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URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT, RIFLE,
COLORADO, PREPARED BY MK - ENVIRONMENTAL SERVICES, DOE
ALBURQUERQUE, FIELD OFFICE, ALBUQUERQUE, NM - (USED AS
A REFERENCE IN OU3 RI/FS/PP APPENDIX G)

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REPORT

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UMTRA PROJECT - RIFLE, COLORADO
SUBCONTRACT DOCUMENTS RFL-PH-II
ISSUED FOR CONSTRUCTION
DECEMBER 1991

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DEMOLITION

PART 1 - GENERAL

1.1 SCOPE

A. This Specification Section describes the requirements for the demolition of structures and disposal of demolished materials and debris as specified in this Section.

B. Structures and facilities to be demolished include the following:

1. Existing Structures/Facilities:

- a. Drainage manhole at Old Rifle Processing Site.
- b. Woven wire fences at the New Rifle decontamination pad.
- c. Chain link fence and associated gates from the access control area at the processing sites.
- d. 36-inch diameter buried RCP at Old Rifle Processing Site.
- e. Power line with poles at Old Rifle and New Rifle Processing Sites.
- f. Sprinkler system on the tailings pile at New Rifle Processing Site.
- g. Decontamination pads and sumps at the Old Rifle and New Rifle Processing Sites.
- h. Monitor wells in accordance with Table 02050-B.
- i. Retention basins at Old Rifle and New Rifle Processing Sites.
- j. Ditch crossings and 24-inch diameter culverts, one at New Rifle and three at Old Rifle.
- k. Contaminated water treatment plant pads at Old Rifle and New Rifle Processing Sites.
- l. Membrane liners from ditches, retention basins, spillways, washwater collection sumps, and washwater

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recirculation ponds at Old Rifle and New Rifle Processing Sites.

- m. Motor vehicle tires stockpiled at the Old Rifle and New Rifle Processing Sites and those scattered in various locations on the sites.
- n. [Concrete foundations and slabs left in place at Old Rifle]* Processing Site at the termination of Phase I Subcontract.
- o. [Any rubble, concrete, debris, slabs, pipes, steel, poles, tires, etc., buried in the tailings piles at Old or New Rifle.]*
- p. All utilities left in place at the Processing Sites at the termination of Phase I Subcontract.

2. Structures installed/constructed under this Subcontract:

- a. [Washwater recirculating system including piping, tanks, and pond liners at Estes Gulch Site, and New and Old Rifle Sites.]*
- b. Membrane liners from ditches, retention basins, spillways, washwater collection sumps, and washwater recirculation ponds at Estes Gulch Site.
- c. [Decontamination pad at Estes Gulch Site, and New and Old Rifle Sites.]*

[Text Deleted]*

1.2 WORK NOT INCLUDED

- A. Disposal of existing stockpiles of demolished materials and debris is not included in the scope of work of this Section. Disposal of existing stockpiles of demolished materials and debris shall be as specified in Section 02200.

[Text Deleted]*

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1.3 RELATED WORK

- A. Section 00800 - Special Conditions: Articles SC-7 and SC-8
- B. Section 01300 - Submittals
- C. Section 01500 - Construction Facilities
- D. Section 01560 - Temporary Controls
- E. Section 01561 - Construction Cleaning
- F. Section 02200 - Earthwork: Disposal of Demolished Materials and Debris and Grading Areas
- G. Section 02771 - Membrane Liner
- H. Section 03000 - Concrete Work: Plugging of Steel Casing Pipe and Constructing a Concrete Sump

1.4 DEFINITIONS

Demolition includes complete dismantling, cutting and breaking up of structures, including all solid contents and associated services and utility lines including their foundations and below grade slabs and footings.

1.5 STRUCTURES TO BE DEMOLISHED

- A. A brief description, type of construction and approximate dimensions of the existing structures to be demolished or abandoned are listed in Table 02050-A and identified on the Subcontract Drawings.
- B. The structures and facilities installed/constructed under this Subcontract are specified under various Specification Sections of this Subcontract and are shown on the Subcontract Drawings. [All temporary structures and facilities built at the sites shall be demolished and disposed of.]*

1.6 SUBMITTALS

- A. General submittal requirements are specified in Section 01300.
- B. Ten days prior to the start of Work, the Subcontractor shall submit to the Contractor, for review, a demolition plan including the following:
 - 1. Methods of demolition to be used.
 - 2. Schedule showing dates and structures to be demolished.
 - 3. List of equipment to be used.

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TABLE 02050-A

<u>Structure Description</u>	<u>Type of Construction</u>	<u>Approximate Dimensions</u>	<u>Approximate Coordinates</u>	
			<u>North</u>	<u>East</u>
<u>Old Rifle Processing Site</u>				
Drainage Manhole	Concrete	4' x 4' x 4'	26000	60400
36-Inch Pipe	Reinforced Concrete	360' long	26000	60400
[Power Line with 1 Pole	As shown on the Subcontract Drawings.]*			
Plugging 48-inch Dia. Pipe with Concrete	Steel	60' Long	As shown on the Subcontract Drawings.	
Decontamination Pad and Sump	As shown on the Subcontract Drawings.			
Membrane Liner	Located in existing retention basin, drainage ditches and recirculation basins.			
Monitor Wells	See Table 02050-B.			
In-place Concrete Foundation and Slabs				
[3 - 24-inch Pipes	Corrugated Metal		Ditch Crossings	
Wastewater Treatment Plant Pads	Concrete]*			
<u>New Rifle Processing Site</u>				
Woven Wire Fences Fencing (Access Control Area)	160 feet at decontamination pad. Metal-Chain Link	690'	N/A	N/A
Double Leaf Swing Gate (Access Control Area)	Metal-Chain Link	40', 30'	N/A	N/A
Gate	Metal-Chain Link	3' x 6'		
Power Line with 17 Poles	As shown on the Subcontract Drawings.			

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TABLE 02050-A (Cont'd.)

<u>Structure Description</u>	<u>Type of Construction</u>	<u>Approximate Dimensions</u>	<u>Approximate Coordinates</u>	
			<u>North</u>	<u>East</u>
Sprinkler System		19,000 lineal feet of 1" to 6" dia. pipe.		
Decontamination Pads and Sumps		As shown on the Subcontract Drawings.		
Membrane Liner		Located in existing retention basin, drainage ditches and recirculation basin.		
Motor Vehicle Tires		Stockpiled on site. 8 not shredded.	Approximately 1407	
[Monitor Well		See Table 02050-B.		
1 - 24-inch Pipe		Corrugated Metal		
Wastewater Treatment Plant Pads		Concrete		
2 - Double Leaf Swing Gates		(1 Gate to be Installed per Drawing RFL-PS-10-0714, Note 4.)]*		

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TABLE 02050-B

WELLS TO BE REMOVED AND DEMOLISHED

NEW RIFLE PROCESSING SITE

<u>Well No.</u>	<u>Coordinates</u>		<u>Casing Diameter (inch)</u>	<u>Approx. Depth of Borehole (feet)</u>
	<u>North</u>	<u>East</u>		
586	23612.9	46916.57	4	61

OLD RIFLE PROCESSING SITE

<u>Well No.</u>	<u>Coordinates</u>		<u>Casing Diameter (inch)</u>	<u>Approx. Depth of Borehole (feet)</u>
	<u>North</u>	<u>East</u>		
581	25859.67	59739.01	4	31
582	25865.73	59749.59	4	21
583	25653.45	59749.05	4	26
593	26107.31	59951.93	2	27
594	26066.71	59686.07	2	27
595	25798.81	59948.87	2	23
596	25613.6	59506.5	2	27

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.1 DEMOLITION

- A. During the execution of this Subcontract, if unidentified waste material is suspected or encountered, the Site Manager shall be immediately notified for identification and subsequent disposition.

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B. Locations of structures to be demolished are shown on the Subcontract Drawings; however, the Subcontract Drawings do not show the locations of all foundations, rubble and debris, concrete pads, and the like, all of which are required to be demolished and removed within the boundaries of the project sites. [Portions of buried concrete foundations exist at Old Rifle Site.]* If underground structures, including but not limited to, slabs, foundations and abandoned communication duct banks that are not shown on the Subcontract Drawings, or not visible from the surface, or not foreseen by the Subcontractor, are encountered, they may be left in-place if all of the following conditions are met:

1. If the concrete is decontaminated, and if soil is not contaminated below it;
2. If the top of the concrete is at least 2 feet below finish grade, and;
3. If the concrete is not shown on the Subcontract Drawings and was not visible from the surface at the time of Subcontract award.

C. Pollution Controls:

1. Water sprinkling, temporary enclosures, and other Contractor-approved methods shall be used to limit the amount of airborne dust and dirt to the lowest practical level. Demolition work shall comply with governing regulations pertaining to environmental protection.
2. Water shall not be used if it is likely to create hazardous or objectionable conditions such as ice, flooding, or pollution. An approved water-based biodegradable wetting agent (surfactant) such as Dupont "Duponol WAQ" or equal shall be used to reduce the quantity of water required.

D. Demolition:

1. Permit requirements are specified in Article SC-11 of the Special Conditions.
2. Foundations and other structures shall be demolished by methods required to complete the work in accordance with governing regulations.
- * 3. Pieces of wood, concrete, and masonry shall be cut or broken up to be no greater than 3 feet in any dimension.

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- * 4. Structural steel members and other long items shall be cut or broken up into 10-foot lengths or smaller.
- * 5. All pipes and ducts shall be cut to sizes no greater than 20 feet in length. Concrete pipes shall be crushed radially. Other pipes and ducts 6 inches and larger in diameter shall be longitudinally cut in half.
- 6. Underground tanks, vats, and the like shall be emptied of contents prior to removal and demolition. The contents will be identified by the Contractor for making a determination of safe handling and disposal procedures. See Section 02081, Article 3.1.B for removal and disposal of the wastes.
- * 7. After the completion of the construction phase, the synthetic membrane liner(s) shall be removed, decontaminated and disposed of as the Subcontractor's property. If the membrane liner(s) cannot be decontaminated by practical means, it shall be disposed of by cutting into strips, no wider than four feet, and placed in the tailings embankment in a manner that would not induce settlement or inhibit water migration.
- 8. The sprinkler system shall be removed concurrently with the excavation of the tailings.
- 9. Used rubber tires shall be collected, cut up radially into two halves and placed in the tailings embankment as specified in Section 02200 or decontaminated as directed by the Contractor and disposed of offsite as Subcontractor's property.

3.2 DISPOSAL OF DEMOLISHED MATERIALS AND DEBRIS

- A. Unless otherwise directed by the Site Manager, demolished materials and debris shall be disposed of in the tailings embankment as specified in Section 02200 and as shown on the Subcontract Drawings.
- B. Burning of materials will not be permitted.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Measurement for payment for the demolition and disposal of structures specified in this Section will be on a lump sum basis. The measurement will not include the following:

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1. Demolition and disposal of decontamination pads and sumps.
2. Membrane liner(s) installed under Section 02771.
- [3. Fencing installed under Sections 02833 and 02835.]*

4.2 PAYMENT

- A. Payment for demolition and disposal of structures specified in this Section will be by the lump sum price quoted therefor in the Bid Schedule. The price quoted shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals, and for performing all work including all clearing, demolishing, breaking of the debris into small pieces, removal, demolition, and decontamination of facilities where required, and disposing of demolished materials and debris as specified in this Section.
- B. Payment for demolition and disposal of decontamination pads and sumps will be considered to be included in the applicable lump sum prices quoted in Section 01500.
- C. Payment for demolition and disposal of membrane liner(s) installed under Section 02771 will be as specified in Section 01500.

END OF SECTION 02050

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SECTION 02200EARTHWORKPART 1 - GENERAL

1.1 SCOPE

A. This Specification Section covers earthwork for, or related to, the following:

1. Excavation and stockpiling of uncontaminated materials from the tailings embankment foundation at the Estes Gulch Disposal site.
2. Excavation of contaminated materials from the two processing sites and construction of the tailings embankment at the disposal site.
3. Removal and disposal of existing stockpiles of demolished materials and debris in the construction of the tailings embankment.
4. Removal of demolished materials and debris resulting from work specified in Section 02050 and placement in the construction of the tailings embankment.
5. Handling and disposal of contaminated vicinity property materials delivered to the New Rifle site by others and placement in the construction of the tailings embankment.
6. Handling and disposal of existing stockpiles and containers of asbestos, hazardous and non-hazardous waste materials in the tailings embankment.
7. Construction of temporary and permanent drainage ditches and wastewater retention basins. Quality assurance and quality control provisions specified in this Section will not be applicable to temporary drainage ditches.
8. Finish grading of the sites, including restoration and regrading of drainage ditches, wastewater retention basins, contaminated water recirculation ponds, sumps, and temporary facilities areas.

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9. Furnishing and placing of imported uncontaminated fill material from Subcontractor's source(s) as backfill at Old and New Rifle Sites.
10. Excavation of the foundation for the Estes Gulch Disposal Cell and stockpiling of excavated material for use as radon barrier and frost cover.
11. Furnishing and placing of cover materials at Estes Gulch.
12. Furnishing and placing radon barrier with and without bentonite amendment and frost barrier at Estes Gulch.
13. Borrow area development and restoration.

[B. This Specification Section covers furnishing and installing displacement monuments as shown on the Subcontract Drawings.]*

1.2 WORK NOT INCLUDED

- A. Earthwork related to the construction of offsite temporary facilities specified in Section 01500 is not included in this Section.
- B. Earthwork for pipe trenches is not included in this Section.

1.3 RELATED WORK

- A. Section 00800 - Special Conditions: Definitions
- B. Section 01300 - Submittals
- C. Section 01500 - Construction Facilities
- D. Section 02050 - Demolition
- E. Section 02141 - Dewatering and Drainage
- F. Section 02278 - Erosion Protection
- G. Section 02935 - Seeding

1.4 DEFINITIONS

- A. Contaminated materials and uncontaminated materials are defined in Article SC-1 of the Special Conditions.

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- B. **Common Excavation:** Common excavation shall include excavation of all materials encountered regardless of the nature of the materials, including topsoil, silt, clay, sand, gravel, talus, soft or disintegrated rock, boulders or detached pieces of solid rock, and rippable rocks (as defined below). Common excavation shall be further classified into the following categories:
1. Contaminated Materials Excavation.
 2. Uncontaminated Materials Excavation.
- C. **Contaminated Materials Excavation:** Contaminated materials excavation shall include excavation of contaminated materials from the existing tailings pile, windblown areas, evaporation ponds, the wastewater retention basins, the washwater recirculation ponds, and any other contaminated areas identified by the Contractor.
- D. **Uncontaminated Materials Excavation:** Uncontaminated materials excavation shall include excavations of uncontaminated materials from the various areas of the sites including, but not limited to, excavations for embankment, drainage ditches, retention basins, trenches, and finish grading.
- E. **Overexcavation:** Overexcavation is defined as (1) excavation carried out beyond the lines and grades indicated on the Subcontract Drawings or (2) excavation carried out beyond the authorized limits set by the Contractor.
- F. **Sands:** The coarse fraction of the tailings defined as containing less than 30 percent passing the No. 200 sieve.
- G. **Sand Slimes:** A mixture of sand and slimes defined as having not less than 30 or more than 70 percent passing the No. 200 sieve.
- H. **Slimes:** Slimes are the fraction of the tailings consisting of silty clay, clay and clayey silt, defined as containing more than 70 percent passing the No. 200 sieve.
- I. **Percent Maximum Density:** Percent maximum density is a percentage of the maximum dry density obtained by the test procedure presented in ASTM D698.
- J. **Topsoil:** See Section 02110.
- K. **Tailings Embankment:** Tailings embankment shall consist of relocated contaminated materials and any other contaminated materials from the tailings piles, evaporation ponds, windblown areas, vicinity property materials, sediments from

wastewater retention basins, demolished materials and debris, and the protective cover materials placed and compacted as shown on the Subcontract Drawings and as specified in this Section.

- L. Subgrade Preparation: Subgrade preparation includes fine grading and compaction of excavations including drainage ditches, backfills, and embankments upon which bedding materials, riprap, filters or other features are to be constructed.
- M. Cover: Cover shall consist of the layers of following fill materials placed over the relocated contaminated materials in the tailings embankment as shown on the Subcontract Drawings:
1. Drainage materials and riprap materials. (See Section 02278.)
 2. Radon barrier material.
 3. Frost barrier material.
- N. Stockpiles of Demolished Materials and Debris: Existing stockpiles of demolished materials and debris consist of pieces of wood, concrete, masonry, steel members and demolished materials and debris resulting from demolition work specified under this Subcontract.
- O. Vicinity Properties Materials: These are contaminated materials from areas other than the processing site.
- P. Handling and Placing of Vicinity Property Materials: This shall include loading, hauling, spreading, moisture conditioning and compacting contaminated vicinity property materials on the tailings embankment area.
- Q. Finish grading shall include excavation and backfill of the various areas of the site including backfilling of evaporation ponds, retention basins, temporary drainage ditches, contaminated water recirculation ponds, sumps, and temporary facilities areas as shown on the Subcontract Drawings.
- R. Temporary Drainage Ditches: Temporary drainage ditches shall include temporary diversion and collector ditches as shown on the Subcontract Drawings.
- S. Permanent Drainage Ditches: Permanent drainage ditches shall include interceptor and toe ditches shown on the Subcontract Drawings.

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- T. Stockpiles and Containers of Asbestos, Hazardous and Non-Hazardous Materials: These are materials removed from the mill buildings and facilities and stockpiled and containerized on site for transport and disposal into the tailings embankment by Subcontractor.
- U. Rippable Rock: Rippable rock is defined as mineral matter in place and of such hardness and texture that it can be effectively loosened or broken down by ripping in a single pass with a late model tractor-mounted hydraulic ripper equipped with one digging point of standard manufacturer's design adequately sized for use with and propelled by a D10 bulldozer, or approved equal crawler-type tractor rated at a minimum of 500-net flywheel horsepower, operating in low gear.
- V. Frozen Material or Subgrade or Foundation: Material or Subgrade or Foundation that has a temperature below freezing and generally contains a variable amount of water in the form of ice.
- W. Average Seasonal High Groundwater Elevations: Monitor wells located in the alluvium of the Old and New Rifle processing sites indicate that the maximum seasonal high groundwater elevations occur during the month of June. The reference groundwater elevations based on contour maps developed from water level data from the monitoring well networks at the two sites are:
1. At Old Rifle Processing Site = El. 5305 feet
 2. At New Rifle Processing Site = El. 5263 feet

These elevations are average figures and may vary significantly from year to year.

1.5 APPLICABLE PUBLICATIONS

- A. The Publications listed below form a part of this Specification to the extent referenced. The Publications are referred to in the text by the basic designation only:

1. American Association of State Highway and Transportation Officials (AASHTO):

T99-86	Moisture-Density Relations of Soils Using a 5.5-lb. (2.5-kg) Rammer and a 12-in. (305-mm) Drop
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T180-86 Moisture-Density Relations of Soils Using a 10-lb. (4.54-kg) Rammer and a 18-in. (457-mm) Drop

2. American Society for Testing and Materials (ASTM):

C136-84 Standard Method for Sieve Analysis of Fine and Coarse Aggregates (Rev. A)

D422-63 Standard Method for Particle-Size Analysis of Soils

D698-78 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. (2.49-kg) Rammer and 12-in. (305-mm) Drop

D1140-54 Standard Test Method for Amount of Material in Soils Finer than the No. 200 (75-um) Sieve (R 1971)

D1556-82 Test Method for Density of Soil in Place by the Sand-Cone Method

D2167-84 Test Method for Density and Unit Weight of Soil In-Place by the Rubber-Balloon Method

D2216-80 Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures

D2922-81 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

D3017-78 Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

D4643-87 Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method

1.6 QUALITY ASSURANCE

A. The Contractor will take soil samples and perform moisture-density tests and particle size determinations to ascertain that the work is being performed in compliance with these Specifications. Samples may be taken on the fill itself. The Contractor will conduct the density and other tests on the fill and related laboratory testing as

frequently as the Contractor considers necessary. The Subcontractor shall remove surface material and render assistance as necessary to enable sampling and testing to be carried out.

B. Methods of Sampling and Testing:

- 1. Particle Size Analysis: ASTM D422 and ASTM C136
- 2. Percentage Passing No. 200 Sieve: ASTM D1140
- 3. In-Place Density: ASTM D1556, D2167, or D2922
- 4. Laboratory Moisture Content: ASTM D2216, D4643
- 5. Laboratory Moisture-Density Relations: ASTM D698
- 6. In-Place Moisture Content: ASTM D3017

C. Suitability of Materials: The suitability of all materials for foundations and backfill will be determined by the Contractor. Fill material shall be approved material from borrow areas or required excavations. [The suitability of radon barrier and frost barrier materials will be determined by the Contractor during cell excavation activities at Estes Gulch. The Subcontractor shall stockpile these materials in separate areas.]*

D. The Subcontractor shall make his own determination of any processing that may be required, and shall perform testing as required to ensure that the materials meet the Specification requirements.

E. The Contractor may direct that inspection trenches or test pits be cut into fills to determine that the Specifications have been met. Such trenches or pits will be of limited depth and size, and shall be backfilled with the material excavated therefrom, or other fill material meeting the requirements for the zones cut into. Backfill shall be compacted to a density at least equal to that specified for adjacent fills.

F. When the Contractor directs inspection trenches or test pits to be excavated into fills and backfills and materials are found to meet all Specification requirements, the excavation and refilling shall be paid for as additional work pursuant to the applicable provisions of the General Conditions. Inspection trenches or test pits, and the refilling of the same, shall be at the Subcontractor's expense when it is found that the materials do not meet the Specification requirements.

G. Tolerances: See Specification Section 01052, [Article 1.8]*.

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1.7 SUBMITTALS

- A. General submittal requirements are specified in Section 01300.
- B. The Subcontractor shall submit to the Contractor for approval, 15 days before he intends to dispose of any material in the spoil area, a plan showing the layout of his proposed activities. The plan shall show: location of rock spoil, location of excavated material, stockpile for topsoil, layout of sediment traps, and other measures for pollution control.

1.8 PROTECTION

- A. The Subcontractor shall preserve and protect the following:
 - 1. Trees, shrubs and other features remaining as a portion of final grading.
 - 2. Bench marks and monuments, existing structures, fences, walks, pavings, curbs, etc. from equipment and vehicular traffic.
 - 3. Utilities not specified for removal.
 - 4. Excavations from cave-in by shoring, bracing, sheet-piling, underpinning or by other methods.
 - 5. Excavation surfaces from frost prior to placing any fill or concrete on such surfaces.
 - 6. Perimeter of excavations to prevent surface water runoff into excavation.
 - 7. Monitor wells not to be sealed or demolished.
 - 8. Radon barrier materials that are placed prior to winter shutdown.
 - 9. Protection of plant species *Astragalus Wetherilli* along the haul road from Highway 13 to Estes Gulch.
 - 10. Sites defined in the report on Threatened and Endangered Species.
 - 11. Archaeological areas encountered during the work.

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PART 2 - PRODUCTS

2.1 UNCONTAMINATED FILL MATERIALS

A. General:

1. Uncontaminated fill material shall further be divided into the following categories:
 - a. General Fill - imported
 - b. Coarse Fill - imported
 - c. Radon Barrier Material
 - d. Radon Barrier Material amended with Bentonite
 - e. Frost Barrier Material
 - f. Topsoil Material

Radon barrier materials shall be obtained from the designated borrow areas. Gravel fill materials shall be furnished by the Subcontractor.

2. Fill materials shall be obtained from required excavations to the extent available. The materials excavated from one site shall be used as fill or backfill for finish grading of the other sites. Where the excavated materials do not meet the requirements of the Specifications or they are not available, the materials shall be furnished from Subcontractor's borrow areas.
3. Submittals for approval of sources proposed for use by the Subcontractor shall include boring logs, borrow area maps and supporting laboratory test data. The Subcontractor also shall provide evidence of availability, right of access to private property including access by the Contractor for sampling and testing, and his plan for hauling the materials to the site. Submittals for approval of sources for uncontaminated fill materials shall be received by the Contractor at least 60 days before use of the material at the site. The Contractor may perform additional tests to determine if the materials meet the requirements specified herein.
4. Approval will be based on evidence of compliance with the requirements specified herein and on verification by the Subcontractor that the volume of materials available is sufficient for construction requirements.

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5. Uncontaminated fill materials for top 6 inches of fill used in finish grading of the sites shall be a mixture of 50 percent topsoil and 50 percent generally fine grained excavated uncontaminated materials.
 6. Uncontaminated fill materials for common/general fill to be used as (i) fill or backfill below the top 6 inches of fill used in finish grading of the sites and as (ii) frost barrier fill for the tailings embankment cover shall conform to the following requirements:
 - a. Uncontaminated common/general fill material shall not contain deleterious substances of more than 5 percent organic material by volume.
 - b. Maximum particle size shall not be greater than three-fourths (3/4) the compacted lift thickness in any dimension, except as noted hereinafter. Individual large stones shall be distributed within the fill materials to provide visual voidfree mass, and be able to meet the requirements of Article 3.8.
- B. Radon Barrier Materials: Radon barrier materials shall consist of uncontaminated materials obtained [Text Deleted]* in the excavation of [the tailings embankment]* foundation and the toe ditch at the Estes Gulch disposal site. [Approximately 2/3 of the uncontaminated materials to be used for construction of the radon barrier shall be mixed with bentonite.]* The materials shall conform to the following requirements:
1. Materials shall consist of soils with 95 percent finer than 1 inch and with a maximum size of 3 inches. In addition, materials shall consist predominantly of soils with a minimum of 60 percent passing [the No. 200 sieve]* and shall be free from deleterious substances and with not more than one percent by volume of organic matter. For the purpose of this Subcontract, the word "predominantly" shall mean that at least four test results out of each consecutive five test results shall indicate a minimum of 60 percent passing [the No. 200 sieve]* and one test out of five excluding retests may have not less than 40 percent passing the No. 200 sieve. [Material testing for percentage passing or retained on specified sieves shall be in accordance with ASTM C136, D422 and D1140. Compliance with these Specifications will be determined by the Contractor.]*

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2. Radon barrier materials shall be screened or otherwise processed to reduce clod sizes to 1 inch or smaller prior to mixing with bentonite and moisture conditioning.
3. Bentonite:
 - a. Bentonite shall be a Wyoming sodium bentonite as obtained from H&H Bentonite, Grand Junction, Colorado, or an approved equal supplier.
 - b. Subcontractor shall submit test results or manufacturer's certificate stating that the bentonite conforms to the requirements of Specification 13A of the American Petroleum Institute. The Contractor reserves the right to inspect the manufacturer's facilities and verify the quality of the bentonite. Test results or manufacturer's certificate shall be submitted for each lot or shipment of bentonite in accordance with Section 01300.
- C. Frost Barrier Materials: Frost barrier materials shall consist of materials obtained from excavation of tailings embankment foundation and other excavated material from the Estes Gulch Disposal Site.
- D. Topsoil shall be stockpiled separately and shall not be used for radon barrier or frost barrier.
- E. Imported Uncontaminated Fill Materials: Imported uncontaminated fill materials shall be obtained from the Subcontractor's sources. Imported uncontaminated fill materials shall be as specified in Paragraph 2.1.A above, and in addition, shall meet the applicable requirements as follows:
 1. General Fill: Conform to Article 2.1.A above.
 2. Coarse Fill:
 - a. Coarse fill materials to be placed in dewatered excavations extending below the elevation of the average seasonal high groundwater (see Article 1.4 for definition of seasonal high groundwater) at Old Rifle and New Rifle processing sites shall be reasonably well graded within the limits shown below when determined in accordance with ASTM D422 and ASTM C136.

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<u>U.S. Standard Sieve Size (Square Openings)</u>	<u>Percent Passing (by weight)</u>
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Coarse Fill

18-inch	100
1-1/2-inch	50-100
No. 200	0-25

- b. Coarse fill materials shall be obtained from natural sand and gravel deposits with less than 5 percent by weight of deleterious materials, including clay lumps, friable particles, and organic matter.

2.2 CONTAMINATED FILL MATERIALS

Contaminated materials defined in Article SC-1 of the Special Conditions resulting from the clearing, stripping and excavation operations in contaminated areas. These materials shall include materials excavated from tailings pile, evaporation ponds, windblown areas, contaminated sediments from drainage ditches and wastewater retention basins, sumps and recirculation ponds and any other areas designated by the Contractor including vicinity properties, demolished materials and debris.

2.3 DEMOLISHED MATERIALS AND DEBRIS

- A. Contaminated demolished materials and debris stockpiled onsite by others shall be placed in the tailings embankment.
- B. Contaminated demolished materials and debris resulting from work specified under Section 02050 shall be placed in the tailings embankment.

2.4 VICINITY PROPERTIES MATERIALS

Vicinity properties materials delivered to the New Rifle site shall be loaded, hauled and placed in the tailings embankment.

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2.5 ASBESTOS, HAZARDOUS AND NON-HAZARDOUS MATERIALS

Existing stockpiles and containers of asbestos, hazardous and non-hazardous waste materials stored on the processing sites shall be transported to the disposal site and placed in the lower lifts of the tailings embankment as directed by the Contractor.

2.6 EQUIPMENT

- A. Vibratory rollers specified for compaction of gravel fill in [Article 3.5.D.8]* shall have a total static weight of not less than 20,000 pounds with at least 90 percent of the weight transmitted to the ground through a single smooth steel drum when the roller is in a level position. The diameter of the drums shall be a minimum of five feet and a maximum of five feet and six inches, and the width shall be a minimum of six feet and be equipped with suitable cleaning devices to keep them free of any accumulation of material. The frequency of vibration during operation shall be between 18 cps and 25 cps and the dynamic force applied by the roller shall be not less than 40,000 pounds at the operating frequency. The roller shall be self-propelled or suitable for towing by a crawler tractor with a minimum drawbar rating of 50 horsepower at speeds not exceeding three miles per hour. A Koehring/Bomag Model BW10S Vibratory Roller (tractor-towed), or approved towed or self-propelled equal shall be used. Prior to the use of a vibratory roller in the work, the Subcontractor shall furnish manufacturer's data, drawings, and computations to verify compliance with the above specifications for approval by the Contractor.
- B. Mixer: The mixer for mixing bentonite with the radon barrier material shall be capable of thoroughly mixing and controlling the percentage, by weight, of bentonite, soil, and water. The mixer shall be one of the following, or approved equal:
- [1. Portable pug-mill.
 2. Portable drum roll asphalt plant, Cedarapids 4820 (with continuous flow process).]*

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- C. Equipment for spreading bentonite on the ground, if used, shall be capable of uniformly spreading the specified amount of bentonite in one or two passes, where the second pass may be made transverse to the first pass. Equipment for spreading bentonite will be subject to Contractor's approval.
- D. All equipment for spreading and mixing bentonite, and for moisture conditioning radon barrier materials mixed with bentonite, will be subject to approval by the Contractor.

PART 3 - EXECUTION

3.1 PROTECTION OF EXPOSED SURFACES

- A. During seasonal shutdowns and during other periods of prolonged exposure (more than six weeks) of excavated or filled areas, the Subcontractor shall provide labor, materials and equipment, as required by the Contractor, to maintain and protect exposed surfaces of uncontaminated and contaminated materials against wind erosion and excessive stormwater erosion. Prior to the application of protective erosion control measures, the exposed surfaces shall be sloped to drain and compacted with a smooth drum roller to eliminate ruts and ridges formed by construction equipment. Unless otherwise approved by the Contractor, acceptable methods of erosion protection are as follows:
 - 1. Spraying with Water containing Chemical Additives: Acceptable chemical additives are CPB-12 as manufactured by Wen-Don Corporation, 206 West 2nd South, Price, Utah, 84501 and "Soil Seal Concentrate" as manufactured by Soil Stabilization Products Company of Merced, California, or approved equal. Mixing and application shall be in accordance with the manufacturer's recommendations, or
 - 2. Covering exposed surfaces with geotextile fabric such as "Supac" as manufactured by Phillips Fibers Corporation of Sacramento, California, or approved equal. Handling and installation shall be as recommended by the manufacturer of the product.
- B. The tailings surface shall also be graded to avoid any ponding of storm water on the surface both during shutdowns and during ongoing operations.
- C. Following a seasonal shutdown or period of prolonged exposure of more than 6 weeks, the Contractor will verify by

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density tests, that the last lift placed of materials previously placed and accepted by tests have been maintained at the applicable minimum specified density. Verification by density tests will be performed at frequencies to be determined by the Contractor. [Materials failing to meet specified density requirements shall be removed or reworked to satisfy the minimum specified density requirements at no additional cost to the Contractor.]*

3.2 EARTHWORK - GENERAL

A. Preparation:

1. Required lines, levels, contours and datum shall be identified before the start of earthwork operations.
2. The Subcontractor shall verify the existing above-ground and underground utilities, identify them, and notify the Contractor immediately of his finding, if any, for appropriate action.

B. Dewatering and Drainage: Prior to commencement of earthwork operations, the Subcontractor shall verify that the dewatering and drainage facilities are constructed and operational in accordance with the requirements of Section 02141. Temporary drainage ditches shall be constructed and maintained to provide drainage during construction.

C. In order to avoid cross-contamination of uncontaminated material, the contaminated and uncontaminated materials shall be kept separated during earthwork operations. Stockpiles of contaminated materials shall be placed on contaminated areas and the drainage collected in the retention basin.

D. The excavated uncontaminated materials, where practicable, shall be used as fill in various areas of the sites including the construction of dikes, general fill, roadway fill, structure fill, backfill, and fill for the final grading of the sites, as required. Uncontaminated excavated material may be stockpiled for later use.

E. Earthwork shall conform to lines and grades indicated on the Subcontract Drawings or as specified in this Section.

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3.3 EXCAVATION

A. General:

1. Excavation shall be carried out to the lines and grades indicated on the Subcontract Drawings or specified herein, or, in the case of contaminated materials, as required by the Contractor's Health Physics Personnel.
2. At all times, the Subcontractor shall conduct his operations in such a manner as to prevent free standing water and contamination of uncontaminated materials. The Subcontractor shall, as a minimum, take the following measures to safeguard against such problems:
 - a. Water leaving a contaminated area shall be routed into the retention basin as specified in Section 02141.
 - b. Exposed surfaces of contaminated and uncontaminated materials excavations shall be protected from erosion as specified in Article 3.1 above.
3. The Subcontractor shall remove all uncontaminated excavated material from the excavation site and dispose of it in fills required at the sites or in the designated spoil areas or use it for other purposes, as approved.
4. Unsuitable or low density subgrade material not readily capable of in-place compaction shall be excavated as directed by the Contractor and disposed of as specified in Article 3.4.
5. Adequate working space for safety of personnel shall be provided within the limits of the excavation.
6. Except as otherwise noted, care shall be exercised to preserve the material below and beyond the lines of all excavation. Where excavation is carried below grade, the Subcontractor shall at his cost backfill to the required grade or to indicated invert grade, as specified, and recompact the backfill to a minimum of 90 percent of maximum dry density as determined by ASTM D698.
7. Excavation for the convenience of the Subcontractor shall conform to the limits approved by the Contractor and shall be at no additional expense to the Contractor.
8. Excavated material shall be placed at sufficient distance from the edge of excavations to prevent cave-ins or bank slides.

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B. Contaminated Materials Excavation:

1. [The Subcontractor shall minimize where practicable the open excavation area of contaminated materials at all times during excavation work to minimize exposure to radon gas. The Subcontractor shall operate from one or two sides at one time, progressing uniformly to opposite sides for completion, unless otherwise approved by the Contractor.]* Contaminated materials shall be excavated to the depths indicated on the Subcontract Drawings, or as required by the Contractor based on monitoring of the excavations, and placed in the proper part of the tailings embankment at the disposal site. The contaminated material shall be excavated generally in priority of its placement in the disposal cell to minimize rehandling and stockpiling.
2. Some of the sands and slimes in the tailings stockpiles at the Old and New Rifle millsite have high moisture contents and may require special handling. The Subcontractor shall plan his excavation of the tailings stockpiles to maximize the mixing of the sands and the slimes e.g. by vertically excavating the face of the pile. The Subcontractor shall make his own determination of special handling methods to be used subject to the approval of the Contractor.
3. During the excavation operation, tests will be performed by the Contractor to determine radioactive contamination of the material to be excavated.

C. Uncontaminated Materials Excavation:

1. Drainage Ditches Excavation:
 - a. General: Ditches shall be cut accurately to the cross sections and grades where indicated. All roots, stumps, rock, and foreign matter in the sides and bottom of ditches shall be trimmed and dressed or removed to conform to the slope, grade, and shape of sections indicated. Care shall be taken not to excavate ditches below the grades indicated. Excessive ditch excavation shall be backfilled to grade with satisfactory, thoroughly compacted material as specified in Article 3.5 at no additional cost to the Contractor. Ditches shall be maintained until final acceptance of the Work.
 - b. Temporary Drainage Ditches: Temporary drainage ditches shall be excavated at locations shown on

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the Subcontract Drawings or as designated by the Contractor to collect and transport storm runoff, wastewater and water-bound contaminated material to the retention basins during construction. Temporary drainage ditches will not be subjected to the requirements of Article 3.8 but will be subjected to testing as determined by the Contractor.

c. Permanent Drainage Ditches:

- 1) Ditches shall be excavated true to line and grade. Any erosion which occurs to ditch excavation before placing erosion protection materials shall be repaired with compacted backfill as specified in Article 3.5. All such repairs shall be at Subcontractor's expense and shall not be included in pay quantities, unless otherwise shown on the Subcontract Drawings.
- 2) The top 6 inches of the subgrade shall be compacted to 90 percent of maximum dry density as determined by ASTM D698 test method. After compaction has been completed, finish grading shall be done in such a manner that the side slopes are smooth surfaces. All rocks, brush, roots, large clods, and other objects shall be removed before placement of the bedding material and the riprap material.

2. Disposal Cell Foundation: The excavation for the Disposal Cell foundation shall be carried out to the lines and grades as shown on the Subcontract Drawings or as designated by the Contractor. [The excavation shall extend down to a firm surface in or on the weathered bedrock or as directed by the Contractor.]* In some areas it may be necessary to excavate into the weathered bedrock to provide a smooth uniform surface to promote drainage. [The Subcontractor shall protect the surface of all prepared foundations from erosion, sedimentation and frost damage. Any such damage to the prepared foundations shall be corrected as required by the Contractor at no additional cost to the Contractor.]*

3.4 DISPOSAL OF EXCAVATED MATERIALS

- A. Contaminated Materials: All contaminated materials excavated from the tailings piles, retention basins, evaporation ponds, other areas of the site and vicinity properties, and demolished materials and debris resulting from all

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sources shall be used in the construction of the tailings embankment as specified herein. Contaminated material will be placed in the tailings embankment by priority generally as indicated on the Subcontract Drawings. Radiological monitoring of contaminated materials or construction expediency may change this priority, as directed by the Contractor. In the course of excavation, buried foundations and structures may also be encountered. All such materials shall be placed in the tailings embankment

B. Uncontaminated Materials:

1. Uncontaminated materials excavated from the sites, including excavations for trenches, drainage ditches and retention basins which are not classified as contaminated materials, shall be used as uncontaminated material fill for construction of various features including site grading, or stockpiled for later use as specified in this Section and as required by the Contractor.
2. Where used in fills, such material shall be transported directly from the excavation and placed in its final position in such fills whenever possible. If required by the Subcontractor's schedule, the material may be placed temporarily in stockpiles at approved locations at the Subcontractor's expense. Material in stockpiles shall be protected from contamination of any kind that would render it unsuitable for use in fills.
3. Excess uncontaminated materials remaining at the site after completion of all required fills shall be distributed over the site in the final grading. Larger rock particles shall be placed in the lower portions of the grading fills.

C. Garbage, refuse, debris, oil, and any waste material which is harmful to the environment shall be removed from the job site and disposed of offsite in a manner approved by the authority having jurisdiction over the offsite disposal facility.

D. All operations in the stockpile areas throughout the Work shall be in strict conformity with the requirements of this Section. The Subcontractor shall ensure that silty water from the stockpile areas does not enter nearby waterways. If required, to control silt in runoff water, temporary berms, detention ponds or silt fences shall be constructed by the Subcontractor.

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3.5 FILL CONSTRUCTION

A. General Requirements:

1. Fill materials shall be placed and compacted to the lines and grades shown on the Subcontract Drawings or as required by the Contractor.
2. Fill slopes shall be overbuilt by two tenths of a foot, then cut back to design grade to eliminate patching or crusting of fill areas.
3. If any portion of the materials placed as fill does not meet the specified requirements, the Subcontractor shall remove such material and replace it with fill materials meeting the specifications at no additional cost to the Contractor.
4. Prior to backfilling with uncontaminated fill materials, the subgrade will be radiologically surveyed by the Contractor to confirm that EPA standards have been met. These radiological surveys may cause delays to backfill operations of up to seven working days. The Subcontractor shall plan his work accordingly.
5. Constructed fills shall be maintained to meet the requirements of this Specification until final completion and acceptance of the Work. This shall include all measures to prevent erosion or contamination during construction, including contamination by radioactive material. During the work and during seasonal or other extended shutdowns, all exposed surfaces shall be protected with special treatments specified in Article 3.1 above.

B. Placing Requirements:

1. Prior to placement of materials, the in-place density of the soil subgrade shall be as specified in Article 3.7. Moisture conditioning shall be as required to obtain the specified compaction.
2. No material shall be placed on any portion of the subgrade or against or upon any structure until consent to place such fill has been obtained from the Contractor.
3. Materials shall not be placed on frozen subgrade or frozen embankment material foundations, nor shall frozen material be used as fill. See Article 1.4 for the definition of Frozen Material or Subgrade or Foundation.

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4. Contaminated materials excavated from existing tailings piles shall be placed in the lower layers of the tailings embankment. Contaminated materials excavated from the evaporation ponds, off-pile areas, and the vicinity property materials delivered to the processing site by others shall be placed in the upper portions of the tailings embankment.
5. Disposing of bulky materials shall be done with care to minimize the volume of voids created in the disposal mass. Bulky materials placed in the embankment shall, where possible, be uniformly distributed in the lower portions of the tailings embankment. Pieces of wood, concrete, and steel members shall be cut or broken up to be no greater than 20 feet in any dimension and no greater than 27 cubic feet in volume, and placed to avoid nesting in 2-foot-to-3-foot high piles with approximately 100 feet horizontal distance between the debris piles. In addition, there shall not be any debris placed within 20 feet of the outer edge of the embankment.
6. Contaminated organic materials shall not exceed 5 percent by volume and shall be evenly distributed throughout the tailings embankment layers to minimize differential settlement.
7. [Fill materials may require wetting or drying prior to compaction as approved by the Contractor. Some tailings sands and slimes may require spreading and extended drying time prior to compaction.]*
8. Fill materials shall be placed in continuous and approximately horizontal layers for their full length and width unless otherwise specified or specifically permitted by the Contractor.
9. Methods of dumping and spreading the materials shall ensure uniform distribution of the material.
10. The loose thickness of each layer of material shall not be greater than that required to achieve the specified compaction. For material containing particles having a maximum diameter of less than 10 inches, the loose lift thickness shall not exceed 12 inches. For material containing rock greater than 10 inches in diameter, the loose lift shall be kept to the minimum constructible thickness, as approved by the Contractor, and the material between the larger particles shall receive adequate

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compaction as approved by the Contractor. Loose thickness of each layer of material placed in dewatered excavations below the normal groundwater level at the processing sites shall not exceed 24 inches, and shall not be less than the maximum particle size in the backfill.

11. Unless otherwise indicated, fill materials shall be placed to a grade no flatter than 2 percent to facilitate drainage of water. In areas where ponding cannot be prevented or ponding has occurred and fill is required to be placed, placing shall begin only after the area is dewatered and permission to place is obtained from the Contractor.
12. When no longer needed for control of contamination, as determined by the Contractor, the temporary drainage ditches, retention basins, recirculation ponds, sumps, and the like shall be removed and the area restored and finish graded as shown on the Subcontract Drawings.

C. Mixing and Placing of Radon Barrier:

1. The first lift of radon barrier shall be spread over the final contaminated material surface with a loose lift thickness sufficient to ensure that the surface of the underlying contaminated materials is not disturbed or mixed into the radon barrier.
2. The top 12 inches of the radon barrier shall consist of uncontaminated soil thoroughly mixed with bentonite.
3. [The mixer for mixing bentonite with the uncontaminated material shall be capable of thoroughly mixing and controlling the percentage, by weight, of bentonite, soil and water. The mixer shall be one of the following, or approved equal:
 - a. Pug-mill.
 - b. Drum roll asphalt plant.

The bentonite-soil mixture shall be loaded into a bituminous-type paving spreader and laid down in controlled lifts as specified in this Section.]*

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4. Mixing of bentonite and soil shall be under dry conditions, not in windy/rainy conditions. Water shall be added only after dry (optimum and below) mixing of bentonite and soil are complete. The bentonite content after mixing shall not be less than 10 percent by weight. The percentage shall be determined by dividing the dry weight of bentonite by the dry weight of uncontaminated soil. Material with an initial moisture content above optimum as determined by ASTM D698 shall require spreading to accelerate drying before bentonite is added. The moisture content shall be brought to within specified limits after bentonite mixing is complete and at the time of compaction. Water shall be applied to the lift surface by methods approved by the Contractor.
5. Inclement Weather: If the work of placement of radon barrier material and/or [Text Deleted]* mixing of bentonite is interrupted by heavy rain or other unfavorable weather, such work shall not be resumed until after approval of the Contractor, who will determine either by visual means or by additional testing that the moisture content and density of the previously placed soil are acceptable.
6. The radon barrier layer shall be compacted to the requirements of Article 3.8.
7. [The surface of each compacted lift of the radon barrier shall be scarified by motor grader or other approved equipment to a depth of 1 to 2 inches and moisture conditioned if necessary to bring the material within the specified range of moisture content before placement of each successive lift.]* In addition, each successive loose lift shall be harrowed prior to mixing with bentonite and water for the amended layer or to compaction for the unamended portion to ensure that there are no clod sizes in [excess of 1 inch in maximum size prior to compaction.]*
8. The final surface of the radon barrier shall be compacted in a manner to prevent formation of ruts, depressions or low areas in which water can accumulate.
9. The top surface of radon and frost barrier materials shall be maintained to the specified densities and moisture contents to a minimum depth of 2 inches until

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the drain layer material is placed. If the top surface is at densities and moisture content lower than specified, then the surface shall be scarified to a minimum depth of 2 inches compacted and moisture conditioned to bring the material within the specified range of density and moisture content.

D. Compaction Requirements:

1. Each lift of fill materials shall be compacted to a minimum density specified in Article 3.8.

[2. Moisture Addition to Contaminated Materials:

a. Moisture shall only be added to contaminated materials for environmental dust control requirements. Dust control moisture shall be added to contaminated fill materials at the place of excavation preceding placement of the materials in the tailings embankment. Moisture shall not be added to contaminated materials in the tailings embankment area except when it is determined to be absolutely necessary for environmental dust control. The Subcontractor shall perform his operations to minimize the need for moisture addition to the extent practicable. Moisture addition shall not be permitted for the convenience of the Subcontractor. The Subcontractor shall use special measures such as fine spray nozzles to add moisture to contaminated materials, as approved by the Contractor, to minimize the amount of moisture added for dust control. Water from the wastewater retention basins may only be used for dust control in contaminated excavation areas, on contaminated haul roads and on contaminated fills.

b. Moisture added to radon barrier materials in the tailings embankment area shall be applied in a manner that prevents runoff onto contaminated materials.]*

[3.]* Subject to the approval of the Contractor, the Subcontractor shall make his own determination of the need for and extent of drying or moisture conditioning necessary in order to achieve specified placement and compaction requirements for the frost barrier and contaminated fill materials.

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- [4.]* During compaction of radon barrier materials, moisture content shall be maintained within optimum to plus three (3.0%) percent of the optimum as determined by ASTM D698.
- [5.]* If the rolled surface of any lift of the fill in place is too wet for proper compaction of the layer of fill material to be placed thereon, it shall be removed, allowed to dry or worked with harrow, scarifier, or other suitable equipment to reduce the water content to the required amount, [and then re-compacted before the next succeeding layer of fill is placed at no additional cost to the Contractor.]*
- [6.]* Fill placed at densities lower than the specified minimum density or at moisture contents outside the specified acceptable range of moisture content shall be reworked to meet the density and moisture requirements or removed [and replaced by acceptable fill compacted to meet these requirements at no additional cost to the Contractor.]*
- [7.]* Uncontaminated fill material to be stockpiled shall be placed by spreading with a bulldozer and track walking. Compaction shall be accomplished by routing of hauling and spreading equipment units over the fill. Locations of spoil areas shall be determined by the Contractor.
- [8.]* Compaction of fill with more than 30 percent retained on a 3/4-inch standard sieve:
- a. Prior to compaction, materials shall be moisture conditioned as approved by the Contractor.
 - b. Compaction shall be accomplished by any of the following combinations of passes and equipment, or approved equal combination:
 - 1) Three passes of a Caterpillar Compactor Model 825C.
 - 2) Three passes of a BOMAG Vibratory Roller Model 213D.
 - 3) Three passes of a Raygo Vibratory Roller Model 400A.
 - 4) Four passes of a track-type tractor with ground pressure of 9.8 pounds per square inch or greater.

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[9.]* Compaction of radon barrier materials shall be accomplished by the use of tamping-foot rollers. The length of the feet on the tamping foot rollers shall not be less than 7 inches. The top surface of the contaminated materials and drainage materials shall be compacted by the use of a smooth drum roller. The weight of the smooth drum roller shall be not less than 70,000 lbs. The final lift of the radon barrier shall be bladed and compacted with a smooth drum roller after being compacted with the tamping foot roller and while the moisture content is still above optimum.

[10.]* The top surface of the compacted final lift of radon barrier shall be bladed to a uniform and smooth grade, as indicated on the Subcontract Drawings, by track-walking with a D6 or larger bulldozer operating parallel to the slope.

3.6 FIELD QUALITY CONTROL

- A. General: The Contractor will take samples and perform tests throughout the construction period, and the Subcontractor shall cooperate in providing access for the Contractor to areas where testing is to be performed and shall schedule his placing to avoid interference with the testing operations.
- B. Tests: The Contractor will perform the following tests on a regular basis.
1. In-place density and moisture content tests for compacted materials where density is specified will be as follows:
 - a. A minimum of one test per 1,000 cubic yards of compactable contaminated and uncontaminated materials placed at the disposal site.
 - b. A minimum of one test per 5,000 cubic yards of materials placed at the processing sites.
 - c. A minimum of one test per 500 cubic yards of radon barrier material placed.
 - d. At least two tests for each day of material placement in excess of 150 cubic yards.
 - e. A minimum of one test per lift and one test per full shift of compaction operations.

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- 2. In-place density tests on areas of soil subgrade at a minimum of one test per 5,000 square yards of the surface area after compaction as stated in Paragraph 3.7.B.
- 3. [Percentage by weight passing the No. 200 sieve and 1-inch sieve (as determined by ASTM C136, D422 and D1140) of radon barrier materials shall be a minimum of one test per 1000 cubic yards placed, with a minimum of one test per day during placement. Allow at least 24 hours for each gradation test performed by the Contractor. Percentage by weight passing the No. 200 sieve and 1-inch sieve (as determined by ASTM C136, D422 and D1140) and permeability tests on samples of radon barrier material mixed with bentonite shall be a minimum of one test for every 10,000 cubic yards of materials selected to be used for radon barrier consisting of uncontaminated soil mixed with bentonite.]*
- 4. Gradation tests (as determined by ASTM C136), at least one test per day and a minimum of one test per 10,000 cubic yards of coarse uncontaminated material placed in dewatered excavations below the average seasonal high groundwater at the processing sites.
- C. The placing and compacting of stockpile fills shall be subject to the approval of the Contractor.

3.7 SUBGRADE PREPARATION

- A. Subgrade Preparation: Subgrade preparation includes fine grading and compaction of excavations, backfills, embankments (including stockpiles) upon which pavement, surfacing, base, subbase, and riprap or other structures are constructed.
- B. The entire surface of the subgrade exclusive of that within the Colorado State Highway right-of-way and the upland drainage area north of the tailings embankment shall be compacted to 90 percent of maximum dry density as determined by ASTM D698 test method to a depth of 12 inches.
- C. The surface of the subgrade of the upland drainage area north of the tailings embankment shall be compacted to 95 percent of maximum dry density as determined by ASTM D698 test method to a depth of 12 inches.
- D. If subgrade is encountered which is too rocky and cannot be tested by AASHTO T99, the subgrade shall be compacted in accordance with [Article 3.5.D.8]*.

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- E. [Where the subgrade consists of natural undisturbed bedrock, no compaction will be required.]*
- [F. Where the subgrade consists of bedrock composed of fragmented or loose material, compaction shall be in accordance with Article 3.5.D.8.]*

3.8 COMPACTION DENSITIES

- A. Each layer of embankment and backfill except for areas below the water table at the Rifle processing sites shall be compacted to at least the following percentage of maximum dry density, as determined by ASTM D698 test method:
 - 1. Tailings Embankment: Top 2 feet
beneath radon barrier 95 percent
 - 2. Embankment and Other Fill Areas
including Trenches for Leachate
Drain System: 90 percent
 - 3. Trench Backfill: 95 percent
 - 4. Radon Barrier: Top 12 inches 100 percent
 - 5. Radon Barrier: Below top 12 inches 95 percent
 - 6. Site Restoration: 90 percent
 - 7. Frost Barrier: 90 percent
- B. Compaction of subgrade, embankments and backfills within the Colorado State Highway right-of-way shall comply with Section 203.11 of the Colorado Standard Specifications.
- C. Backfill in dewatered excavations extending below the water table at the processing sites and other backfill and fill materials containing more than 30 percent by weight of the material greater than 3/4 inches, shall be compacted in accordance with [Article 3.5.D.8]*.
- D. Compaction densities and moisture contents shall be rounded to the nearest tenth of a percent.

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3.9 DISPOSAL OF DEMOLISHED MATERIALS AND DEBRIS

- A. All demolished materials and debris stockpiled onsite and demolished materials and debris resulting from demolition work specified in Section 02050 shall be disposed of in the tailings embankment conforming to the applicable provisions of this Section and as required by the Contractor.
- B. During construction of the tailings embankment, demolished materials and debris shall be placed concurrently with tailings.

3.10 DISPOSAL OF VICINITY PROPERTY MATERIALS

- A. During the progress of the Work of this Subcontract, contaminated vicinity properties materials shall be delivered to the New Rifle site by others under a separate subcontract from the Contractor. The Subcontractor shall coordinate the deliveries of such materials to conform to his construction schedule through the Site Manager.
- B. The Subcontractor shall receive, sort and stockpile such materials, transport and spread on the tailings embankment, moisture condition, place and compact, as required, in the construction of the tailings embankment conforming to the applicable provisions of this Section and as required by the Contractor.

3.11 HANDLING AND DISPOSAL OF ASBESTOS, HAZARDOUS AND NON-HAZARDOUS MATERIALS

- A. Existing stockpiles and containers of radiologically contaminated asbestos, hazardous and non-hazardous materials shall be transported from the processing sites to the disposal site and disposed of in the construction of the tailings embankment.
- B. The Subcontractor shall comply with the applicable provisions of (1) Article SC-8 of the Special Conditions and (2) Section 02081.

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PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. [Measurement for payment for the following items of excavations will be by the cubic yards of material placed in the disposal cell. The quantities for payment will be computed by average end area method from surveys conducted before and after placement operations.

1. Placement into the Tailings Embankment at Estes Gulch Disposal Site of all Excavated Contaminated Materials, Windblown Contaminated Materials and Contaminated Vicinity Property Materials from Old Rifle and New Rifle Sites and Existing Stockpiles of Demolished Materials and Debris (Bid Schedule Item 401)]*

B. Measurement for payment for the following items of excavation will be by the cubic yards of materials excavated. The quantities for payment will be computed by average end area method from surveys conducted before and after excavation operations:

1. Common Excavation of Uncontaminated Material from Temporary Drainage Ditch at Estes Gulch Disposal Site (Bid Schedule Item 216)
2. Common Excavation of Uncontaminated Material from Wastewater Retention Basin at Estes Gulch Disposal Site (Bid Schedule Item 218)
3. Common Excavation of Uncontaminated Soil from Permanent Ditches at Estes Gulch Disposal Site (Bid Schedule Item 220)
4. Common Excavation of Uncontaminated Soil from Foundation of Tailings Embankment at Estes Gulch Disposal Site (Bid Schedule Item 501)
5. Common Excavation of Uncontaminated Soil for Finish Grading of Estes Gulch Disposal Site (Bid Schedule Item 801)

C. Measurement for payment for the following items of fills will be by the cubic yards of materials placed. The quantities for payment will be computed by average end area method from surveys conducted before and after placement:

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1. Placement of Excavated Uncontaminated Material from Temporary Drainage Ditch as Fill for Temporary Drainage Ditch (Bid Schedule Item 217)
 2. Placement of Excavated Uncontaminated Material from Wastewater Retention Basin as Fill for Wastewater Retention Basin (Bid Schedule Item 219)
 3. Placement of Excavated Uncontaminated Material from Toe Ditch as Fill for Toe Ditch (Bid Schedule Item 221)
 4. Placement of Excavated Uncontaminated Materials as Fill or Backfill for Finish Grading of Estes Gulch Disposal Site (Bid Schedule Item 802)
 5. Placement of Excavated Uncontaminated Materials as Fill for Radon Barrier (Bid Schedule Item 502)
 6. Placement of Excavated Uncontaminated Materials as Fill for Frost Barrier (Bid Schedule Item 504)
 7. Placement of Excavated Uncontaminated Materials as Fill or Backfill for Finish Grading of Old Rifle Processing Site (Bid Schedule Item 803)
- D. Measurement for payment for furnishing and mixing bentonite will be by the tons of material furnished and placed. The quantities for payment will be calculated from the weigh slips of the material delivered to the site and utilized in the Work. (Bid Schedule Item 503)
- E. Measurement for payment for furnishing and placing the following items of uncontaminated materials will be by the cubic yards of materials furnished and placed. The materials shall be furnished from Subcontractor's own sources. The quantities for payment will be computed by average end area method from surveys conducted before and after placement:
1. Furnish and Place Coarse Uncontaminated Materials as Fill or Backfill for Finish Grading of Old and New Rifle Processing Sites (Bid Schedule Item 804)
 2. Furnish and Place Uncontaminated Materials (General Fill) for Finish Grading of Old and New Rifle Processing Sites (Bid Schedule Item 803)
- F. Separate measurement for payment will not be made for the following items, and such work will be considered incidental to the related items of work:
1. Subgrade preparation.

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2. Temporary stockpiling of excavated materials.
 3. Required rehandling of materials.
 4. Temporary storage of bentonite.
 5. Borrow area excavation, restoration, reseeding and incidental activities.
 6. Protection of exposed surfaces during shutdown.
- G. Overexcavation: Overexcavation for the Subcontractor's convenience or due to error or lack of control by the Subcontractor will not be measured for payment. At the discretion of the Contractor, such overexcavation shall be backfilled with compacted contaminated or uncontaminated fill, as required, at the Subcontractor's expense.
- H. Separate measurement for payment will not be made for any other excavations or fills specified in this Section.
- I. Measurement for payment for the following will be by lump sum:
1. Handling and Removal of Existing Stockpiles of Demolished Materials and Debris and Asbestos, Hazardous and other Nonhazardous Materials from Old and New Rifle Processing Sites and Disposal at Estes Gulch Disposal Site (Bid Schedule Item 403)
- J. Measurement for payment for disposal of demolished materials and debris resulting from work specified in Section 02050 of this Subcontract will be as specified in Section 02050.
- [K. Measurement for payment for furnishing and installing displacement monuments will be by the number of monuments installed.]*

4.2 PAYMENT

- A. Payment for the items of Article 4.1.A above will be by their applicable unit prices per cubic yard quoted therefor in the Bid Schedule. The prices quoted shall include full compensation for excavating, hauling, and placing the excavated materials in their final locations including all clearing at the processing site, stripping, grading, shaping, preparing subgrade, moisture conditioning, compacting, temporary stockpiling and required rehandling.

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- B. Payment for the items of Article 4.1.B above will be by their applicable unit prices per cubic yard quoted therefor in the Bid Schedule. The prices quoted shall include full compensation for excavating, hauling, and placing the excavated materials in temporary stockpiles, or in spoil areas if excess or unsuitable for use as fill, as required, including all clearing at the processing site, stripping, grading, shaping, and compacting such stockpiles or areas as specified.
- C. Payment for the items of Article 4.1.C above will be by their applicable unit prices per cubic yard quoted therefor in the Bid Schedule. The prices quoted shall include full compensation for hauling the materials from excavated areas or retrieving the materials from temporary stockpiles, as required, and placing the excavated materials in their final locations including all clearing at the processing site, stripping, grading, shaping, preparing subgrade, and compacting, as required.
- D. Payment for furnishing and mixing bentonite will be by the unit price per ton quoted therefor in the Bid Schedule. The price quoted shall include full compensation for hauling and mixing bentonite with uncontaminated fill for placement as radon barrier.
- E. Payment for the items of Article 4.1.E above will be by their applicable unit prices per cubic yard quoted therefor in the Bid Schedule. The prices quoted shall include full compensation for furnishing the required materials from the Subcontractor's own sources and placing, including clearing, stripping, grading, shaping, preparing subgrade, moisture conditioning and compacting, and restoration of borrow areas, as required.
- F. Separate payment will not be made for the items mentioned in Article 4.1.F above. All costs for such work will be considered to be included in the prices quoted for the applicable related items of work.
- G. Separate payment will not be made for any other excavations or fills specified in this Section. All costs for excavations or for furnishing and placing such fills will be considered to be included in the related items of excavation.
- H. Payment for the items of Article 4.1.I above will be by their applicable lump sum prices quoted therefor in the Bid Schedule. The prices quoted shall include full compensation for loading and transporting the materials and containers from the processing sites to the disposal site, and placing and compacting in the tailings embankment.

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- I. Payment for disposal of demolished materials and debris resulting from the work specified in Section 02050 of this Subcontract will be as specified therein.
- J. Payment for handling and disposal of (contaminated) vicinity properties materials will be by the unit price per cubic yard quoted therefor in the Bid Schedule. The price quoted shall include full compensation for coordinating the delivery of materials with the Vicinity Properties Subcontractor, receiving and placing the materials in the tailings embankment including moisture conditioning and compacting, as required.
- K. Separate payment will not be made for prolonged maintenance of stockpiles, slopes, cuts or fills, as stated in Articles 3.1.A.1, 3.1.A.2 and 3.1.B of Seasonal Shutdown.
- [L. Payment for furnishing and installing displacement monuments will be by the unit price quoted therefor in the Bid Schedule.]*

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