



# Shirley Basin South, Wyoming, Disposal Site

## FACT SHEET

*This fact sheet provides information about the Uranium Mill Tailings Radiation Control Act Title II Shirley Basin South Disposal Site in Carbon County, Wyoming. The U.S. Department of Energy Office of Legacy Management manages the site.*

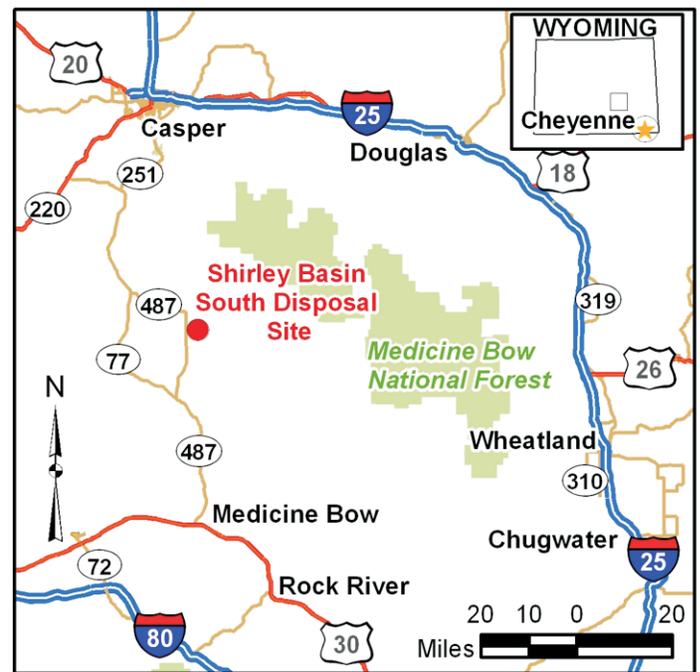
### Site Description and History

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 142-acre tailings impoundment on site. Because of a depressed uranium market, the mining and milling operations shut down in 1985, and mill decommissioning began. The Petrotoomics Company, the mill operator, completed site reclamation and encapsulated the tailings, contaminated site soils, and contaminated building materials in an engineered, on-site disposal cell 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, Petrotoomics, 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



Location of the Shirley Basin South Disposal Site

for long-term custody. At that time, title to the site transferred from Petrotoomics to DOE.

### Shirley Basin South Disposal Site

Cleanup and reclamation at the millsite 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 on-site disposal trenches.

Past seepage from the tailings pile has contaminated shallow site ground water in the Upper Sand and Main Sand aquifers beneath the site. From about 1980 to the mid-1990s, Petrotoomics 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, ground water 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.

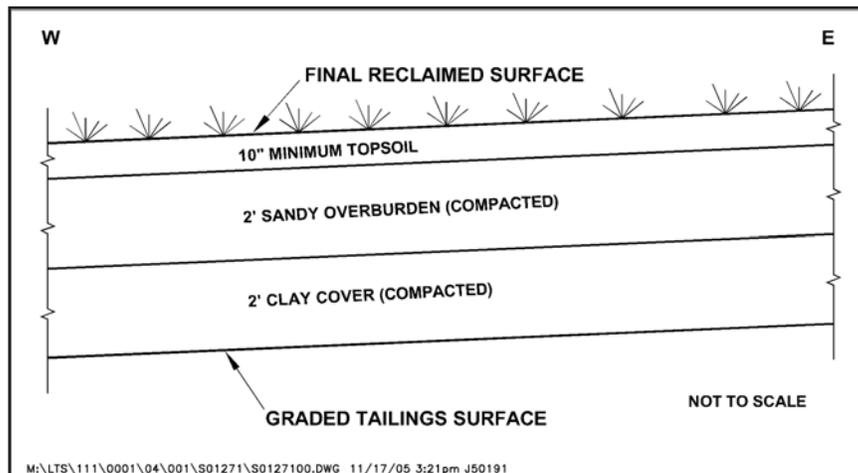
A ground water monitoring network will be sampled annually to verify compliance with alternate concentration limits and other designated ground water protection standards. Noncompliant results will be addressed in accordance with the site-specific Long-Term Surveillance Plan to ensure protectiveness 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 protected by riprap. A surface water diversion system, consisting of a combination of contoured surfaces and drainage and collection channels, is designed to divert 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 6.3 million tons (about 4.5 million cubic yards) of tailings, which contain 974 curies of radium-226.



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

## **Legacy Management Activities**

DOE 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, DOE conducts annual inspections of the site to evaluate the condition of surface features, performs site maintenance as necessary, and monitors ground water to ensure the continued integrity of the disposal cell. The encapsulated materials will remain potentially hazardous for thousands of years.

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 DOE's responsibility for the integrity of the Shirley Basin South Disposal Site will last indefinitely.

## **Contacts**

Site-specific documents related to the Shirley Basin South Disposal Site are available on the DOE Office of Legacy Management website at <http://www.LM.doe.gov/land/sites/wy/shirley/shirley.htm>.

For more information about DOE Legacy Management activities at the Shirley Basin South Disposal Site, contact

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