placed in maximum 24-inch lifts with slopes not exceeding 6 horizontal to 1 vertical. The minimum slope for the stockpile shall not be less than two percent. Such stockpiles shall be in proximity to installed instrumentation in order to monitor pore pressures. The stockpile limits shall be approved by the QC Manager and rate of placement for wet ash shall not exceed two feet in elevation per day. This rule is subject to threshold limits noted in the QC Plan. The CONTRACTOR shall make every effort to construct stockpiles over the maximum stockpile footprints before the next lift is placed. Wet stockpiles shall not exceed five feet in height without approval by the QC Manager.

## **PART 3 - MATERIAL CLASSIFICATION AND DESCRIPTION**

### **3.1. ASH MATERIAL**

Ash material shall consist of bottom ash, fly ash as well as earthen materials recovered from embayment ash removal operations. These materials shall be free of objectionable materials as defined in Paragraphs 1.4 above. Ash materials will be commingled during construction operations and placed in accordance with these specifications.

### **3.2. WATER**

Water used in controlling moisture shall consist of water obtained from the Stilling Basin, Ash Pond remnants, sediment basin or other sources approved by the TVA.

## **PART 4 - EXECUTION**

### **4.1. GENERAL**

**4.1.1.** No fill work shall be performed in any section of the proposed stack footprint until it has been approved as safe by the TVA Safety Professional.

4.1.2. No embankment shall be placed until the foundation for that section has been approved by the QC Manager. The surface shall be firm subgrade. Soft areas shall be bridged with dry ash or by use of geogrid and stone or other materials until the performance standards outlined in Section 02400 of these Technical Specifications are met.

#### 4.2. ASH MATERIAL

All ash embankment material shall be placed within the designated limits as shown on the Drawings. Ash material shall not be placed or used outside of the designated work area without TVA approval.

### PART 5 - SPREADING

#### 5.1. GENERAL

No fill shall be placed upon a frozen surface, nor shall snow, ice or frozen materials be incorporated in the fill.

#### 5.2. ASH MATERIAL

5.2.1 Ash material for stack construction shall be placed in relatively horizontal lifts with approximate 12-inch maximum (loose) thickness and graded to a 1% minimum slope. Ash placement shall not exceed two feet per day in a discrete area unless authorized by the QC Manager based on the response of instrumentation.

5.2.2. No material placed by dumping in piles or windrows shall be incorporated in a layer in that position, but shall be moved and spread by blading or similar approved methods.

5.2.3. Material in the form of large lumps or masses shall be pulverized by disking, harrowing or by the use of mechanical pulverizers prior to compacting. All lumps or masses, whose largest dimension exceeds four (4) inches, shall be broken down prior to compacting.

### PART 6 - MOISTURE CONTROL

#### 6.1. MOISTURE ADJUSTMENT

Moisture content shall be adjusted as necessary to facilitate compaction and minimize dusting. Moisture control shall be achieved by either windrowing or other approved methods; or adding water to achieve a workable moisture content. Sprayers located at the working face shall be used as necessary to control dusting depending primarily on local weather conditions.

#### 6.2. ASH STACKING

During the compaction operations the materials being placed shall be maintained within four percent below optimum and six percent above optimum moisture content as determined by ASTM D-698 or as established by the QC Manager based on field observations and testing. Testing responsibility is as defined in the QC Plan. The moisture content shall be controlled in the following manner:

1. Water may be added to the fill materials at the source or after the material has been brought onto the embankment, whichever is the most practical. When material deposited on the embankment is too dry, the CONTRACTOR shall be required to water each layer and obtain uniform moisture distribution in the layer by disking, blading or other approved methods. The amount of water applied shall be accurately controlled so that free water will not appear on the surface during or subsequent to compaction operations.
2. Material deposited on the fill that is too wet shall be removed or spread and permitted to dry, assisted by disking or blading, if necessary, until the moisture content is reduced to the specified limits.
3. When the top surface of a layer becomes too dry or too smooth to permit suitable bonding with the subsequent layer, the CONTRACTOR shall loosen the material by scarifying or disking. Traversing the fill surface with tamping foot compactor or track equipment may not achieve adequate scarification. The CONTRACTOR shall then moisten the loosened material to an acceptable moisture content and re-compact the material to the specified density.
4. Adjustments of moisture content shall be made on the basis of determination of moisture by field tests as construction progresses.

## **PART 7 - PREPARATION OF SURFACES**

### **7.1. GENERAL**

**7.1.1.** If, in the opinion of the QC Manager, the surface of the prepared foundation is too dry or smooth to bond properly with the layer of material to be placed thereon, it shall be moistened and/or worked with harrow, scarifier, or other suitable equipment, in an approved (by QC Manager) manner to a sufficient depth to provide a satisfactory bonding surface before the next succeeding layer of material is placed. If, in the opinion of the QC Manager, the surface of the fill in place is too wet for proper compaction of the layer of material to be placed thereon, it shall be allowed to dry; or be worked with a harrow, scarifier or other suitable equipment to reduce the water content to an acceptable amount; and then it shall be recompacted before the next succeeding layer of material is placed.

**7.1.2.** During placement operations, the top surface of the fill layer will be crowned with grades of not less than one percent to maintain positive drainage.

### **7.2. ASH MATERIAL**

At the CONTRACTOR's discretion, the surface may be sealed. Prior to placement of subsequent lifts the sealed surface shall be lightly scarified to promote lift bonding.

## **PART 8 - COMPACTION**

### **8.1. COMPACTION REQUIREMENTS**

**8.1.1. Ash Material.** Ash material shall be placed and spread in accordance with Sections 5.2 and 6.2. After each layer of the ash stack has been placed, spread, and contains the required moisture, it shall be compacted by passing an appropriate compaction roller or rubber tired construction equipment over the entire surface of the layer a sufficient number of times to obtain the specified density to full depth of the lift. Adjustments in the compactive effort shall be made on the basis of field density determinations made as the construction progresses.

Ash fill shall be compacted to 90 percent of its maximum dry density as determined by ASTM D-698. In-place moisture shall be -4% to +6% of optimum moisture as determined by ASTM D-698 or as established by the QC Manager based on field observations and testing.

**END OF SECTION 02300**

**TECHNICAL SPECIFICATIONS**  
**DIVISION 2 – SITE WORK**  
**SECTION 02400 – SUBGRADE IMPROVEMENTS**

**PART 1 - GENERAL**

**1.1. DESCRIPTION OF WORK**

This Section covers the grading and structural improvements to the subgrade of the Ash Pond area prior to ash stacking. This Work is performance based and the effort required or materials needed are not specified herein. The performance goal is to achieve a stable subgrade capable of supporting construction equipment, construction traffic and the ash stacking described in Section 02300 of the Technical Specifications. This Work may include excavation of saturated materials in addition to subgrade improvements.

**1.2. SUBMITTALS**

The CONTRACTOR shall provide source and material Certification statements for materials planned to be incorporated into the work. These statements shall be provided by each supplier that the product conforms to these Specifications. In addition all materials shall meet the testing schedules noted in the Quality Control (QC) Plan. Materials shown below are not mandated for incorporation into the Work, only that material quality standards be met to protect the TVA from adverse effects.

**1.3. RELATED DOCUMENTS**

The conditions and description of work shown in other sections of these Technical Specifications as well as the Drawings and QC Plan apply to this Section. Related Sections include the following:

- Section 02100 – Erosion Control and Stabilization
- Section 02150 – Site Preparation
- Section 02200 – Excavation
- Section 02300 – Backfill and Embankment
- Section 02410 – Surface Drainage Ditches
- Section 02936 – Revegetation

**PART 2 - MATERIALS**

**2.1. AGGREGATE**

Aggregate imported to the site shall consist of quarried stone meeting the chemical and physical quality requirements of Section 903 of the Tennessee Department of Transportation (TDOT) “Standard

Specifications for Road and Bridge Construction” (Standard Specifications) latest edition. The gradation provided shall be noted in the submittals. Aggregate that is already on site that will be utilized for subgrade improvements is not subject to this requirement.

## **2.2. TDOT MACHINED RIPRAP OR SHOT ROCK**

Riprap or shot rock imported to the site for use in the subgrade improvements shall consist of quarry stone meeting the physical and chemical requirements of Section 709 of the Tennessee Department of Transportation “Standard Specifications for Road and Bridge Construction” latest edition. The gradation provided shall be noted in the submittals. Riprap or shot rock that is already on site that will be utilized for subgrade improvements is not subject to this requirement.

## **2.3. GEOTEXTILE**

Geotextile proposed for use for subgrade improvement shall be subject to large scale direct shear testing prior to placement. The CONTRACTOR shall provide samples of the proposed geotextile, ash and stone for shipment to a qualified laboratory approved by the QC Manager. Testing shall occur under loadings determined by the QC Manager. Note that stability issues may preclude the uses of some geotextiles. Once the geotextile has been tested and approved for use, substitution of alternate fabric shall not occur without testing of the alternate fabric.

## **2.4. GEOGRID**

A sample of the proposed geogrid and product specifications shall be submitted to the TVA for information purposes as part of project documentation. The use of products that exhibit shear at junctions when subjected to typical construction conditions shall be discontinued and another product utilized.

## **2.5. BOTTOM ASH**

Bottom Ash if utilized for subgrade improvements shall meet site and EPA/TDEC requirements for sourcing. Bottom Ash shall not be imported to the site.

# **PART 3 - EXECUTION**

## **3.1. SUBGRADE IMPROVEMENT METHODOLOGIES**

Means and methods to stiffen the subgrade and provide a suitable surface for construction activities and stacking shall be the responsibility of the CONTRACTOR. Such methods shall be presented by the CONTRACTOR in a means and methods plan and submitted to the TVA and the QC Manager for review and discussion prior to commencement of subgrade improvements. Note that the existing materials are saturated in some areas and may require the use of low ground pressure equipment to bring to grade by excavation or filling.

The subgrade means and methods plan shall include a list of materials proposed for use, placement methodologies, layout plan for deployment of materials and schedule. Materials shown in Part 2 above are not an all-inclusive list nor is it intended to mandate methods utilized.

Subgrade shall be subjected to proofrolling as a method of demonstrating the subgrade performance. Proofrolls shall be conducted by passes of loaded rubber-tired hauling equipment with a minimum gross weight of 100,000 pounds and minimum tire contact pressure of 35 psi.

### **3.2. PERFORMANCE CRITERIA**

If in the opinion of the QC Manager, the subgrade exhibits excessive deformation and movement in response to passes of equipment or proofrolling then additional preparation shall be required. Excessive deformation is defined as:

- Lateral displacement of subgrade caused by passes of heavy equipment or observed during the proof roll.
- Vertical deformation or pumping of subgrade greater than three inches.
- Rutting in excess of three inches.

**END OF SECTION 02400**

**TECHNICAL SPECIFICATIONS**  
**DIVISION 2 – SITE WORK**  
**SECTION 02410 – SURFACE DRAINAGE DITCHES**

**PART 1 - GENERAL**

**1.1. DESCRIPTION OF WORK**

This Specification covers constructing temporary surface drainage ditches and flumes as well as placing riprap armor where needed. Ditches may be formed by excavation or by embankment placement. All ditches shall conform to the lines and grades shown on the Drawings. Note that the Ash Pond pool elevation is about 756.3 feet but may vary based on precipitation. Water may be ponded within ditches cut into existing ground (Ditch 10 and approximately 250 feet upslope into Ditches 8 and 9) before draining to the existing outlet structure.

**1.2. SUBMITTALS**

Certification statements shall be provided by each supplier that the product conforms to these specifications. Prior to installation, the geotextile manufacturer shall provide TVA and the Quality Control (QC) Manager with certification signed by an authorized employee of the manufacturer. The certification shall indicate that the geotextile material meets or exceeds the specified minimum average roll values provided in Table 1. A sample of the erosion control blanket shall also be provided to the QC Manager.

In addition all materials shall meet the testing schedules noted in the QC Plan.

**1.3. RELATED DOCUMENTS**

The conditions and description of work shown in other sections of these Technical Specifications as well as the Drawings and QC Plan apply to this Section. Related Sections include the following:

- Section 02100 – Erosion Control and Stabilization
- Section 02150 – Site Preparation
- Section 02200 – Excavation
- Section 02300 – Backfill and Embankment
- Section 02400 – Subgrade Improvements
- Section 02936 – Revegetation

## **PART 2 - MATERIALS**

### **2.1. TDOT CLASS A-3 MACHINED RIPRAP**

Riprap used in flumes and in rock check dams shall consist of quarry stone meeting the requirements of Section 709 of the Tennessee Department of Transportation "Standard Specifications for Road and

Bridge Construction” latest edition. Machined Riprap (Class A-3) shall vary in size from 2 inches to 6 inches (from 50 to 150 mm) with no more than 20% by weight being less than 4 inches in size (150 mm).

## 2.2. EROSION CONTROL BLANKET

Erosion control blanket shall be a manufactured product consisting of plastic netting on both sides with excelsior or coconut fiber in between. The blanket shall withstand shear stress in excess of 2 pounds per square foot. Erosion control blanket shall conform to North American Green SC150 or American Excelsior Curlex II products or QC Manager approved equal.

## 2.3. TEMPORARY DITCH GEOTEXTILE

The ditch geotextile shall conform to GSE, NW-16 non-woven geotextile or SKAPS Industries GE 116 non woven geotextile, or QC Manager approved equivalent. Other equivalent products are noted in the QC Plan. Properties of equivalent materials shall conform to Table 1.

**Table 1. Geotextile Filter Properties**

Property	Test Method	English	Metric
Unit Weight	ASTM D 3776	16 oz/yd <sup>2</sup>	542 g/m <sup>2</sup>
Tensile Strength	ASTM D 4632	380 lbs	1.69 kN
Puncture Strength	ASTM D 4833	235 lbs	1.04 kN
Trapezoidal Tear Strength	ASTM D 4533	140 lbs	0.623 kN
Grab Tensile Elongation	ASTM D 4632	50%	50%
AOS	ASTM D 4751	100 sieve	0.15 mm
Permittivity	ASTM D 4491	0.5 sec <sup>-1</sup>	-
U.V. Resistance	ASTM D 4355	70%	70%

**Note:** All numerical values represent minimum average roll values (i.e., average of test results from any sampled roll in a lot shall meet or exceed the minimum average roll values in the table) in weaker principle direction. Lot sampled according to ASTM D 4354, “Practice for Sampling Geosynthetics for Testing.”

## **PART 3 - EXECUTION**

### **3.1. SHIPMENT AND STORAGE**

The geotextile shall be labeled, stored, and handled in accordance with ASTM D-4873, "Guide for Identification, Storage, and Handling of Geosynthetics." The geotextile shall be kept dry and wrapped in a waterproof wrapping such that it is protected from UV light and the elements during shipping and storage. Geotextile rolls shall be stored in a manner which protects them from the elements. If stored outdoors, they shall be elevated and protected with a waterproof, opaque cover.

### **3.2. INSTALLATION**

#### **3.2.1. General**

The geotextile shall not be installed until submittals are reviewed and the geotextile is accepted by the QC Manager. The CONTRACTOR shall handle all geotextiles in such a manner as to ensure the geotextile is not damaged. The surface on which the geotextile is to be placed shall be prepared to a smooth condition free of debris or obstructions which may damage the geotextile. The ditch subgrade shall be approved by the QC Manager prior to geotextile placement. Care shall be taken not to entrap stone, excessive dust, or moisture in the geotextile. The CONTRACTOR shall not operate equipment over the geotextile.

#### **3.2.2. Deployment**

- Geotextiles shall be deployed free of wrinkles and folds. On slopes, the geotextiles shall be anchored at the top and unrolled down the slope. In the presence of wind, all geotextiles shall be weighted with sandbags or other material which will not damage the geotextile. Geotextile uplifted by wind may be reused upon approval by the QC Manager.
- Geotextile shall be covered within 15 days of deployment to provide protection from ultraviolet degradation.

#### **3.2.3. Geotextile Placement**

Adjacent geotextile panels shall be overlapped. Minimum one foot overlaps are required. Seams shall be oriented parallel to (in the direction of) the slope as practicable. The geotextile shall be examined over the entire surface after installation to ensure that no potentially harmful objects are present.

### **3.3. RIPRAP**

#### **3.3.1. Installation**

Riprap may be placed by mechanical means using a backhoe or loader. The rock shall be placed to the depths and template shown in the drawings. The surface of the riprap, upon completion, shall be graded into final position to ensure proper thickness and a uniform surface. Larger rocks shall be uniformly distributed with the small rocks and spalls filling the voids between the larger rocks.

#### **3.3.2. Application**

Riprap lining shall be used in Temporary Flumes and for armoring areas subject to scour and as indicated on the Drawings and Details.

### **3.4. EROSION CONTROL BLANKET**

#### **3.4.1. Installation**

Before placing erosion control blanket, the subgrade or subsequent lift of fill shall be compacted and uniformly graded. Erosion control blanket shall be placed and installed in accordance with the Drawings and Details and the Manufacturer's recommendations.

#### **3.4.2. Application**

Erosion control blanket shall be used on the Perimeter and Temporary Ditches (ditches 8, 9, 10, 11 and 12) as indicated on the Drawings and in other locations as determined by the Construction Manager.

### **3.5. REPAIRS**

Damaged geotextiles and geotextiles contaminated with dirt shall be repaired immediately. Repairs shall be made with the same geotextile product style as the original material. All repairs shall meet the approval of the QC Manager, prior to cover placement.

Geotextile panels which require repair shall be removed and replaced with new material. Replacement material shall be overlapped as previously described in this specification. All seams shall be oriented parallel to (in the direction of) the slope. Seams constructed perpendicular or transverse to the slope will not be accepted.

**END OF SECTION 02410**

**TECHNICAL SPECIFICATIONS**  
**SECTION 02936 – REVEGETATION**

**PART 1 - GENERAL**

**1.1. DESCRIPTION**

This Work consists of furnishing all labor, equipment and materials for long term, medium term and short term stabilization of the Ash Pond Stacking area during construction. The work includes methods for preparing the seedbed, adding soil amendments, and seeding disturbed areas until final cover is applied in a later project.

**1.2. RELATED WORK**

- A. Quality Control (QC) Plan
- B. Section 02100 – Erosion Control and Stabilization
- C. Section 02150 – Site Preparation
- D. Section 02200 – Excavation
- E. Section 02300 – Backfill and Embankment
- F. Section 02400 – Subgrade Improvements
- G. Section 02410 – Surface Drainage Ditches

**1.3. SUBMITTALS**

- A. Agronomic soil test results shall be submitted to the TVA and QC Manager.
- B. Seed tickets, fertilizer certification, and CaCO<sub>3</sub> equivalency certification shall be submitted to the TVA and QC Manager.
- C. A specification sheet on the proposed hydromulch shall be submitted to the QC Manager.
- D. The proposed compost shall be submitted to the TVA for approval by the QC Manager
- E. A sample of the Erosion Control Blanket shall be submitted to the TVA and the QC Manager.

## **1.4. QUALITY CONTROL**

**1.4.1.** Agricultural limestone shall be purchased from quarries approved by the Tennessee Department of Agriculture.

**1.4.2.** Fertilizer (bagged or bulk) either dry or liquid, must be manufactured and sold under the jurisdiction of the Tennessee Department of Agriculture, Ag Inputs Section.

**1.4.3.** All seed shall be certified by an Official Seed Certifying Agency. Seeds shall have been tested within nine months prior to use. Each kind of seed shall be separately packed and delivered to the project in a seed-tight bag. Each bag shall bear a tag or label bearing the seal of the Official Seed Certifying Agency. The analysis of the seed (% pure seed, % germination, date tested, etc.) shall be attached to the bag.

## **PART 2 - PRODUCTS**

### **2.1. LIME**

Agricultural ground limestone or its equivalent shall be used. The ground limestone must meet the following requirements: contain sufficient calcium and magnesium carbonate and be equivalent to not less than 80 percent calcium carbonate and must be fine enough so that not less than 90 percent shall pass through a US Standard No. 10 sieve and not less than 35 percent shall pass through a US Standard No. 50 sieve. Lime shall be applied at the rate specified in Paragraph 3.1. Agricultural ground limestone shall be purchased from quarries approved by the Tennessee Department of Agriculture.

### **2.2. FERTILIZER**

The fertilizer shall be a commercial fertilizer containing the plant nutrients of nitrogen (N), available phosphoric acid ( $P_2O_5$ ) and soluble potash ( $K_2O$ ) and shall be applied at the rate specified in Section 3.1.1 and 3.2.1. The fertilizer utilized shall be 19-19-19 or equivalent. Bagged fertilizer shall display the following information on the bag or on a sticker or tag attached to the bag: net weight, brand and grade, guaranteed analysis, and name and address of manufacturer. Bulk fertilizer (dry or liquid) shall be accompanied by a statement from the manufacturer which contains the same information required for the bagged fertilizer.

### **2.3. SEED**

**2.3.1.** Seed shall be applied to all disturbed areas, in accordance with Table 1 with no alterations except with the written consent of the QC Manager. The seed mixture shall be totally free of any wild onion, giant foxtail, nodding thistle, Johnsongrass, and Canada thistle seed and contain less than two percent other crop seed. The seed shall also comply with all Tennessee seed laws and regulations.

**2.3.2.** Seed shall be furnished fully tagged and labeled in accordance with the state laws and the US Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of invitations for bid. All seed must be from the latest crop available. No seed will be accepted with a

date of test of more than nine (9) months prior to the date of delivery to the site. Any seed which has become wet, moldy or otherwise damaged in transit or storage will not be accepted.

**2.3.3.** All seed shall be delivered in separate bags or packages according to species or be a certified seed mixture. The tags from each seed bag shall be given to the QC Manager at the site. These tags will be required for final payment.

**2.3.4.** All legume seed shall be treated with inoculant prior to seeding in accordance with Paragraph 2.7 (Inoculants).

**Table 1**

Seed Mixtures	Hydroseed Rate (pounds/acre PLS*)
Application Period: February 1 to November 15)	
German Millet (Annual)	15
Bermuda Grass	15
Alfalfa	20
White Sweet Clover	5
Red Clover	5
Perennial Rye	30
Fescue (Endophyte free)	25
Weeping Lovegrass	3
Seed Mixes: November 15 to February 1	
Winter Wheat	60
Temporary Seed Mix:	
Annual Rye	60

\*PLS Pure Live Seed is determined by multiplying the percent germination of the seed times the percent purity

**2.4. SHORT TO MID-TERM DURATION HYDROMULCH**

The hydromulch utilized for short to medium term applications (less than two months) shall consist of a matrix of wood fibers, and crimped man-made fibers and performance-enhancing additives. Hydromulch shall conform to Flexterra FGM for short to moderate term applications. Mulch shall be applied at the rate specified in Paragraph 3.2.6 and 3.3.2.

## **2.5. LONG-TERM DURATION HYDROMULCH**

The hydromulch utilized for long term applications (greater than two months) shall consist of a matrix of blended coconut and wood fibers, with crimped interlocking man-made fibers and additives. Hydromulch shall conform to Cocoflex ET-FGM or equivalent for long term applications. Mulch shall be applied at the rate specified in Paragraph 3.1.6.

## **2.6. COMPOST**

Compost shall consist of organic matter such as Buffalo Compost or equivalent. The compost shall be free of deleterious amounts of metals, pesticides, or other environmental hazards. The compost shall be capable of being spread and incorporated into the ash or mixed with hydraulic mulch. Alternate composts that introduce organic matter will be considered.

## **2.7. INOCULANTS**

The inoculant for treating legume seeds shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species and shall not be used later than the date indicated on the container or otherwise specified. A mixing medium, as recommended by the manufacturer, shall be used to bond the inoculant to the seed. Four times the amount of the inoculant recommended by the manufacturer shall be used. Seed shall be sown within 24 hours of treatment and shall not remain in a hydroseeder longer than four (4) hours.

## **2.8. EROSION CONTROL BLANKET**

Erosion control blanket shall be a manufactured product consisting of plastic netting on both sides with excelsior or coconut in between. Erosion Control Blanket shall be utilized in areas where hydromulch is not providing acceptable erosion protection.

## **PART 3 - EXECUTION**

### **3.1. LONG TERM COVER (GREATER THAN 60 DAYS)**

**3.1.1.** For areas that have been disturbed by grading activities but will lay idle for more than 60 days the following work shall be performed. The areas to be seeded shall be dressed to a reasonably smooth, firm surface, as determined by the QC Manager. Compost shall be placed to a depth of two inches and incorporated into the top six inches of soil by disking or tilling or shall be incorporated with the hydromulch. Lime (if needed) shall be applied at the rate determined by testing. Fertilizer shall be applied at a rate sufficient to meet the requirements of nitrogen (N), phosphorus (P<sub>2</sub>O<sub>5</sub>) and potash (K<sub>2</sub>O) indicated by soil testing performed immediately prior to seeding. These soil tests shall be the responsibility of the Construction Manager.

**3.1.2.** The surface shall be tilled to a minimum depth of six (6) inches with either a tandem or offset disk meeting the following specifications:

- A. Disk Size: 22 inches minimum

- B. Disk Spacing: 13 inches maximum
- C. Weight: 400 pounds per foot of cut minimum
- D. Equipped with a drag of sufficient weight to remove any furrows left by the disk.

**3.1.2.1.** Preparation shall be suspended when soil conditions are not suitable for the preparation of a satisfactory seedbed. The QC Manager shall make this determination.

**3.1.3.** The specified mixtures of pure live seed (PLS) will be used on all disturbed areas using the seasonal variations shown.

**3.1.4.** All areas shall be seeded immediately following seedbed preparation. In the event the date does not concur with the seeding schedules specified, seeding shall be accomplished using any one of the specified rates or an equivalent rate designed to fit the site and weather conditions, as directed by the QC Manager.

**3.1.5.** All seed shall be broadcast evenly over the area immediately following tilling using a hydroseeder. The slurry PH shall not be allowed to drop below a pH of 5.0. In addition, the CONTRACTOR shall provide an accurate pH meter to monitor the slurry at all times.

**3.1.6.** Hydromulch materials shall be spread uniformly over all seeded areas. The mulch shall be applied uniformly over all seeded areas at the rate of one and a half (1.5) tons per acre immediately following seeding. Hydromulch may be mixed with seed and fertilizer for application.

**3.1.7.** Erosion control blankets shall be employed to repair areas where erosion features have formed in previously hydromulched areas and in the Perimeter and Temporary Ditches (ditches 8, 9, 10, 11 and 12). Install up and down the hill (vertical) for long slopes. Walk blankets down to ensure good contact with the soil. Use plenty of staples to keep blankets flat. Overlap blankets at 6 to 8 inches on sides, tops and bottoms. Do not stretch blankets, and do not exceed manufacturer's directions on maximum slope angle for the product. Refer to the Manufacturer's recommendations for installation patterns and stapling.

**3.1.8.** The CONTRACTOR shall achieve 80 percent vegetative cover at the end of the second growing season. Such vegetative cover shall be measured using a transect method along the project baseline or other convenient baseline. This method shall involve taping along chosen transects and observing vegetation at each one-foot interval. At each observation point it will be noted whether vegetation is in contact with the transect. The sum of positive observations divided by total observations will determine compliance. Noticeably bare or eroded areas along or between transects shall be repaired even if the overall vegetative cover exceeds 80 percent.

**3.1.9.** These seeding specifications are intended to stabilize the project area through establishment of an adequate vegetative cover to provide protection until the Ash Pond Stacking area is capped. The CONTRACTOR may be permitted to incorporate alternate seeding, fertilization and/or protection techniques which produce the intended results. The CONTRACTOR is encouraged to consider such applications. However, the CONTRACTOR is cautioned that if an alternate technique is utilized, the CONTRACTOR shall still meet the requirements of Paragraph 3.1.9.

**3.1.10.** Use of alternative techniques or other deviations from the standards and instructions provided herein must be approved by the QC Manager prior to implementation. The QC Manager will partially base his assessment on the purity of the constituents proposed, as well as the potential for interference of the proposed alternate techniques with other elements of the project and the overall design intent.

**3.2. MID TERM COVER (GREATER THAN 21 DAYS, LESS THAN 60 DAYS)**

**3.2.1.** For areas that have been disturbed by grading activities but will lay idle for more than 21 days but less than 60 days, the following work shall be performed. The areas to be seeded shall be dressed to a reasonably smooth, firm surface, as determined by the QC Manager. Hydromulch shall be placed as discussed below. Fertilizer shall be applied at a rate sufficient to meet the requirements of nitrogen (N), phosphorus ( $P_2O_5$ ) and potash ( $K_2O$ ) indicated by soil testing performed immediately prior to seeding. These soil tests shall be the responsibility of the Construction Manager.

**3.2.2.** The surface shall be tilled to a minimum depth of six (6) inches with either a tandem or offset disk meeting the following specifications:

- A. Disk Size: 22 inches minimum
- B. Disk Spacing: 13 inches maximum
- C. Weight: 400 pounds per foot of cut minimum
- D. Equipped with a drag of sufficient weight to remove any furrows left by the disk.

**3.2.2.1.** Seedbed preparation shall be suspended when soil conditions are not suitable for the preparation of a satisfactory seedbed. The QC Manager shall make this determination.

**3.2.3.** The specified mixtures of pure live seed (PLS) will be used on all disturbed areas using the temporary seed mixture shown.

**3.2.4.** All areas shall be seeded immediately following seedbed preparation. In the event the date does not concur with the seeding schedules specified, seeding shall be accomplished using any one of the specified rates or an equivalent rate designed to fit the site and weather conditions, as directed by the QC Manager.

**3.2.5.** All seed shall be broadcast evenly over the area immediately following tilling using a hydroseeder. The slurry PH shall not be allowed to drop below a pH of 5.0. In addition, the CONTRACTOR shall provide an accurate pH meter to monitor the slurry at all times.

**3.2.6.** Hydromulch materials shall be spread uniformly over all seeded areas. The mulch shall be applied uniformly over all seeded areas at the rate of one (1.0) ton per acre immediately following seeding. Hydromulch may be mixed with seed and fertilizer for application

**3.2.7.** Erosion control blankets shall be employed to repair areas where erosion features have formed in previously hydromulched areas. Install up and down the hill (vertical) for long slopes. Walk

blankets down to ensure good contact with the soil. Use plenty of staples to keep blankets flat. Overlap blankets at 6 to 8 inches on sides, tops and bottoms. Do not stretch blankets, and do not exceed manufacturer's directions on maximum slope angle for the product. Refer to the Manufacturer's recommendations for installation patterns and stapling.

**3.2.8.** These seeding specifications are intended to stabilize the project area through establishment of an adequate vegetative cover to provide protection until additional grading work is performed or the Ash Pond Stacking area is capped. The CONTRACTOR may be permitted to incorporate alternate seeding, fertilization and/or protection techniques which produce the intended results. The CONTRACTOR is encouraged to consider such applications.

**3.2.9.** Use of alternative techniques or other deviations from the standards and instructions provided herein must be approved by the QC Manager prior to implementation. The QC Manager will partially base his assessment on the purity of the constituents proposed, as well as the potential for interference of the proposed alternate techniques with other elements of the project and the overall design intent.

### **3.3. SHORT TERM COVER (LESS THAN 21 DAYS)**

**3.3.1.1.** Areas that have been disturbed by grading activities but will lay idle for more than 14 days and less than 21 days or are generating dust or pose an erosion hazard as determined by the Construction Manager or QC Manager, shall have the following work performed.

- I. The surface shall be tracked using a dozer with cleat marks parallel to the contour.
- II. Temporary surface water diversions as needed in place prior to mulching.

**3.3.2.** Hydromulch materials shall be spread uniformly over all areas. The mulch shall be applied uniformly over all seeded areas at the rate of one (1.0) ton per acre.

**3.3.3.** Use of alternative techniques or other deviations from the standards and instructions provided herein must be approved by the QC Manager prior to implementation. The QC Manager will partially base his assessment on the purity of the constituents proposed, as well as the potential for interference of the proposed alternate techniques with other elements of the project and the overall design intent.

**END OF SECTION 02936**