Fact Sheet

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U.S. DEPARTMENT of ENERGY | Office of Legacy Management

Bluewater, New Mexico | Disposal Site

AN UMTRCA TITLE II SITE

This fact sheet provides information about the **Bluewater site.** Long-term stewardship responsibilities for this site are managed by the **U.S. Department of Energy Office of Legacy Management** under **Title I** of the **Uranium Mill Tailings Radiation Control Act of 1978.**

Site Information and History

The Bluewater disposal site is in Cibola County, approximately 9 miles northwest of Grants, New Mexico. Anaconda Copper Company constructed the original carbonate-leach mill at the site in 1953 to process limestone uranium ore mined in the vicinity of the site. The mill had a production capacity of 300 tons of ore per day. An acid-leach mill was constructed in 1957 to process sandstone uranium ore from the Jackpile-Paguate mine, the largest open-pit uranium mine in North America, located north of Laguna Pueblo. The carbonate-leach mill closed in 1959, and production in the acid-leach mill was reduced for economic reasons. The acid-leach mill resumed full operations in 1967, and the capacity of the mill had increased to 6,000 tons of ore per day by 1978. Milling operations at the site ended on February 14, 1982. In 1977, the Anaconda Copper Company became a subsidiary of the Atlantic Richfield Company (ARCO).

Uranium ore processing at the Bluewater mill produced radioactive tailings, a predominantly sandy material. The tailings were conveyed in slurry from the mill to two locations, depending on the milling method. The acid-leach tailings were segregated from the carbonate-leach tailings to prevent chemical reactions from occurring as a result of mixing acidic and basic compounds. Process water in the tailings slurry seeped into the underlying alluvial and bedrock (San Andres-Glorieta) aquifers and contaminated the groundwater.

ARCO began decommissioning the mill in 1989 and began site reclamation in 1991. By 1995, all mill tailings, contaminated soils, demolished mill structures, and contaminated vicinity property materials were encapsulated in on-site disposal areas. These areas are the main tailings disposal cell, the carbonate tailings disposal cell, an asbestos disposal area, a disposal area that also contains a polychlorinated biphenyl (PCB) disposal cell, and two small former dumps.

Regulatory Setting

Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA) in 1978 (Public Law 95-604). The site is under the jurisdiction of Title II of UMTRCA, which applies to uranium mill sites that were under active U.S. Nuclear Regulatory Commission (NRC) license when UMTRCA was enacted. Title II of the legislation specifies that after reclamation is completed, long-term custody of the site is the responsibility of either the federal government or the host state, at the option of the state. The state of New Mexico declined to become the long-term custodian, and the U.S. Department of Energy (DOE) assumed responsibility for the site.

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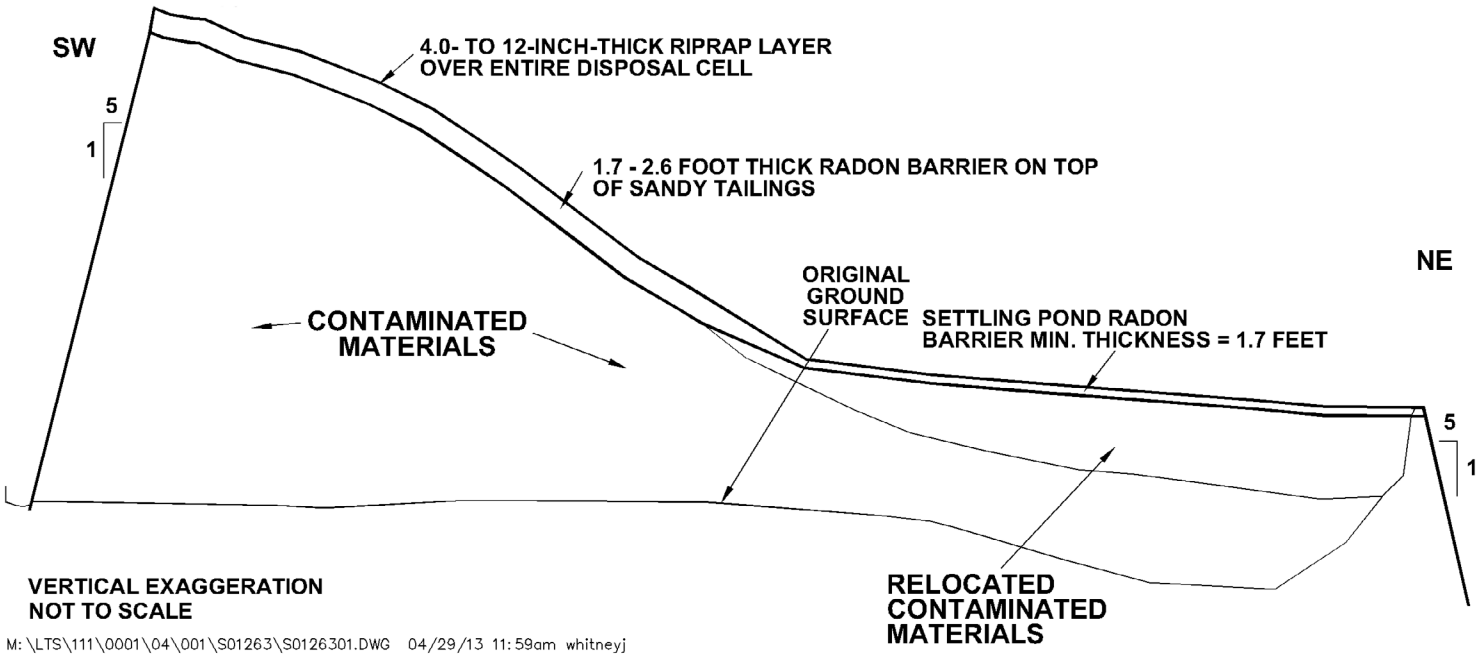

Southwest-Northeast Cross Section of the Main Tailings Disposal Cell at the Bluewater Disposal Site.

Under Title II of UMTRCA, the licensee, ARCO, was responsible for remedial action. ARCO encapsulated the tailings in two disposal cells and other contaminated materials in disposal areas meeting NRC design requirements. NRC's cleanup and reclamation standards are codified in Title 10 *Code of Federal Regulations* (CFR), Part 40, Appendix A. These standards conform to U.S. Environmental Protection Agency (EPA) standards in 40 CFR 192. The site was included under the NRC general license for UMTRCA Title II sites (10 CFR 40.28) and transferred from ARCO to DOE for long-term custody in 1997.

Disposal Site

The site comprises 3,300 acres, about one-third of which (the southern and western parts) is covered by basalt flows that filled a former river valley and covered alluvial sediments that were present in the valley. The alluvial aquifer at the site is contained in the buried alluvium, which is covered by up to 130 feet of basalt. Much of the remainder of the site consists of sedimentary rock outcrops and large areas of wind-deposited, fine-grained materials. The region around the disposal site is sparsely populated, and the main land use near the site is grazing. A barbed wire perimeter fence encloses the entire site.

Mill Tailings Disposal Cells

Mill tailings were encapsulated in two engineered disposal cells: the main tailings disposal cell (acid-leach tailings) and the carbonate cell (carbonate-leach tailings). The main tailings disposal cell, which includes the contiguous acid tailings and south bench disposal areas, covers about 354 acres and contains an estimated 23 million tons of tailings and other contaminated materials having a total activity of about 11,200 curies of radium-226. The cover of the main tailings disposal cell is a two-layer system designed to encapsulate and protect the contaminated materials. The cover consists of a low-permeability radon barrier (first layer placed over compacted tailings) and a rock (riprap, second layer placed over radon barrier) erosion protection layer. More than 90% of the total tailings material is encapsulated in the main tailings disposal cell.

The carbonate tailings disposal cell covers about 54 acres and contains an estimated 1.3 million tons of contaminated materials having a total activity of about 1,130 curies of radium-226. Layers of radon barrier material and riprap similar to those on the main disposal cell also cover the carbonate tailings disposal cell to protect the cover from erosion.

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Other Disposal Areas

Three engineered disposal structures were constructed adjacent to the carbonate tailings disposal cell. They were designed to encapsulate radiologically contaminated material associated with milling activities. Two other small open dumps that existed near the carbonate tailings disposal cell were also capped with radon barriers and stabilized to prevent erosion. None of these disposal areas contain mill tailings. The volumes of material placed in these disposal areas were not provided in ARCO's completion report.

The asbestos disposal area covers about 2 acres adjacent to the south edge of the carbonate tailings disposal cell. The materials in this cell consist of byproduct material and asbestos-containing plant-building debris. Disposal was permitted by the state of New Mexico as a Special Waste. The cover consists of a layer of radon barrier material capped with a layer of soil/rock matrix that was seeded with native grasses.

Disposal Area No. 1, located south of the carbonate tailings disposal cell, covers about 11 acres and consists primarily of debris from decommissioning of the mill crushing and grading facilities and other reclamation activities. The cover consists of a layer of radon barrier material overlain by topsoil that was seeded with native grasses.

A cell for PCB-contaminated materials covers less than an acre and was constructed within Disposal Area No. 1. PCB-contaminated waste was discovered during reclamation of the mill. At the time of the discovery, no commercial waste disposal facility in the United States was licensed to accept radioactive waste contaminated with PCBs. PCBs are regulated under the EPA, who agreed to issue a permit for disposal at the site. The PCB cell is completely encapsulated (bottom, sides, and top) in a 3-foot-thick clay liner. The cover of this interior cell has a layer of radon barrier material over the clay liner and is capped by a layer of riprap for erosion protection.

Two former open dumps totaling about 2 acres are located east of the carbonate tailings disposal cell. These dumps were used during operations at the mill site to dispose of miscellaneous waste and byproduct material. Radon barrier material was placed on both dumps, and the top surfaces were covered with topsoil that was seeded with native grasses.

Example monitoring well at Bluewater site.

Compliance Strategies

Active treatment by pumping contaminated groundwater from the aquifers in 1989 produced no significant reduction in concentrations of contaminates. The main constituents of concern are molybdenum, selenium, and uranium. Consequently, in 1990, ARCO applied to NRC for alternate concentration limits (ACLs). ACLs may be adopted when established maximum concentration limits are unattainable, providing the ACLs do not pose a present or potential future hazard to human health or the environment. NRC approved the application in 1996.

The groundwater monitoring network consists of 19 wells located inside the site boundary. Samples are analyzed annually, at a minimum, for molybdenum, selenium, uranium, and other constituents. PCB monitoring was conducted on-site from 1997 to 2017 and was discontinued in 2018. No PCBs were detected during monitoring.

Legacy Management Activities

The DOE Office of Legacy Management (LM) manages the disposal site according to a site-specific Long-Term Surveillance Plan to ensure that the disposal cell systems continue to perform as designed. Under this plan, LM conducts annual site inspections to evaluate the condition of surface features, performs site maintenance as necessary, and monitors groundwater to verify the continued integrity of the disposal cells and to verify that groundwater does not migrate off the site with contaminant concentrations greater than those approved by NRC.

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The primary constituent of concern for this site is uranium. Uranium concentrations in groundwater at the site remain below the NRC approved ACLs. Although groundwater at the site is in regulatory compliance with NRC, groundwater monitoring indicates that uranium concentrations beyond the site boundary exceed the New Mexico groundwater quality standard of 0.03 mg/L. Continual evaluation of groundwater data at and downgradient of the site indicates that no drinking water supply wells have contaminant concentrations above the state standards. LM, in consultation with NRC and New Mexico Environmental Department, continues to evaluate off-site contamination to ensure safety of human health and the environment.

In accordance with 40 CFR 192.32, the disposal cells are designed to be effective for 1,000 years, to the extent reasonably achievable, and, in any case, for at least 200 years. However, the general license has no expiration date, and LM's responsibility for the safety and integrity of the site will last indefinitely.

Beneficial Reuse

The Bluewater site is in an important migratory pathway for elk, monarch butterflies, and other sensitive species such as bats. As part of its stewardship, LM continues to identify opportunities to improve habitat at the site.

LM identified milkweed populations which provide habitat for monarch butterflies and conducted pollinator studies that resulted in reduced spraying of chemicals on noxious weed populations to protect pollinator plants at the site.

LM recently discovered bats are using the site for day roosting, which provides an opportunity to monitor and maintain these roosting areas.

Other conservation efforts include fence modifications to reduce injury to wildlife by fence entanglement and the installation of a self-sustaining wildlife drinking system.

Contact Information

In case of an emergency at the site, contact 911.

LM toll-free emergency hotline: **(877) 695-5322**

Site-specific documents related to the Bluewater, New Mexico, Disposal Site are available on the LM website at **www.energy.gov/lm/bluewater-new-mexico-disposal-site**.

To access the Bluewater groundwater monitoring data set, please visit **https://gems.lm.doe.gov/**

For more information about LM activities at the Bluewater, New Mexico, Disposal Site, contact:

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