

*Office of Environmental Management – Grand Junction*



**Attachment 4  
Water Resource Protection Strategy  
at Crescent Junction**

June 2006



U.S. Department  
of Energy

**Office of Environmental Management**

*Work Performed Under DOE Contract No. DE-AC01-02GJ79491  
for the U.S. Department of Energy Office of Environmental Management.  
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Appendix A Material Placement in the Disposal Cell

## Contents

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Appendix B Infiltration Modeling for Alternative Cover Design

U.S. Department of Energy—Grand Junction, Colorado

Calculation Cover Sheet

Calc. No.: MOA-02-05-2006-5-24-00    Discipline: Construction    No. of Sheets: 3

Project: Moab UMTRA Project

Site: Crescent Junction Disposal Site

Feature: Material Placement in the Disposal Cell

Sources of Data:

UMTRA Specifications, Earthwork, Section 02200, Revision 15, Document Number 5025-GRJ-S-01-01029-17

Sources of Formulae and References:

None.

Preliminary Calc.     Final Calc.     Supersedes Calc. No.

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## **Problem Statement:**

Develop a placement methodology that allows the residual radioactive material to be placed in the cell in manner that is efficient for construction but does not cause excessive or differential settlement or provide conditions that would cause the tailings to be susceptible to liquefaction. In addition, the placement method must be able to handle the oversized material and debris that must be disposed of in the cell.

## **Method of Solution:**

The UMTRA program has successfully constructed and disposed of residual radioactive material and debris in 22 disposal cells. Utilizing the same method is warranted at this site.

## **Assumptions:**

Existing specification incorporates lessons learned during a multiple-year, multiple-site project and is relevant for the work in Moab.

## **Calculation:**

Not Applicable. See Discussion section.

## **Discussion:**

### Sample Material Placement Specification

- No material shall be placed on any portion of the subgrade or against any berm until consent to place fill is obtained from the Contractor.
- Material shall not be placed on frozen subgrade or frozen material, nor shall frozen material be placed in the cell for final placement.
- Material shall be placed to maintain positive drainage and to prevent ponding. Prior to forecast precipitation events, the subcontractor shall roll or back-blade material to provide a compacted surface that promotes runoff.
- Fill materials shall be placed in continuous and approximately horizontal lifts for their full length and width unless otherwise specified or specifically permitted by the Contractor.
- Method of dumping and spreading of material shall ensure uniform distribution of material and prevent segregation.
- Loose thickness of each lift of materials shall not be greater than that required to achieve the specified compaction. In no case shall the lift thickness exceed 12 inches, except in cases of backfilling around debris that requires thicker lifts.
- Material shall be placed and compacted to a density of at least 95 percent of Standard Proctor maximum dry density and -3 percent to +2 percent of optimum moisture content.
- Wet materials may be disked, blended, scarified, plowed, or air-dried in order to meet required moisture content. Dry materials may need to be blended with wetter materials or be wetted to meet the required moisture content.
- Materials that have been placed and compacted that are outside the range of either density or moisture content shall be re-worked until the materials meet the requirements.
- Disposal of oversized material (greater than 6 inches in any direction) and debris shall be done evenly in the embankment to minimize the voids created. Material shall be spread out to promote compaction of material in the voids and to prevent nesting. Debris shall be disposed of at least 10 feet (ft) below the bottom of the radon barrier.

- Debris shall be no greater than 10 ft in any dimension and no greater than 27 cubic ft in volume. The autoclaves may be placed intact. Subcontractor shall provide a Work Plan describing loading, unloading, movement, placement, and placement of soil material around the autoclaves. All other material shall be size-reduced to the maximum dimensions stated.
- Loads of debris shall be placed at least 15 ft apart.
- Large amounts of debris/trash that cannot be sized should be evenly spread.
- Loads of debris shall have at least 5 ft of separation vertically.
- Wide drains (geotextile material) do not need to be sized.
- Temporary toe drains, pumps, and piping shall be installed, operated, and maintained at the low end of the cell to remove construction water, precipitation runoff, and pore water until directed by the Contractor.

#### Field Quality Control

- Subcontractor will take samples and perform quality-control tests throughout the construction period in conformance with the Contractor-approved quality-control plan. Contractor may observe quality-control tests and will perform quality assurance tests. Subcontractor shall provide safe access for quality assurance tests and shall provide timely test data and any required assistance to the Contractor.
- In-place density and moisture-content tests shall be performed at a minimum of one test per 1000 cubic yards of material placed.
- There shall be a minimum of one in-place density and moisture content test performed on each shift of material placement.
- There shall be a minimum of one in-place density and moisture content test performed on each lift of material placement
- Locations of in-place density and moisture content tests shall be surveyed for northing, easting, and elevation. Locations shall be plotted and reported.

#### **Conclusion and Recommendations:**

- Additional detail will be provided in final specifications.

#### **Computer Source:**

- Not applicable.