



Composite Cover System for the Monticello Millsite Repository

The U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), the State of Utah Department of Environmental Quality (UDEQ), the Monticello Site Specific Advisory Board, and the general public have actively participated in the design process of the cover. The composite cover is a multilayered earthen and geomembrane (plastic) design. The purpose of this fact sheet is to provide information specific to the design and construction of the cover. The placement of contaminated material in the repository will be completed by the end of August 1999.

Background

The original Monticello mill was built in 1942 to provide an additional supply of vanadium during World War II. The mill was modified in the early 1950s to process uranium ore. Milling continued intermittently until the early 1960s, when the mill was dismantled.

Tailings are the sandlike material that remains after processing of ore. Uranium tailings contain naturally occurring materials that radioactively decay to radium and then to radon, a radioactive gas. Tailings and uranium ore contaminated properties in and around the city of Monticello. Tailings were dispersed by wind and water from the millsite and residual ore remained from hauling and stockpiling operations.

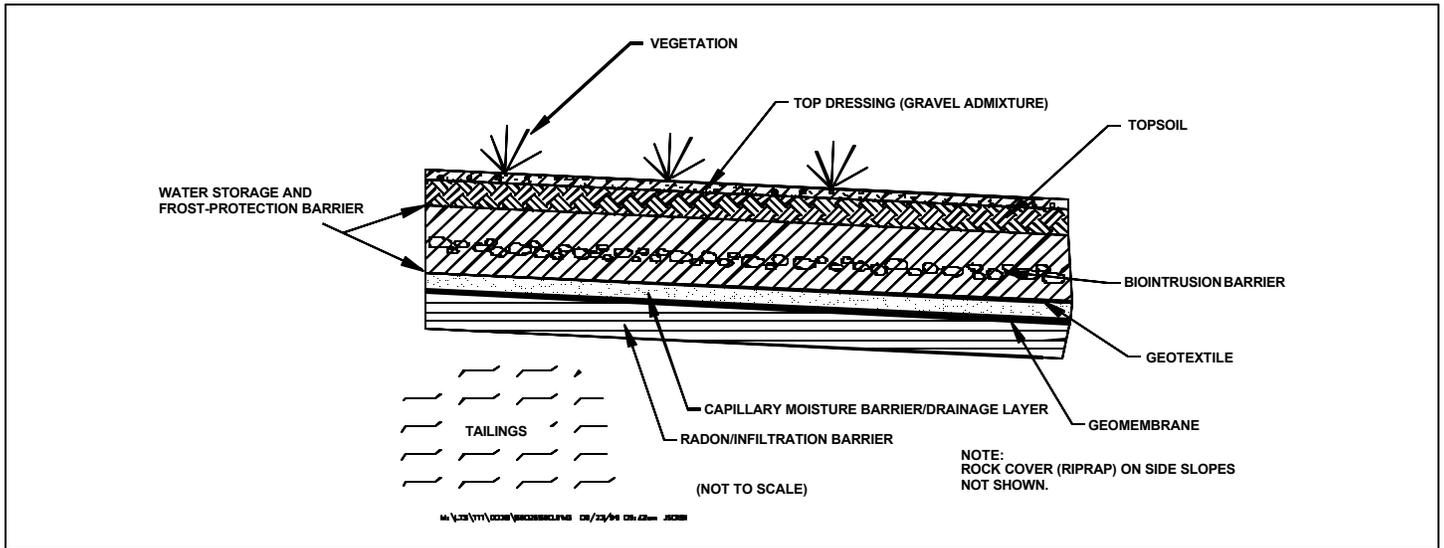
DOE entered into an agreement with EPA and UDEQ to clean up tailings under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The cleanup must also comply with applicable or relevant and appropriate Federal, State, and local environmental laws and regulations.

Design

In 1995, it was estimated that a total of 2.3 million cubic yards of tailings and tailings-contaminated materials would be placed in the repository. Currently, the repository contains 2.5 million cubic yards of material. To accommodate the additional material, the cover was raised 4 feet on the west half and 8.5 feet on the east half of the repository, but the proportions of the cover that will have native vegetation or rip rap (various size rock) did not change. The cover is a multilayered earthen and geomembrane design. The design meets or surpasses the EPA minimum technology guidance for hazardous-waste landfill disposal facilities. The cover was designed to control the release of radon, to enhance isolation of contaminants over the long term, and to prevent infiltration of precipitation into the radon barrier and underlying tailings.

From the top of the tailings upward, the cover consists of eight layers.

- **Radon/Infiltration Barrier**—Thickness: 24 inches. Composition: Clay-like soil that is moisture-conditioned and compacted to maximize radon attenuation.
 - **Geomembrane**—Composition: 60-mil high-density polyethylene (plastic) serves as a water-infiltration barrier.
 - **Capillary Moisture Barrier/Drainage Layer**—Thickness: 14 inches. Composition: Well-graded sand. This layer allows moisture to drain at the perimeter of the cover.
 - **Geotextile**—Composition: Nonwoven geosynthetic serves as a layer separator during construction.
 - **Water Storage, Frost-Protection, and Biointrusion Barrier**—Composition: This layer, 40 inches in thickness, includes a 12-inch biointrusion barrier consisting of cobbles with 12 to 14 inches of clay-like soils above and below the cobbles.
 - **Topsoil/Gravel Admixture**—Topsoil/gravel admixture total thickness: 24 inches. Topsoil: 16 inches of topsoil to support vegetation. Gravel admixture: 8-inch-thick mixture of topsoil and gravel provides erosion protection.
 - **Vegetation**—Composition: Mixture of vegetation designed to maximize soil water extraction and erosion protection.
 - **Rock Cover**—A rock cover will be used on the north- and east-facing side slopes with gradients of 5:1 and 10:1 (horizontal:vertical). The term 5:1 means that for each 5-foot horizontal increment there is a 1-foot change in elevation. On the west and south side of the repository, the slopes will be either 20:1 or 18:1. These more gradual slopes are designed to blend in with the surrounding terrain. Approximately 60 percent of the surface area of the cover will be native vegetation.
- Monticello Site Specific Advisory Board members expressed concern that the repository blend in with the



surrounding environment. DOE has located rock at a local quarry that will be used on the steeper slopes. This rock meets the color criteria as well as the durability criteria.

Following completion of emplacement of the cover components and revegetation, the repository cell will be placed under the DOE Long-Term Surveillance and Maintenance Program indefinitely. The site will be monitored annually and the cover and surrounding areas will be assessed for damage and erosion. It is estimated that it will take 2 or 3 years for the vegetation to become established. To protect the vegetation, a wildlife fence around the area will restrict grazing by deer and cattle for a minimum of 5 years.

Pond 4, located just east of the repository, will be retained to collect drainage from the tailings for an expected 5 to 20 years. A wildlife fence was installed around the pond to protect the liner from damage by deer and other wildlife. No discharge from the pond to the environment is expected to occur as this is a triple-lined pond with leak-detection capability.

Progress

Several layers of the cover have already been placed in the repository. Installation of the cover began May 25, 1999. The west end of the cover is complete except for the topsoil and vegetation. The east end, barring unforeseen weather, is scheduled for completion by December 31, 1999.