



## Tuba City, Arizona | Disposal Site

### AN UMRCA TITLE I SITE

This fact sheet provides information about the **Tuba City 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 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 mill site. The U.S. Department of Energy (DOE) began surface remedial action at the Tuba City site in 1988. All uranium mill tailings from the on-site 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.

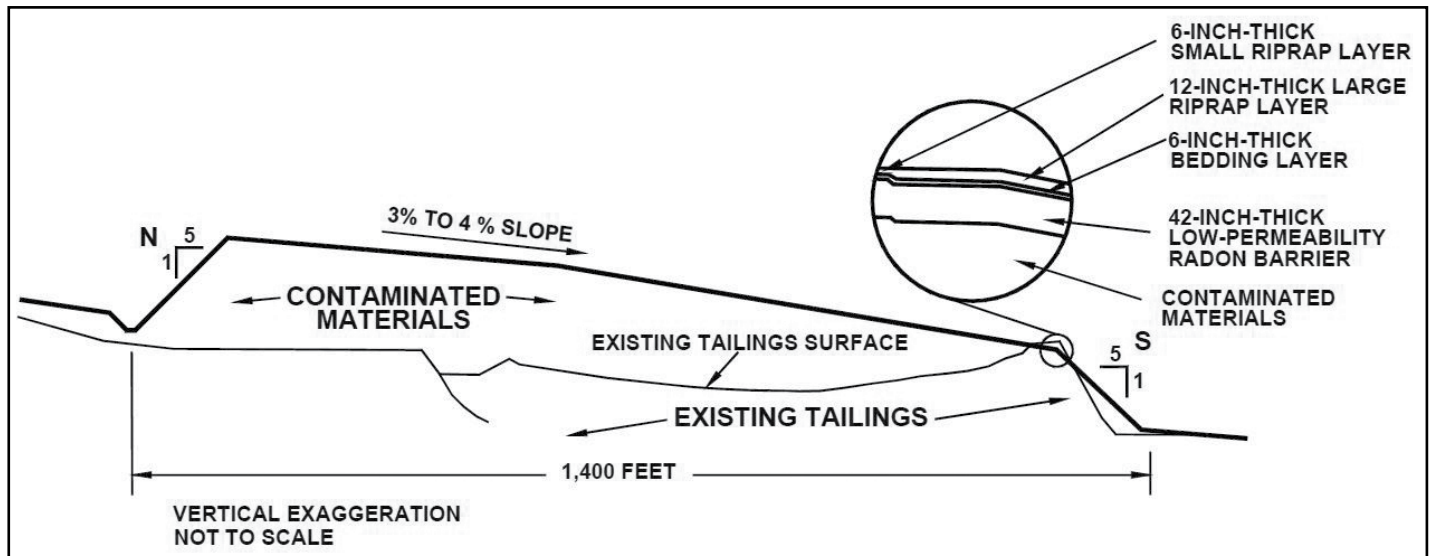
### Regulatory Setting

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 covered in disposal cells for control of radon emissions in compliance with the 40 CFR 192 regulatory standard. 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 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.



*North-South Cross Section of the Tuba City Disposal Cell.*

Land near the site is used for grazing; adjacent land is used for dry and irrigated farming and residential purposes. There is no known domestic, industrial, or agricultural use of groundwater from the contaminated region of the aquifer. Nearby residences receive water from the Navajo Tribal Utility Authority; this water comes from a network of seven wells completed in the bedrock aquifer, the nearest of which is approximately 0.34 miles north (hydraulically upgradient) of the site.

The nearest surface water flow is approximately 6,000 feet southeast of the site, where seeps are present along cliff bands that border Moenkopi Wash. Water from Moenkopi Wash is used for stock watering and agricultural diversions by the Navajo and Hopi residents near the site. 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. Contaminants infiltrated from the mill's tailings impoundment to the uppermost part of the aquifer and have been detected 4,400 feet down gradient of the historic mill location. 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, it is a mill-related contaminant and is present at concentrations exceeding natural background. A cleanup goal for sulfate was determined in consultation with Navajo and Hopi agencies.

## Compliance Strategies

The compliance strategy for contaminated groundwater underlying the site is active remediation. The objective of this strategy is to remove nitrate and uranium (the primary

site contaminants) and other site-related contaminants from the aquifer to meet 40 CFR 192 standards and other water quality restoration goals that are documented in the Groundwater Compliance Action Plan (GCAP).

Active remediation, including extraction and treatment of contaminated groundwater, was initiated in 2002. Treatment steps included softening and distillation. Treated water met all regulatory water quality standards and was returned to the aquifer through an infiltration trench. Concentrated wastes from the treatment process were disposed of in the on-site double-lined evaporation pond. Due to difficulties with groundwater extraction and the distillation unit, operation of this system was suspended in 2014.

Active remediation currently includes extraction of contaminated groundwater and conveyance directly to the evaporation pond, as described in the "Plan for Interim Treatment During Distillation Shutdown for the Tuba City, Arizona, Disposal Site." In this process, clean water evaporates to the atmosphere and contaminants are safely accumulated in the pond.

A network of 128 groundwater monitoring wells (surrounding the extraction wells) is used to track water quality and water level trends. Monitoring well sampling and analyses are performed twice annually. Extraction well sampling and analyses are performed twice annually.

Direct evaporation, as well as other treatment approaches, are being studied while operations continue under interim treatment status. Studies will lead to a revision of the GCAP, with protection of human health and the environment being imperative in the development of the future groundwater compliance strategy.

## 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. A stormwater 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 composed of:

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 was designed 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

The DOE 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 192.02(a), 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.

## 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 Tuba City, Arizona, Disposal Site are available on the LM website at [www.energy.gov/lm/tuba-city-arizona-disposal-site](https://www.energy.gov/lm/tuba-city-arizona-disposal-site).

To access the Tuba City groundwater monitoring data set, please visit <https://gems.lm.doe.gov/>.


For more information about LM activities at the Tuba City, Arizona, Disposal Site, contact:

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