Tennessee Valley Authority
Regulatory Submittal for Kingston Fossil Plant

Documents submitted:
Deep Soil Mixing Field Demonstration Work Plan, Revision 4

Date Submitted:
05/20/2010

Submitted to whom
Craig Zeller

Concurrence

Received	Not Applicable	TVA
☐	☒	Steve McCracken
☒	☐	Kathryn Nash
☒	☐	Dennis Yankee DHY
☒	☐	Michelle Cagley MC
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☐	☐	_____

Received	Not Applicable	Jacobs
☒	☐	Steve Richardson
☒	☐	Jack Howard
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☐	☐	_____
☐	☐	_____

Approvals

TVA Kathryn Nash Date 5/20/10

EPA [illegible] Date 5/20/10

cc:

- ☒ Anda Ray, TVA
- ☒ Barbara Scott, TDEC
- ☒ Leo Francendese, EPA
- ☒ Dennis Yankee, TVA
- ☒ Kathryn Nash, TVA
- ☒ Cynthia Anderson, TVA
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- ☒ Steve Richardson, Jacobs
- ☒ Michelle Cagley, TVA
- ☒ Greg Signer, TVA
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- ☒ Katie Kline, TVA
- ☒ Gretchen Wahl, Jacobs
- ☒ Dannena Bowman, EPA
- ☒ Jeff Gary, Jacobs
- ☒ Robert Pullen, Jacobs
- ☒ Craig Zeller, EPA

WORK PLAN
For

DEEP SOIL MIXING FIELD DEMONSTRATION, REVISION 4

in support of
DREDGE CELL CLOSURE

Prepared for

TVA

by
JACOBS ENGINEERING
05/19/10

RLD

INTRODUCTION AND PURPOSE

Deep soil mixing is to be utilized in the construction of the containment structure for the dredge cell at the Kingston Fossil Plant. This process involves the insitu mixing of cement or other material with the soil at depths up to approximately 70 feet to form “soilcrete” panels or columns. The demonstration project is to provide information necessary to refine the design and constructability parameters. The construction or formation of structural columns about eight feet in diameter, to a depth of seventy feet below the surface for a linear distance of twenty feet, with a compressive strength of one hundred fifty (150) pounds per square inch is planned. Additional columns or panels could be constructed if required to accomplish the objectives.

DESIGN AND CONSTRUCTION COMPONENTS

The soilcrete panels are to be constructed in the dredge cell on the north side of the east-west haul road about 700 feet east of Swan Pond Road and south of the proposed location of the containment structure. The system to mix cement with soil at various depths comprises a batch plant to mix the cement and water, pumps to convey the cement slurry, and crane mounted augers to mix the cement slurry with the soil. Note the attached reference document DSMDP-A for additional information. TVA Civil projects will prepare the area for the test program. The site will require grading and selective stabilization to support the equipment. Note the attached site location plan.

CONSTRUCTION AND QUALITY CONTROL

Prior to construction of the columns on site, laboratory tests using “typical ash” are conducted to determine a mix design to be used in the field demonstration program. The laboratory columns and the columns constructed in the field are to be tested for unconfined compressive strength, triaxial compressive strength, tensile strength, hydraulic permeability, and leaching. The field samples will be obtained by drilling down thru the column until bedrock is encountered. In addition a visual inspection will be conducted by excavating along the perimeter of the panel. The depth and length of excavation will be determined in the field.

The panels are to have a minimum effective width of seven (7) feet and achieve a compressive strength of one hundred fifty pounds per square inch.

Stantec Consulting Services Inc. the “Engineer of Record” will serve as Quality Control Manager.

Handling and disposition of core samples for testing and analysis will be in accord with site policy.

SAFETY AND HEALTH

The test program will be conducted in accord with the TVA Site Wide Safety and Health Program. The job hazard analysis, step by step analysis, and pre job briefing for this specific activity will compliment the Site Wide Program. The work will be within the exclusion zone thereby requiring personnel have the appropriate Hazwopper training. All equipment and vehicles will be decontaminated by washing with water and visually inspected prior to leaving the site.

Material handling processes and operating equipment will be potential dust generators. The cement silo for the batch plant will be a closed system with a bag house type dust suppression system that will minimize dust emissions during filling and discharging. Areas around the operating equipment will be maintained to minimize fugitive dusts by using water trucks and ground cover material.

WASTE MANAGEMENT

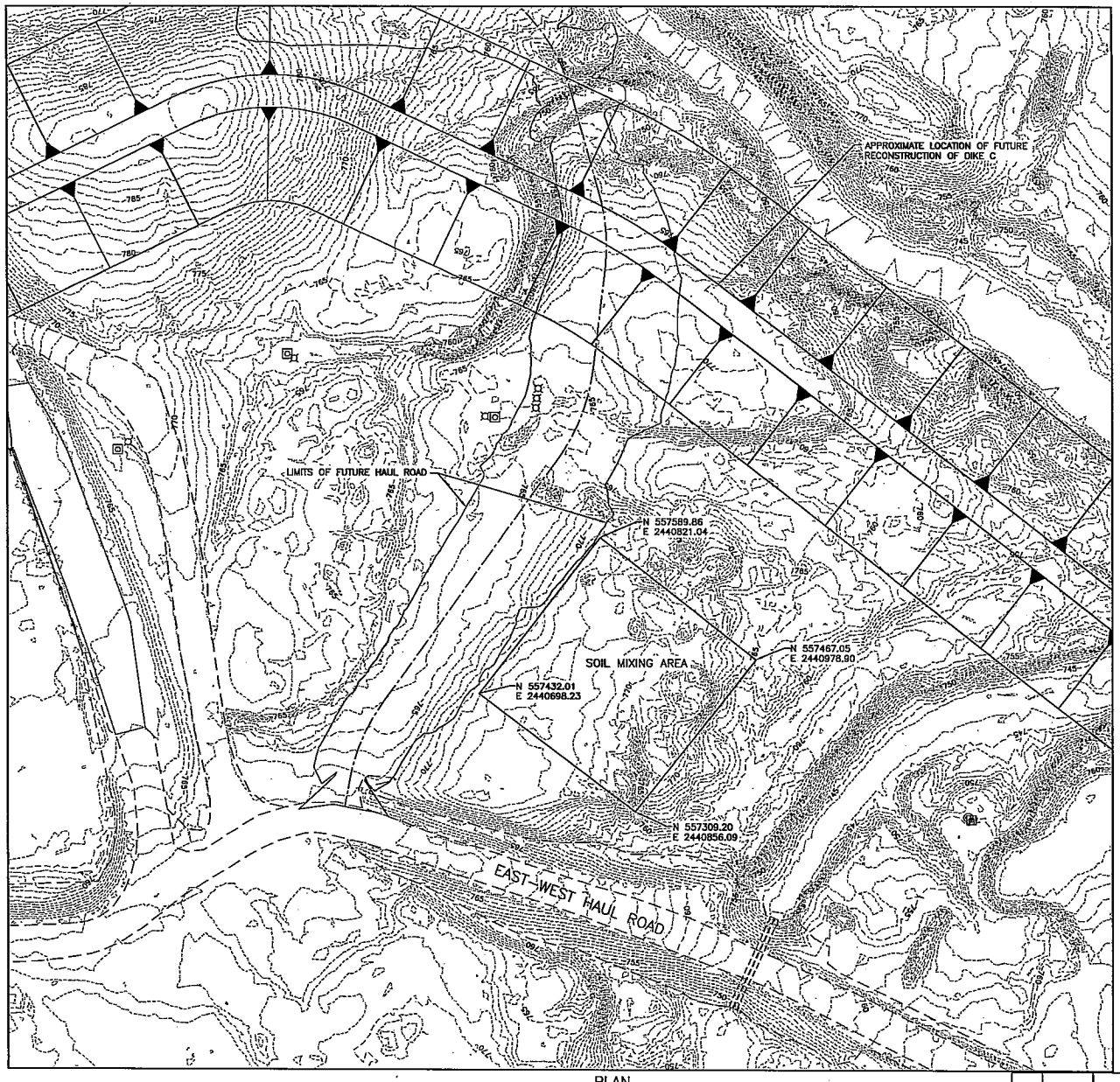
The soil mixing operation will generate a “collar” of moist ash-cement material on the ground surface around the augers. This material will be primarily ash with about 8%+\- cement.
As the material is generated, it will be spread over the test area creating about a 4 inch layer of material or collected and hauled to a the dredge cell.

TRANSPORTATION MANAGEMENT

The contractor selected will arrange for the shipment of the batch plant, crane and miscellaneous support equipment. He will be responsible for all permits, fees etc required to transport the equipment to and from the site.

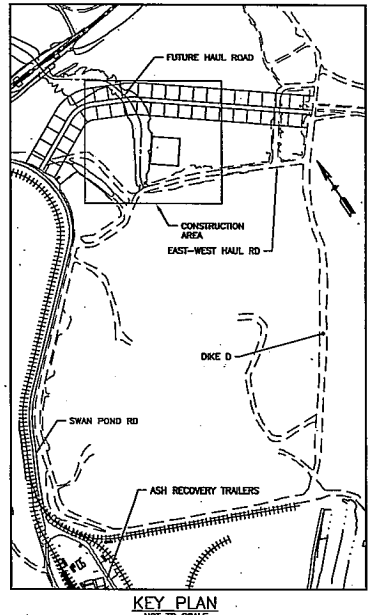
PROJECT MANAGEMENT

The test program will be overseen by Jack Howard, Engineering Manager for Jacobs Engineering, and supported by Jim Sells, Construction Manager, Jacobs Engineering, and Civil Projects, TVA. The contractor is being selected by TVA Purchasing through the competitive bidding process. Once the contractor is selected about, mid May 2010, it is estimated to require approximately six (6) weeks to complete.



PLAN

SCALE: 1"=50'



KEY PLAN

NOT TO SCALE

0 50' 100' 150'

A	3/18/10	ISSUED FOR CONSTRUCTION				

SEAL

JACOBS

KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY

DEEP SOIL MIXING AREA LOCATION PLAN

SCALE: SHOWN | DRAWING NO. INF-SK-069 | REV. A

REQUIREMENTS DOCUMENT- DSMFDP-A
Deep Soil Mixing Field Demonstration Program
Dredge Cell Closure
Kingston Fossil Plant
Harriman, Roane County, Tennessee

Tennessee Valley Authority (TVA) is planning a deep soil mixing field demonstration program across a designated portion of the Kingston Fossil Plant Dredge Cell. Primary objectives of this program are to:

- demonstrate the constructability of installing soilcrete panels in accordance with conceptual design/layout requirements;
- establish mix design parameters required to achieve target strengths;
- establish construction metrics to include production rates, sequence, etc.; and
- gain site-specific experience to facilitate the bidding process.

Generalized subsurface conditions within the program limits are assumed to consist of roughly 35 feet of loose, wet fly ash underlain by 30 feet of alluvial soil deposits (silty lean clay (about 10 feet) and sandy silt to silty sand (about 20 feet)) underlain by bedrock (weathered shale). The maximum depth of treatment is assumed to be no more than 70 feet. It is noted that actual dimensions may differ from those assumed herein.

1. Site Preparation (to be performed by resident TVA Earthwork Contractor)

Initial site preparation includes regrading existing ash surfaces to a relatively consistent elevation to facilitate working platform construction.

2. Working Platform (to be constructed by resident TVA Earthwork Contractor)

The function of the working platform is to provide a stable base to support necessary equipment for deep soil mixing operations. The Deep Soil Mixing Contractor (DSM Contractor) shall submit metrics (i.e. required footprint(s), the gross weight and associated ground pressures for proposed equipment, tolerable settlements, etc.) with its proposal to facilitate working platform design by TVA.

3. Deep Soil Mixing

3.1. General

3.1.1. Scope of Work

The scope of work consists of furnishing all plant, labor, equipment and materials to perform deep soil mixing operations. The primary objectives described above shall be achieved.

3.1.2. DSM Contractor Qualifications

The DSM Contractor shall submit a company profile with its proposal along with a minimum of four project descriptions that demonstrate successful experience with deep soil mixing operations within the previous five years. The project descriptions shall include contact information for the project owners, who may be contacted regarding the performance of the DSM Contractor on the listed projects. Resumes of key team members (including the lead driller that will be conducting the fieldwork), listing specific project experience with this technology, shall also be submitted.

3.2. Products and Materials

3.2.1. Soilcrete Columns

A series of overlapping soil-cement (soilcrete) columns shall be constructed within a designated area of the Dredge Cell (see attached drawing). A single, continuous line (or panel) with a minimum length of 20 feet and a minimum effective width of seven feet shall be formed by overlapping individual columns. Each column shall be advanced through the working platform and the in-situ foundation ash/soil layers and shall penetrate into bedrock a minimum of two feet. The soilcrete columns shall be a homogenous mixture of cement grout and in-situ foundation ash/soil materials.

3.2.2. Materials

The DSM Contractor shall furnish materials of uniform quality that meet the requirements of this program.

Cement used in preparing grout shall conform to ASTM C-150 (standard specification for Portland Cement). The cement shall be protected from moisture damage and contamination during transit and storage. Cement that has become caked due to moisture absorption or cement containing lumps or foreign matter shall not be used. Based on the limited availability of potable water on site, the DSM Contractor shall use river water to prepare cement grout. The DSM Contractor shall submit water requirements (in terms of quantity) with the mix design. TVA will transport water to areas designated by the DSM Contractor.

3.2.3. Equipment

The DSM Contractor shall furnish and maintain equipment to ensure safe, continuous and efficient production during deep soil mixing operations. Descriptions and specifications for key equipment to be used in this program shall be submitted with the DSM Contractor's proposal.

The DSM Contractor shall furnish all storage silos, mixers, pumps, regulating and measuring devices that are required to continuously produce cement grout at the batch plant. The capacity of the batch plant shall be sufficient to support the production rate of soilcrete panel construction.

The DSM Contractor shall furnish equipment of sufficient size, capacity, torque and capability to construct soilcrete panels with the specified width, length and depth. The equipment shall be capable of advancing and withdrawing the mixing tools while

simultaneously injecting and mixing cement grout with the in-situ foundation ash/soil materials. The equipment shall have an electronic system for monitoring and recording key construction parameters, including (at a minimum) mixing shaft rotation speed, penetration and withdrawal rate, grout injection rate and penetration pressure.

3.3. Deep Soil Mixing Execution

3.3.1. Mix Design

The conceptual design unconfined compressive strength requirement of the soilcrete columns is 150 pounds per square inch (psi) following 28 days of curing. The DSM Contractor shall submit an initial mix design to meet this requirement and make adjustments in the field based on results obtained.

TVA will provide batch samples of ash for mix design purposes at the start of this program. The DSM Contractor shall submit sample requirements (i.e. quantity, container type, etc.) with its proposal and retrieve these samples at the site for use in developing the mix design to meet specified strengths.

3.3.2. Construction

Deep soil mixing construction metrics, including depth, mixing tool rotation speed, penetration and withdrawal rate, and grout injection rate shall be monitored in real time for each soilcrete column. These shall be adjusted based on encountered subsurface conditions to obtain a uniformly mixed soilcrete column that meets the conceptual design criteria. Data shall be provided to TVA in the field, upon the completion of each completed soilcrete column.

Vertical alignment of soilcrete columns shall be monitored during deep soil mixing operations. Verticality tolerance of one percent or less shall be achieved. Adjacent panels or columns shall overlap so that no gaps of untreated material remain along the panel alignment.

The soilcrete panels shall penetrate into the underlying bedrock (weathered shale) for a minimum of two feet. The DSM Contractor shall also develop and submit alternative termination / mixing tool refusal criteria with its proposal to ensure that no untreated subsurface materials are left between the bottom of the panels and the top of bedrock.

3.3.3. Spoil Collection

Spoil return from the deep soil mixing operations will be removed and disposed by the resident TVA Earthwork Contractor.

3.3.4. Dust Control

The DSM Contractor shall conduct deep soil mixing operations in a manner that is consistent with site dust control requirements. TVA will provide these under separate cover.

3.4. Quality Assurance and Quality Control (QA/QC)

3.4.1. Sampling of Wet Mixed Soilcrete

The DSM Contractor shall furnish equipment and materials required to collect wet grab samples at TVA designated intervals. For bidding purposes, it is anticipated that a total of 100 cylinders measuring three inches in diameter and six inches in length will be requested. Recovered samples shall be sealed and transported daily by the DSM Contractor to a TVA designated testing laboratory (located in or near Knoxville, Tennessee).

3.4.2. Coring of Completed Panels

The DSM Contractor shall provide for drilling to retrieve test cores of the completed soilcrete panels. Drilling operations shall be conducted following 28 days of construction and at TVA designated locations and intervals. For bidding purposes, it is anticipated that a total of three borings (with a minimum diameter of three inches each) will be extended to full depth for a total of 210 feet. Recovered cores shall be transported by the DSM Contractor to a TVA designated testing laboratory (located in or near Knoxville, Tennessee).

3.4.3. Laboratory Testing (to be performed by TVA designated laboratory)

TVA will conduct subsequent laboratory testing of the test cylinders and core samples; results will be made available to the DSM Contractor. Laboratory testing will include the following:

- Unconfined compressive strength
- Triaxial compressive strength
- Tensile strength

3.4.4. Documentation

The DSM Contractor shall document its daily activities during the deep soil mixing program. For each soilcrete column, the following information shall be recorded:

- Column identification, location and ground surface elevation (to be provided by TVA surveyors)
- Column diameter
- Column termination depth
- Grout injection rate and pressure
- Mixing tool penetration and withdrawal rate
- Mixing tool rotation speed during penetration and withdrawal

- Total quantity of grout injected
- Sampling locations and depths
- Other comments defined by TVA during the course of the work necessary to meet the primary program objectives

Upon completion of the fieldwork, the DSM Contractor shall prepare and submit a written report. The report shall address the primary objectives of the program by:

- evaluating the the constructability of installing soilcrete columns panels in accordance with conceptual design/layout requirements (i.e. pattern, diameter, depths, strengths, etc.);
- establishing mix design parameters for the production phase; define the minimum cement content;
- establishing soilcrete construction parameters including mixing tool rotation speed, penetration and withdrawal rate, and grout injection rate for encountered subsurface layers;
- optimizing the construction sequence for the production phase;
- developing recommendations for alternative procedures if the soilcrete columns do not meet conceptual design/layout requirements; and
- documenting lessons learned from this field demonstration program to facilitate construction during the production phase.

Results of the deep soil mixing field demonstration program (mix design, production rates, strengths achieved, etc.) will be provided to other bidders for future project phases.

3.5. Exceptions and Alternative Methodologies

Proposed exceptions to the planned deep soil mixing field demonstration program as outlined herein will be considered by TVA as part of bid evaluations. Any exception must be clearly documented to the satisfaction of TVA prior to executing work.

Alternative methodologies (to include but not limited to ground improvement technologies) may be presented by the DSM Contractor for consideration by TVA.

Summary of Contractor Submittals

Deep Soil Mixing Field Demonstration Program
Dredge Cell Closure
Kingston Fossil Plant
Harriman, Roane County, Tennessee

Proposal Submittal Requirements

Description	Scope Reference (section)
Required Metrics to Support Working Platform Design by TVA	2
Company Profile, Project Descriptions and Key Team Member Resumes	3.1.2
Key Equipment Descriptions and Specifications	3.2.3
Ash Sample Requirements to Support Mix Design	3.3.1
Alternative Termination / Mixing Tool Criterion	3.3.2

Project Schedule

Description	Scope Reference (section)	Completion/Submittal Milestone	Comments
Retrieve Ash Samples from the Site (for mix design purposes)	3.3.1	within 1 week following NTP	
Develop/Submit Mix Design (includes laboratory bench testing)	3.3.1	within 4 weeks following receipt of samples	*assume data extrapolated prior to 28-day curing period*
DSM Fieldwork			
Site Mobilization (includes equipment set-up)		within 2 weeks following mix design approval	
Test Panel Construction		within 2 weeks following site mobilization	
Collect/Deliver Wet Grab Samples	3.4.1	daily during test panel construction	*samples shall be transported to TVA designated laboratory*
Daily Documentation	3.4.4	daily during test panel construction	*copies of daily documentation shall be provided to TVA during DSM fieldwork*
Coring of Completed Panels			
Site Mobilization		minimum 28 days following test panel construction	
Coring	3.4.2	within 1 week following site mobilization	
Deliver Core Samples	3.4.2	within 1 day following coring activities	*samples shall be transported to TVA designated laboratory*
Final Documentation (report format)	3.4.4	within 1 week following coring activities	

NTP - Notice to Proceed
DSM - Deep Soil Mixing

Deep Soil Mixing Field Demonstration Program
Kingston Fossil Plant
Harriman, Roane County, Tennessee

Responses to Questions/Comments
April 26, 2010

Comments (dated April 21, 2010) received via e-mail from Craig Zeller with the U.S. Environmental Protection Agency (EPA). Referenced program documents prepared by Stantec Consulting Services Inc. (Stantec) and dated March 25, 2010 were issued by Tennessee Valley Authority (TVA) on March 31, 2010 for the purpose of bid solicitation.

Comment No. 1: Section 3.1.2 - It is my understanding that the selected DSM contractor will submit a proposal with more details regarding implementation/performance of the pilot work. When that document becomes available, I would like opportunity for a quick review.

Response No. 1: TVA will provide a copy of the requested work plan submitted by the selected DSM contractor.

Comment No. 2: Section 3.3.1 Mix Design - 150 psi is listed here as a performance spec for UCS of cured soilcrete columns. I recall from the EE/CA report another spec related to a 25% area replacement factor. Should that be listed here (or somewhere in the wp) as an additional requirement? Or will you calculate that info from the documentation required in Section 3.4.4?

Response No. 2: The deep soil mixing field demonstration program is intended to demonstrate the constructability of installing soilcrete panels in accordance with conceptual design/layout requirements; establish mix design parameters required to achieve target strengths; establish construction metrics to include production rates, sequence, etc.; and gain site-specific experience to facilitate the bidding process. Various area replacement ratio requirements are being considered in ongoing seismic analysis calculations and do not need to be verified as part of the demonstration program.

Comment No. 3: Section 3.3.2 Construction - 2nd paragraph mentions that columns shall overlap so that no gaps of untreated material remain along the panel alignment. Should we specify a minimum overlap, or are you deferring to selected DSM contractor's best professional judgment?

Response No. 3: The DSM contractor's work plan will reflect the proposed overlap to achieve the minimum effective width requirements. This will be reviewed by Stantec as part of bid evaluations.

Comment No. 4: Section 3.4 QA/QC - Wet mixed soilcrete cylinders (n=100), 3 borings of cured soilcrete columns to depth (n=3) and proposed lab testing all look very sound.

Response No. 4: Noted.

Deep Soil Mixing Demonstration Program
Kingston Fossil Plant
Harriman, Roane County, Tennessee

Responses to Questions/Comments
May 3, 2010

Questions/comments received via e-mail from Barbara Scott with the Tennessee Department of Environment and Conservation (TDEC) – Division of Solid Waste Management on April 29, 2010. Referenced program documents prepared by Stantec Consulting Services Inc. (Stantec) and dated March 25, 2010 were issued by Tennessee Valley Authority (TVA) on March 31, 2010 for the purpose of bid solicitation.

Comment No. 1: Page 4. TVA specifies the compressive strength of the soil grout columns at 150 psi but does not provide a minimum threshold for the shear strength of the DSM columns. TVA should specify the minimum shear strength the DSM columns must meet to be acceptable for this design.

There is an inconsistency about the diameter of the DSM columns, on page 4 the diameter is 8 ft. and later the diameter is 7 ft. (Page 8; 3.2.1). This should be corrected.

Response No. 1: The target unconfined compressive strength of 150 psi roughly corresponds to a shear strength of 75 psi.
The minimum thickness of the wall is 7 ft. the diameter of the columns will be approximately 8 ft. to achieve the minimum thickness.

Comment No. 2: Page 7 – Introduction. The pilot describes installing DSM columns to a maximum depth of 70 ft. There is a description of soil and ash to be encountered. It is noted that a working platform will be constructed to provide the DSM equipment with a stable work area. The document does not provide a drawing of the working platform or the metrics of the working platform. This would be helpful, particularly the "height" of the working platform as it may impact the depth into soil/ash the columns can be constructed, especially if the maximum depth is 70' in the pilot. If the working platform is 10' then the maximum column depth would only be 60' below current ground surface.

Response No. 2: Generalized subsurface conditions described in the introduction were based on available AECOM geotechnical borings located near the planned program limits. The assumed dimensions are anticipated to exceed the maximum depths (or thicknesses) of the various subsurface layers, while providing for a reasonable constructed thickness (roughly five feet or so) of the working platform. To confirm this, TVA will provide for a pilot (sample) boring within the program limits prior to DSM Contractor mobilization. Conventional augering and standard penetration sampling/testing techniques will be used to advance the pilot boring to bedrock.

Details for the working platform will be developed by Stantec based on specific requirements (i.e. required footprint(s), the gross weight and associated ground pressures for proposed equipment, tolerable settlements, etc.) established by the DSM Contractor. These details will be used in combination with the pilot boring to confirm equipment/material requirements.

Comment No. 3: Section 3.2.1. A diagram should be added that provides a view of the constructed DSM columns for this pilot. This will provide everyone with a image of how the completed DSM "wall" will look. This will also resolve the question of whether the columns are physically connected making a "wall" or if the columns stand on their own with some separation. This connection of the columns, forming a wall, would provide greater stability that a series of stand-alone columns. However, if the columns are connected, is there any impact on ground water movement, resulting in the "bathtub effect" in the containment area a drainage issue to be addressed on the outside of the containment area.

Response No. 3: The program is intended to construct a single, continuous line (or panel) from a series of overlapping columns. The net dimensions of the constructed panel is specified with a minimum length of 20 feet and a minimum effective width of seven feet.

Laboratory testing requirements have been supplemented to include permeability testing of the batch mixes and selected test cylinders and core samples. Results will be used in future groundwater modeling and facility design activities.

Comment No. 4: Section 3.3.2. Please describe how the DSM Contractor will insure that the DSM columns are extended into the underlying bedrock/shale for a minimum of 2 ft.

Response No. 4: Results from the pilot boring (see Response No. 2) will be used to establish initial target termination depths. The DSM Contractor will also consider the response of the drilling equipment (i.e. penetration resistance) to confirm that the columns have been advanced into bedrock.

Comment No. 5: Section 3.4.1. Will the samples collected as described in this part (wet grab samples) be stored and allowed to cure to measure their physical properties and then the results compared with the samples obtained from the coring described in 3.4.2?

Response No. 5: Yes. Recovered grab samples will be stored in a warm, moist environment until testing following selected curing periods (including a minimum 28-day period which has been established for the recovered core samples).

Comment No. 6: Section 3.4.2. This section describes the DSM column cores that will be taken including an anticipated total column length of 210 ft. Will the 210 feet of core be entirely from the DSM column into the soil/ash or will it only include the portion of the DSM column below the working platform?

Response No. 6: It is intended that coring be conducted across the program limits (at discrete locations) to recover treated subsurface layers (below the working platform) for laboratory testing purposes.

Comment No. 7: Section 3.4.3. TVA should add measurement of shear strength of columns to the testing parameters. This information is needed to fully analyze potential for failure due to horizontal forces such as an earthquake.

The permeability of the DSM column samples should be tested to determine if there will be a bathtub effect once the soil columns are installed, unless the DSM columns will be overlapped leaving space between them for ground water to move through.

Please describe the sampling frequency of the DSM cores. Will the cores be sampled at specific intervals; every 2 ft., every 5 ft.?, or a intervals where the subsurface material changes from coal ash to native material, where there is a change in the native material from "sand" to "clay".

Response No. 7: Testing requirements for the program have been supplemented to include permeability testing of the batch mixes and selected test cylinders and core samples (see Response No. 3). Direct shear testing will also be conducted on selected test cylinders and core samples.

Continuous coring will be performed at three discrete locations across the completed panel to full depth. Recovered cores will be evaluated by Stantec and selected samples from treated subsurface layers (including various ash, clay and silt/sand layers) will be subjected to testing.

Comment No. 8: Section 3.4.4. During the installation of the columns, samples of the native material should be taken and analyzed to determine the media content (% coal ash, % soil, soil components, moisture content, etc.). This data can be used to develop a correlation between the physical strengths (shear strength, tensile strength, compression strength, etc.) of the soil/grout mixture when samples of the DSM columns are analyzed. This information is very important because it can be used to project the physical strength of the DSM columns completed during installation of the DSM columns around Dike C dependent upon the soil/ash mixture under Dike C. Further if any of the column samples are analyzed and physical strengths are found to be less than required, it will allow adjustment of the % grout added to the soil/ash mixture.

The DSM contractor should be required to monitor the moisture content of the returned spoils as the DSM column is advanced and to record when the DSM column construction encounters the saturated zone. The % moisture content and saturation zone may have an impact on the physical strength of the DSM column as it is advanced.

The DSM contractor should provide a description of any changes in methodology, equipment or technology that would be needed to advance the DSM columns to a depth of more than 70' (including the depth of the working platform).

Response No. 8: Index testing (consisting of classification and moisture content testing) will be conducted on selected samples recovered from the pilot boring (see Response No. 2). The DSM Contractor will be tasked with recording visual descriptions (including moisture content) of spoils conveyed to the ground surface during the augering process.

As part of the program documentation, the DSM Contractor is required to evaluate the constructability of installing the columns to the conceptual design/layout requirements. If the columns can not be installed in accordance with these requirements, the DSM Contractor is requested to develop recommendations for alternative procedures for consideration in subsequent project phases.