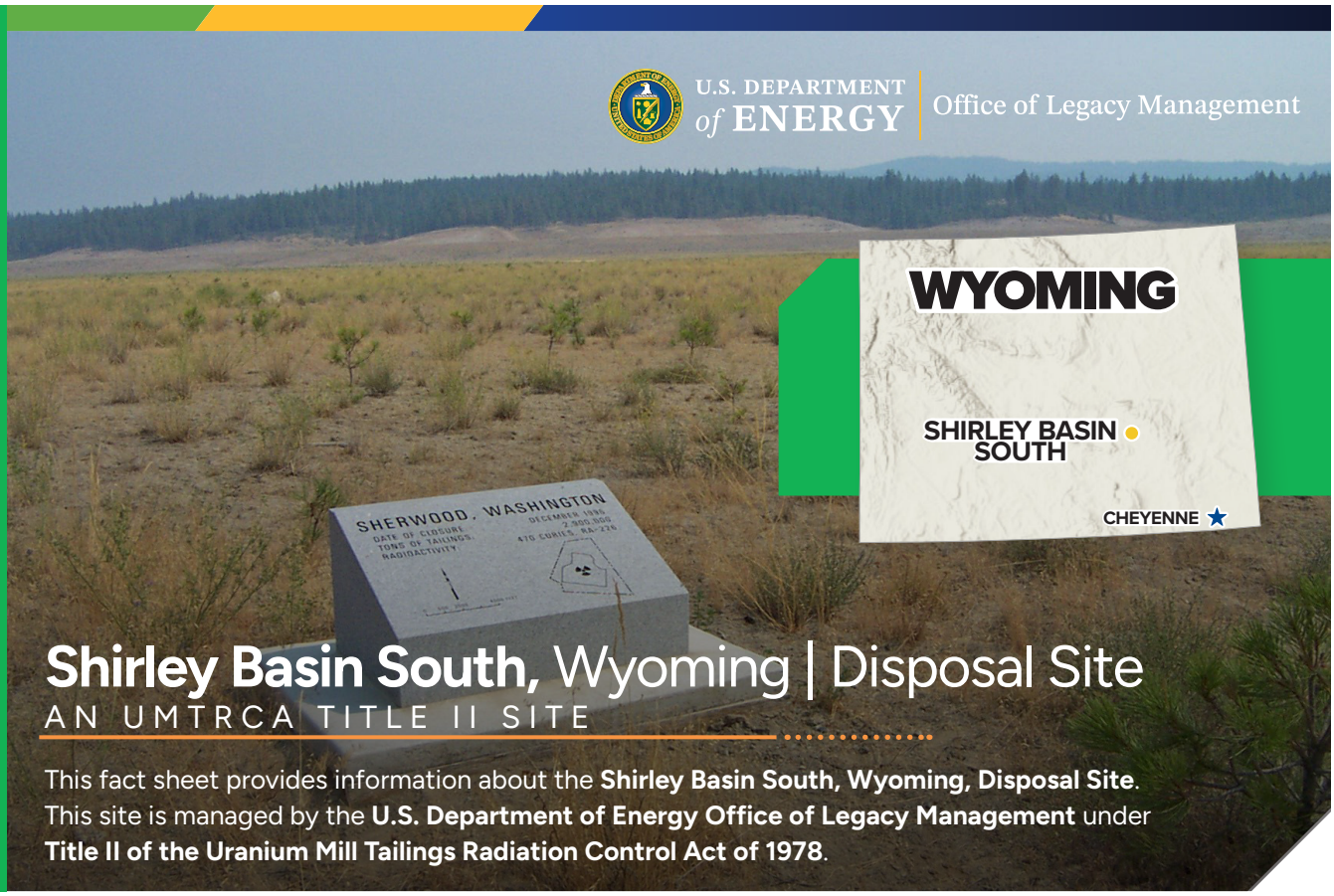
Fact Sheet



Shirley Basin South, Wyoming | Disposal Site

AN UMTRCA TITLE II SITE

This fact sheet provides information about the **Shirley Basin South, Wyoming, Disposal Site**. This site is managed by the **U.S. Department of Energy Office of Legacy Management** under **Title II of the Uranium Mill Tailings Radiation Control Act of 1978**.

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Site Information and History

The Shirley Basin South disposal site is located in rural Carbon County about 60 miles south of Casper and 35 miles north of Medicine Bow, Wyoming. The site is at an elevation of about 7,100 feet.

A uranium mill at the site processed uranium ore from 1962 to 1974 and from 1978 to 1985. The mill used a conventional acid leach process to extract uranium from the ore, which was mined from nearby open pit mines. The milling process created radioactive tailings, a predominantly sandy material. Tailings and process solution were conveyed in a slurry to a tailings impoundment onsite. Because of a depressed uranium market, the mining and milling operations shut down in 1985, and mill decommissioning began. The Petrotomics Company, the mill operator, completed encapsulation of the tailings, contaminated site soils, and contaminated building materials in an engineered, onsite disposal cell in 2000. Site remediation was completed in 2001.

Regulatory Setting

Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA) in 1978 (Public Law-95-604). The Shirley Basin South site qualifies as an UMTRCA Title II site because it was operating under an active U.S. Nuclear Regulatory Commission (NRC) license when UMTRCA was passed. 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. Wyoming declined to become the long-term custodian of the Shirley Basin South site, and the U.S. Department of Energy (DOE) assumed custodial responsibility for the site. Under Title II of UMTRCA, the licensee, Petrotomics, was responsible for remedial action. NRC's cleanup and reclamation standards are promulgated in Title 10 *Code of Federal Regulations* (CFR), Part 40, Appendix A. These standards conform to U.S. Environmental Protection Agency standards specified in 40 CFR 192. NRC concurred with DOE's Long-Term Surveillance Plan for the site in June 2005, and the site was included under NRC's general license for long-term custody. At that time, title to the site transferred from Petrotomics to DOE.

Shirley Basin South Disposal Site

The site consists of a 142-acre disposal cell located on a 1,527-acre parcel. Cleanup and reclamation at the mill site consisted of demolishing site structures and removing contaminated soils. Mill components that were not salvaged and sold were buried in a mine pit, the tailings pile, or onsite disposal trenches.

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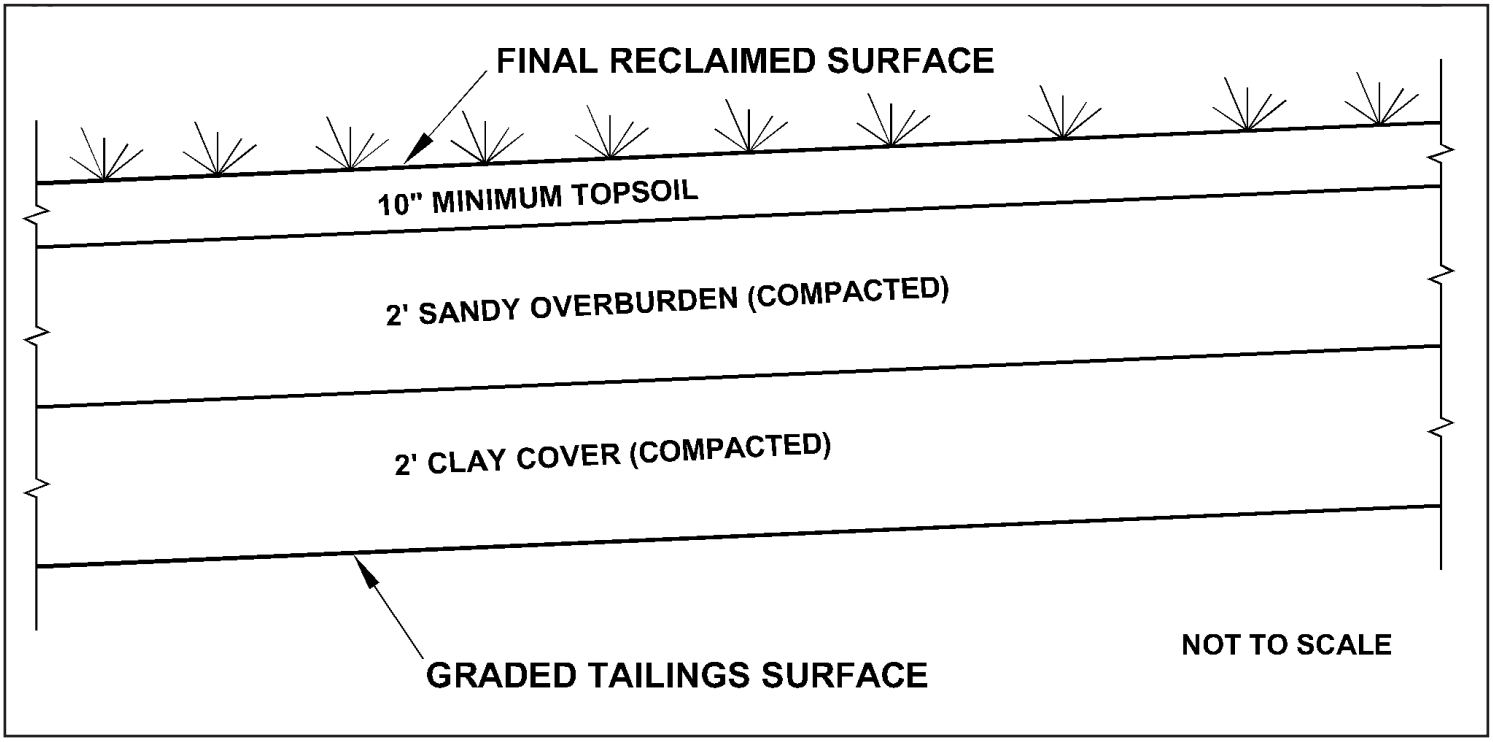

West-East Cross Section of the Shirley Basin South Disposal Cell.

Past seepage from the tailings pile has contaminated shallow site groundwater in the Upper Sand and Main Sand aquifers beneath the site. From about 1980 to the mid-1990s, Petrotomics pumped pore water from the tailings pile and shallow aquifers to reduce seepage and control downgradient migration of contaminants. Although pumping removed significant volumes of contaminants from tailings pore water and the aquifers, groundwater quality improved only slightly during 15 years of active remediation. The extensive pumping essentially dewatered the tailings pile and the Upper Sand aquifer, and well yields decreased to the point that recovery of contaminants was no longer effective. Further studies indicated that continued pumping of the Main Sand aquifer would not reduce contaminant concentrations to established standards.

Compliance Strategy

In 1996, Petrotomics applied to NRC for alternate concentration limits for the contaminants of concern. After amendments to the application, NRC concurred with the request and approved alternate concentration limits in 1998 for cadmium, chromium, lead, nickel, radium-226, radium-228, selenium, thorium-230, and uranium. Alternate concentration limits may be adopted within specified areas when established concentration limits are unattainable and the alternate limits will not pose a present or potential future hazard to human health and the environment.

A groundwater monitoring network is sampled annually to verify compliance with alternate concentration limits and other designated groundwater protection standards. Noncompliant results will be addressed in accordance with the site-specific Long-Term Surveillance Plan to ensure protectiveness of human health and the environment.

Disposal Cell Design

The objective of the tailings impoundment cover is to isolate the uranium mill tailings from the surrounding environment. To be effective, the cover must reduce radon gas emissions to rates below regulatory standards, minimize infiltration of precipitation that could potentially leach contaminants into the subsurface, and physically contain the contaminated materials to prevent dispersion.

The tailings cover consists of 2 feet of compacted clay, 2 feet of compacted sandy overburden, and a minimum of 10 inches of topsoil. The topsoil was seeded primarily with grasses that are well adapted to the area. The tailings cover was sloped to shed water to discharge points that are

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protected by riprap. A surface water diversion system, consisting of a combination of contoured surfaces and drainage and collection channels, diverts rainwater away from the disposal cell. Riprap armor was placed on steeper slopes and flow concentration points where flow velocities would have the potential to erode the tailings encapsulation surfaces.

The disposal cell encapsulates about 6.3 million tons of tailings, which contain 974 curies of radium-226.

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 prevent release of contaminants to the environment. Under provisions of this plan, LM conducts annual inspections of the site to evaluate the condition of surface features, performs site maintenance as necessary, and monitors groundwater to ensure the continued integrityof the disposal cell.

In accordance with 40 CFR 192.32, the disposal cell is 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 integrity of the Shirley Basin South disposal site will last indefinitely.

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 **Shirley Basin South, Wyoming, Disposal Site**, are available on the LM website at **www.energy.gov/lm/shirley-basin-south-wyoming-disposal-site.**

For more information about LM activities at the **Shirley Basin South, Wyoming, Disposal Site**, contact:

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