



Tuba City, Arizona, Disposal Site

FACT SHEET

This fact sheet provides information about the Uranium Mill Tailings Radiation Control Act of 1978 Title I disposal site at Tuba City, Arizona. This site is managed by the U.S. Department of Energy Office of Legacy Management.

Site Description and History

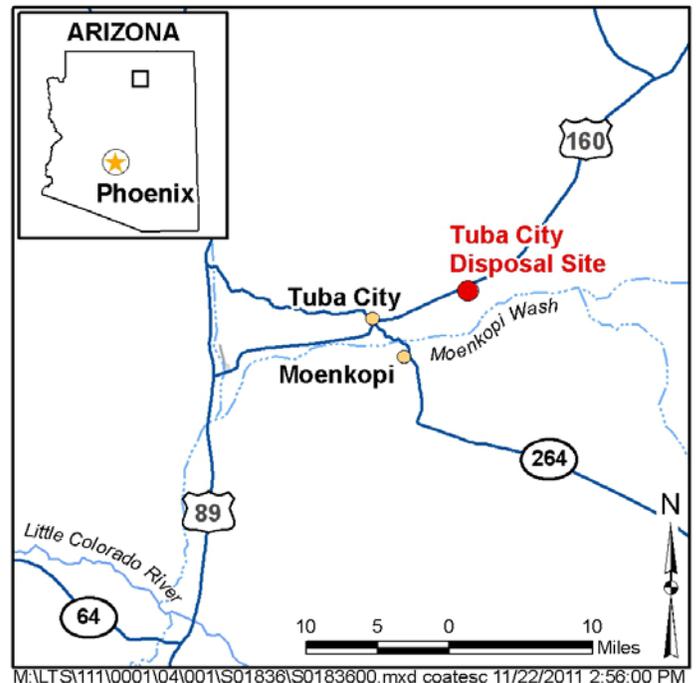
The Tuba City, Arizona, Disposal Site is within the Navajo Nation and close to the Hopi Reservation, approximately 5 miles east of Tuba City and 85 miles northeast of Flagstaff, Arizona. The Rare Metals Corporation and its successor, El Paso Natural Gas Company, operated a uranium mill at the site between 1956 and 1966. During its 10 years of operations, the Tuba City mill processed about 800,000 tons of uranium ore. The milling operations created low-level radioactive mill tailings, a predominantly sandy material. The tailings were conveyed in a slurry from the mill to evaporation ponds at the site. These ponds covered an area of 33.5 acres, and windblown tailings affected an additional 250 acres northeast of the millsite. The U.S. Department of Energy (DOE) began surface remedial action at the Tuba City site in 1988. All uranium mill tailings from the onsite piles, debris from demolished mill buildings, and windblown tailings were moved and stabilized in an engineered disposal cell on site. DOE completed site cleanup in 1990.

Regulatory Setting

Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA) in 1978 (Public Law 95-604), and DOE remediated 22 inactive uranium-ore-processing sites under the Uranium Mill Tailings Remedial Action Project in accordance with standards promulgated by the U.S. Environmental Protection Agency in Title 40 *Code of Federal Regulations* (CFR) Part 192. Subpart B of 40 CFR 192 regulated cleanup of contaminated groundwater at the processing sites. The radioactive materials were encapsulated in U.S. Nuclear Regulatory Commission–approved disposal cells. The U.S. Nuclear Regulatory Commission general license for UMTRCA Title I sites is established in 10 CFR 40.27. The Tuba City disposal cell was included under the general license in 1996.

Disposal Site

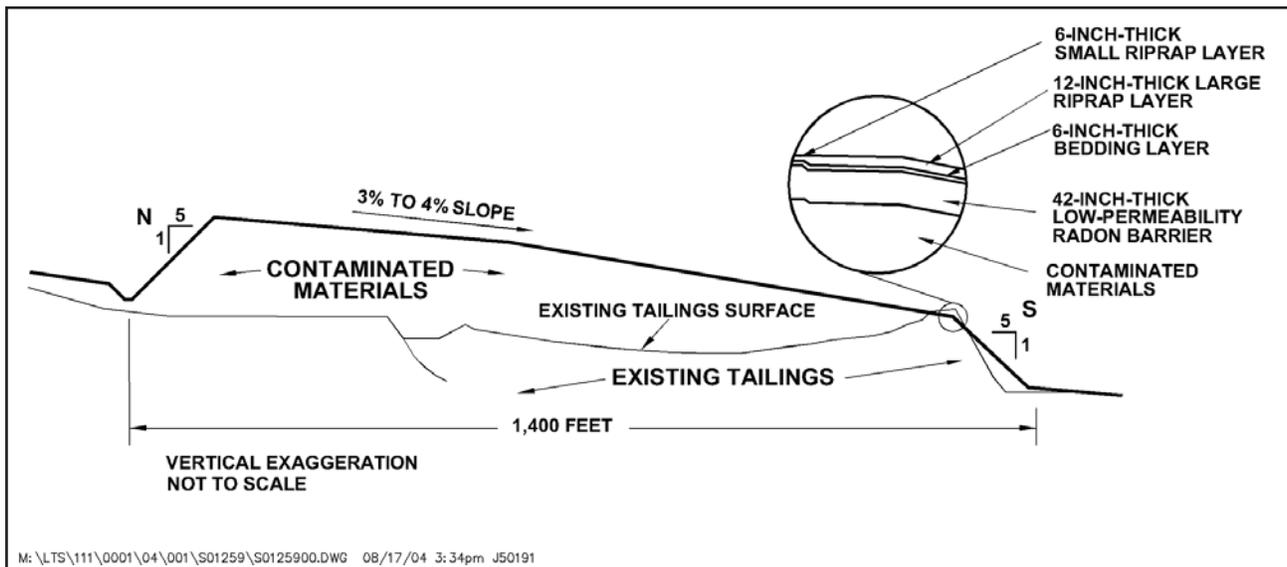
The disposal site is approximately 6,000 feet northwest of and 300 to 400 feet in elevation above Moenkopi Wash, an intermittent stream that drains to the



Location of the Tuba City Disposal Site

southwest into the Little Colorado River. The disposal site lies at an elevation of approximately 5,100 feet above sea level on the middle of three alluvial terraces associated with ancestral flows in Moenkopi Wash. Thin surficial deposits of unconsolidated dune sand and alluvial gravels overlie the Navajo aquifer, which is the main aquifer near the Tuba City site and is regionally vast within sedimentary deposits comprising the Navajo Sandstone Formation. The saturated thickness of the aquifer near the disposal cell is about 500 feet, although within 2,000 feet south of the disposal cell the aquifer thins rapidly because of topography and regional groundwater discharge at Moenkopi Wash. Depth to groundwater ranges from about 60 to 75 feet below land surface.

Land near the site is used only for occasional grazing; adjacent land is used for dry and irrigated farming and (although not extensively) residential purposes. There is no known domestic, industrial, or agricultural use of groundwater from the contaminated region of the



North-South Cross Section of the Tuba City Disposal Cell

aquifer. Nearby residences receive water from the Navajo Tribal Utility Authority; this water comes from a well completed in the bedrock aquifer approximately 1.5 miles northwest (hydraulically upgradient) of the site.

The only surface water associated with the Tuba City site is located approximately 4,000 feet south of the site, where seeps are present along cliff bands that border Moenkopi Wash. Water from Moenkopi Wash may occasionally be used for stock watering and agricultural diversions by the Navajo and Hopi residents near the site. Early site characterization efforts and ongoing annual monitoring have found no contamination in the seeps in this area.

Historical milling operations contaminated groundwater in the Navajo aquifer. The primary source of contamination is water that drained from the unlined evaporation ponds and infiltrated into the subsurface. Site-related contamination in the uppermost part of the aquifer has been detected 2,500 feet hydraulically downgradient from the disposal site. Groundwater contaminants with concentrations that exceed their standards in 40 CFR 192 are molybdenum, nitrate, selenium, and uranium. High levels of sulfate are also present in the groundwater. Although sulfate is not regulated in 40 CFR 192, its concentration in groundwater is high enough to cause a potential health risk, and a restoration goal was established for comparison to monitoring results.

Compliance Strategy

The compliance strategy for contaminated groundwater underlying the site is active remediation. The objective of this strategy is to remove uranium (the primary site contaminant) and other site-related contaminants from the aquifer to meet 40 CFR 192 standards or the water quality restoration goals established in the Groundwater Compliance Action Plan.

The groundwater remediation system currently comprises 37 extraction wells completed within the contaminated region of the aquifer. The extracted water is conveyed in underground piping to an onsite treatment plant, where it is distilled following ion exchange softener pretreatment. A lined solar evaporation pond receives the waste liquid (brine) and the softener regeneration waste. An infiltration trench located upgradient of the contaminant plume receives the treated water (distillate), where it is returned to the aquifer. Apart from a temporary suspension in 2010–2011 for plant upgrades, the active remediation system has been in full-scale operation since mid-2002. Numerous groundwater monitoring wells that are used to track water quality and water level trends are situated within and surrounding the network of extraction wells.

Disposal Cell Design

The five-sided disposal cell occupies an area of 50 acres on the 145-acre site. The cell rises 44 feet above the surrounding land. An interceptor ditch was constructed on the upslope side of the site. A woven wire fence with locked gates surrounds the site, and the site perimeter is marked with warning signs and permanent monuments.

The cover of the disposal cell is a multicomponent system designed to encapsulate and protect the contaminated materials. The disposal cell cover comprises (1) a low-permeability radon barrier (first layer placed over compacted tailings) consisting of clayey soil, (2) a granular bedding material placed as a capillary break, and (3) rock (riprap) erosion protection layers.

The cell location and design were selected to minimize the potential for erosion from wind and storm water

runoff. Surrounding disturbed areas were regraded and reseeded with native vegetation.

Legacy Management Activities

DOE's Office of Legacy Management (LM) is responsible for ensuring that the selected groundwater compliance strategy at the Tuba City disposal site continues to be protective of human health and the environment.

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 verify the continued integrity of 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 safety and integrity of the Tuba City disposal cell will last indefinitely.

Contacts

Documents related to the Tuba City disposal site are available on the LM website at <http://www.lm.doe.gov/tuba/Sites.aspx>.

For more information about LM activities at the Tuba City disposal site, contact

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