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Shepherd Miller, Inc.

CONSULTING ENVIRONMENTAL
& GEOTECHNICAL ENGINEERS

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September 4, 1992

Mr. Ray Gonzales
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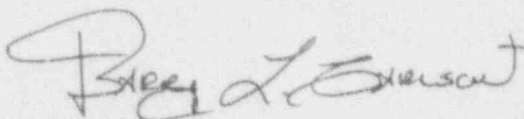
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Dear Ray:

Enclosed is the text only of the Edgemont Reclamation Modification Construction Specifications for your review. Your initial review and any comments will be greatly appreciated. If you have any questions, please call either Bob Medlock or me.

Sincerely,

SHEPHERD MILLER, INC.



Barry L. Carlson
Project Engineer

Enclosure

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TECHNICAL SPECIFICATIONS
FOR MODIFICATIONS TO THE RECLAMATION
OF THE URANIUM TAILINGS DISPOSAL AREA
TENNESSEE VALLEY AUTHORITY
EDGEMONT, SOUTH DAKOTA

Prepared For:
Tennessee Valley Authority
Chattanooga, Tennessee

Prepared By:
Shepherd Miller, Inc.
Fort Collins, Colorado

August 20, 1992

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1.0 GENERAL DESCRIPTION OF WORK

The work covered by these Specifications consists of the construction modifications for the Southeast and North diversion channels at the TVA facility in Edgemont, South Dakota. All work performed shall be in accordance with these Specifications; the North and Southeast channel sections and detail drawings are attached. In the event of discrepancies, or if any aspect of the work is questionable, the Contractor shall be solely responsible for requesting clarification from the owner. Work shall be conducted in basic accordance with the schedule provided by the owner.

1.1 CONSTRUCTION MODIFICATION ITEMS

Southeast channel modifications require, over a certain portion of the channel, the removal of existing riprap, minor excavation, and the placement of appropriate filter material, and new, larger-sized riprap. Modifications to the North channel require the installation of a new section of riprap, which will require shallow excavation, the placement of appropriate filter material, and the placement of new riprap.

2.0 EXCAVATION

The work described in this section is intended to achieve the configuration shown on the design drawings. Excavation of portions of the existing channels will be required for the installation of riprap as specified in the design plan. All excavations shall be of sufficient depth to allow for the minimum thickness of riprap and filter material shown in Table 1. During excavation of the channel, the contractor shall take all steps necessary to limit impact to the existing channel above and below the designated sections for modification. All excavated material shall be spoiled in areas designated by the owner.

3.0 EROSION PROTECTION

The erosion protection specified in this plan is for the North and Southeast channels. The erosion protection consists of riprap and filter material placement. The erosion protection for the Southeast channel shall consist of a four layer system. The top layer shall be at least 38 inches thick and shall consist of material meeting the size specifications for "Southeast Riprap" presented in Table 1. The second layer, immediately below the riprap material, shall be at least 8 inches thick and shall consist of material meeting the size specifications for "4 inch D_{50} Filter" presented in Table 1. The third layer shall be at least 6 inches thick and shall consist of material meeting the size specifications for "Filter 1" presented in Table 1. The lower layer shall be at least 6 inches thick and shall consist of material meeting the size specifications for "Filter 2" presented in Table 1.

The erosion protection for the North channel shall consist of a two layer system for the majority of the channel, and a three layer system in the transition zone. For the two layer system, the top layer shall be at least 6 inches thick and shall consist of material meeting the size specifications for "North Riprap" presented in Table 1, and the bottom layer shall also be at least 6 inches thick and shall consist of material that meets the size specifications for "Filter 2" presented in Table 1. For the three layer system (located only within the transition zone), the top layer shall vary from 8 inches thick adjacent to the newly constructed area to 30 inches adjacent to the existing riprapped channel. This top layer shall consist of material meeting the size specifications for "Transition North Riprap" presented in Table 1. The middle layer shall be at least 6 inches thick and shall consist of material that meets the size specifications for "Filter 1" presented in Table 1. The lower layer shall be at least 6 inches thick and shall consist of material that meets the size specifications for "Filter 2" presented in Table 1.

All riprap and filter material shall meet the durability requirements specified in Section 3.3. Final lines and grades for the diversion channels shall be as shown on the construction drawings. Upon construction completion, the contractor shall provide the owner with as-built drawings showing final grades and elevations.

3.1 RIPRAP MATERIAL

Riprap shall consist of sized angular rock obtained from the approved source or an alternate source approved by the owner. The material shall be angular, resistant to abrasion and weathering, and shall be free from fractures, seams, soils and other defects that would affect durability. Only riprap approved by the owner shall be used. The riprap shall meet or exceed the durability specifications presented in Section 3.3 and the size requirements presented in Table 1, unless otherwise approved by the owner.

3.2 FILTER MATERIAL

Filter material shall consist of sized angular rock obtained from the approved source or an alternate source approved by the owner. The material shall be reasonably free from clay and soils. The filter material shall meet the durability specifications presented in Section 3.3 and sized as specified in Table 1, from a source approved by the owner.

3.3 DURABILITY TESTING

Laboratory durability test results and durability ratings for each riprap will be developed prior to placement.

Durability testing shall consist of the following:

- | | |
|-----------------------------|---------------------------|
| 1. Adsorption | ASTM C-127, |
| 2. Bulk Specific Gravity | ASTM C-97, |
| 3. Sodium Sulfate Soundness | ASTM C-88, and |
| 4. L.A. Abrasion | ASTM C-131 or ASTM C-535. |

The results of the durability testing shall be used to rate the rock durability in accordance with the rating system (Table D1) of the NRC's Staff Technical Position "Design of Erosion

Protection Covers for Stabilization of Uranium Mill Tailings Sites," August 1990. Both riprap and filter material shall have a durability rating of 80 or greater. The identified source of riprap shall be subjected to durability testing resulting in a rating in excess of 80.

In addition to identification of acceptable material, the riprap and filter material testing shall be conducted periodically during construction. Details of testing frequencies are contained in Section 4.0.

3.4 RIPRAP, FILTER MATERIAL AND GRADATION

Table 1 of these specification identifies the design D_{50} (median rock size) for the riprap and filter material. The riprap and filter material shall conform to the following criteria.

1. A minimum of 50 percent by weight of the material shall be greater than the design D_{50} shown in Table 1 of the specifications.
2. The material shall meet the gradation requirements shown in Table 1.
3. Riprap and filters shall have a minimum durability rating as specified in Section 3.3.

At least five days prior to placement of any riprap or filter material, durability testing and particle size analysis of the rock shall be conducted and approved for each rock gradation. The contractor shall provide the owner with the results of the quality control checks at the frequency described in Section 4.0.

3.5 RIPRAP MATERIAL PLACEMENT

Riprap shall be installed at the locations and at the grades shown on the design drawings. The riprap shall be placed in a manner to ensure that the larger rock fragments are uniformly distributed and the smaller fragments fill the void spaces adequately to provide a densely-placed uniform layer of the specified thickness. Hand placing of material will be required only to the extent necessary to ensure the results specified above. Replaced material which does not meet the requirements described in Section 3.0, shall be removed, reworked or replaced as necessary by the contractor to meet these specifications.

3.6 FILTER MATERIAL PLACEMENT

Each filter layer will be placed in a maximum of 6 inch lifts and shall be smoothed and compacted. The minimum filter thickness for each layer shall be 6 inches. The contractors selected placement process shall ensure that segregation of the filter material does not occur. Replaced material which does not meet the requirements described in Section 3.0, shall be removed, reworked or replaced as necessary by the contractor to meet these specifications.

4.0 QUALITY CONTROL

Inspection and testing shall be performed for construction and verification that these Specifications have been met or exceeded. Quality control shall include material testing and verification of in place material thickness.

4.1 ROCK DURABILITY TESTING

Durability testing frequency will include a minimum of initial testing before use and testing for each additional 10,000 cubic yards of rock from a particular rock source. Additional tests more frequent than every 10,000 cubic yards will be conducted when the rock characteristics (color,

texture, etc) in the rock borrow source vary significantly from previously tested rock. A minimum of three durability tests shall be required for each material size with less than 30,000 cubic yard total value. The three tests shall be at initiation, after one-third and after two-thirds of the placement of the total material volume.

4.2 RIPRAP AND FILTER GRADATION AND THICKNESS TESTING

Testing of the riprap and filter material as placed shall include certification that rock gradation and the riprap layer thickness are consistent with the design specifications.

The riprap and filter material gradations shall be tested every 10,000 cubic yards for a specified gradation. A minimum of three gradation tests shall be required for material sizes with less than 30,000 cubic yards. The three gradation tests shall be at initiation, after one-third and two thirds of the placement of the total material volume.

The in-place material shall be visually inspected to confirm the material has been installed in accordance to Section 3.0 of these specifications. The riprap and filter layer thickness shall be inspected to ensure the material thickness is at or greater than the minimum specified in Table 1. The riprap and filter layer thicknesses shall be verified at maximum intervals of 100 linear feet. In addition, the in-place riprap shall be surveyed at maximum intervals of 100 linear feet to verify channel grades.

4.3 RECORDS

Weekly inspection reports shall be written by the contractor that address the work performed, projected schedule, adequacy of construction, inspection summary, testing material summary and a list of project change orders and their justification. The reports shall become part of the permanent record of the design implementation.

Records shall include the date, name of tester, items inspected or tested, type of inspection test, identification of the test method, result, acceptability and acceptance criteria, and name and

initials of the reviewer. The records shall also identify the testing equipment or instruments used in performing the test. When documenting deviations, non-conformance, and stop work order situations, the report shall provide sufficient details so that the acceptability of the necessary corrective action and final resolution can be independently reviewed.

TABLE 1
RIPRAP AND FILTER MATERIAL SUMMARY

	SOUTHEAST RIPRAP	NORTH RIPRAP	TRANSITION NORTH RIPRAP	4 Inch D ₅₀ FILTER	FILTER 1	FILTER 2
THICKNESS	38"	6"	*	8"	6"	6"
D50	19"	1/2"	8"	4"		

(ALLOWABLE PERCENT PASSING THE GIVEN DIMENSION)

40"	97-100					
36"	91-98					
32"	85-94					
28"	77-86					
24"	62-77					
20"	43-55					
16"	31-38		93-100			
12"	20-27		73-83			
8"	9-16		35-50	87-100		
6"	3-8		16-23	73-85		
4"	0-4		8-13	37-50		
3"			0-6	27-34		
2"				15-19	97-100	
1"		85-100		0-6	83-95	
3/4"		70-80			74-87	
1/2"		35-50			63-77	
3/8"		30-40			53-73	
#4		10-20			12-34	95-100
#8		0-10			0-7	80-98
#14						60-87
#20						35-74
#40						16-45
#70						5-19
#100						0-10

* Varies as shown on the construction drawings.