

Uranium Mill Tailings Remedial Action (UMTRA) Ground Water Project at Durango, Colorado

This fact sheet provides information about the UMTRA Ground Water Project site at Durango, Colorado. The U.S. Department of Energy Grand Junction Office in Grand Junction, Colorado, manages the UMTRA Ground Water Project.

Site Description and History

The Durango UMTRA Ground Water Project site is a former uranium-ore processing site located 0.25 mile southwest of the city of Durango, Colorado, in La Plata County, Colorado (Figure 1). The former millsite consists of two geographically contiguous, but hydrogeologically separate, areas: the mill tailings area and the raffinate ponds area (Figure 2). Both areas are located on the west bank of the Animas River and are immediately southwest of the intersection of U.S. Highways 160 and 550. A narrow terrace above the Animas River connects the two areas.

The Durango mill was constructed on the site of a former lead smelter. Vanadium Corporation of America constructed and operated the mill from 1942 to 1946 to produce vanadium. Between 1949 and 1963, the mill produced uranium oxide under contract to the U.S. Atomic Energy Commission. Milling activities produced 1.2 million cubic yards of tailings and resulted in contamination of 33 of the 40 acres of millsite property.

The U.S. Department of Energy (DOE) completed surface remediation of abandoned mill tailings and other contaminated surface residual radioactive material associated with former milling operations at the site. Radiologically contaminated materials were relocated to the Durango Disposal Cell, also known as the Bodo Canyon Disposal Cell, that is located approximately 1.5 miles southwest of the Durango processing site. Surface remedial action began in November 1986 and was completed in May 1991 by the UMTRA Surface Project. Following removal of the tailings piles and contaminated soils, the former mill tailings and raffinate ponds areas were contoured and reseeded with native grasses.

Some residual contamination was left in place in two regions along the banks of the Animas River, in unreachable areas of windblown contamination on the slope of Smelter Mountain, and in soils in the raffinate ponds area. DOE is currently evaluating contamination in the ground water under the site to determine how

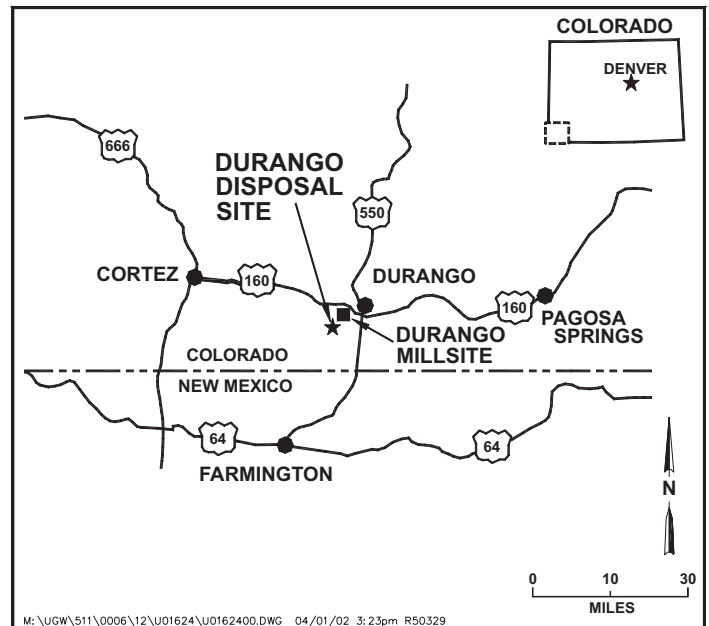


Figure 1. Location of Durango UMTRA Ground Water Project Site

to meet standards set forth by the U.S. Environmental Protection Agency (EPA).

The City of Durango owns the former mill tailings area, and the Animas-La Plata Water Conservancy District owns the former raffinate ponds area.

As part of the Animas-La Plata water project, construction of a pumping plant is proposed on the former raffinate ponds area. This federal project would supply municipal, industrial, and drinking water to Durango; Farmington and Aztec, New Mexico; the Navajo Nation; and Southern Ute and Mountain Ute tribes. The Animas-La Plata Water Conservancy District, the U.S. Bureau of Reclamation, and the Colorado Department of Public Health and Environment are developing a land-use plan for the raffinate ponds area. Although the land-use plan has not been completed, residential use will not be considered, and permanent buildings at the raffinate ponds area will not be allowed without the approval of the Colorado Department of Public Health and Environment and DOE.

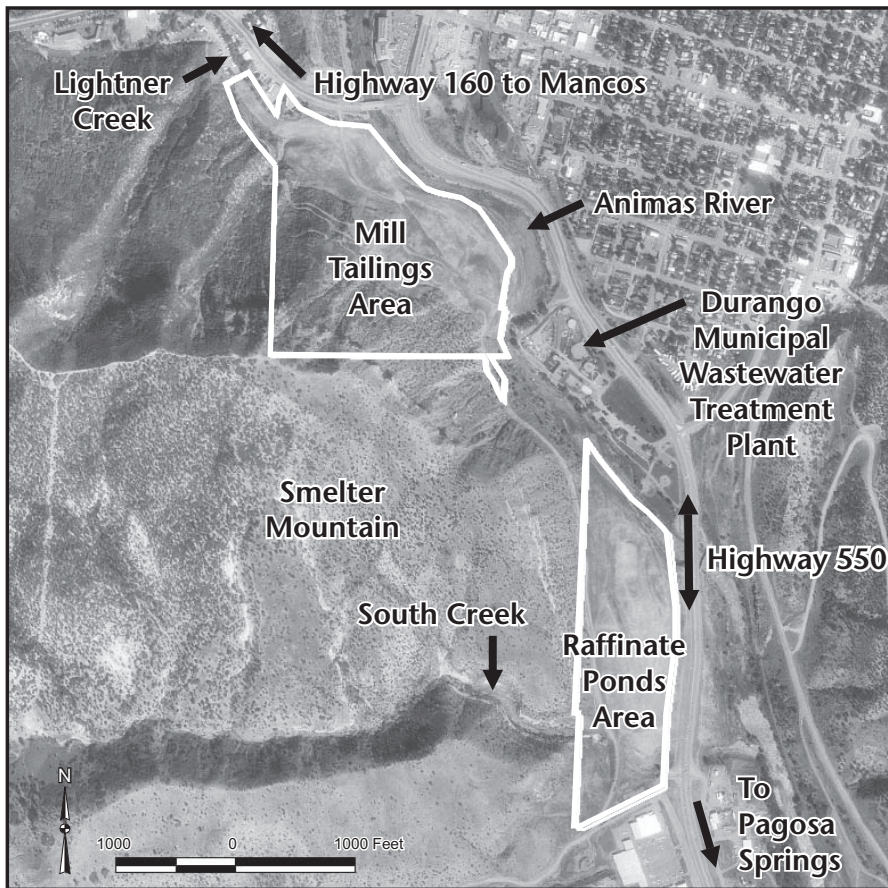


Figure 2. Locations of Mill Tailings Area and Raffinate Ponds Area

Mill Tailings Area

The mill tailings area consists of approximately 40 acres located on a bedrock-supported river terrace between Smelter Mountain to the west, the Animas River to the east and south, and Lightner Creek to the north. A lead smelter near the south end of the mill tailings area operated from 1880 to 1930. Slag from the smelter operations was deposited in the southeast corner of the area adjacent to the Animas River.

Ground water at the mill tailings area is present in an unconfined alluvial aquifer. Recharge of the aquifer or the addition of water results from infiltration of precipitation and runoff and by contact with the Animas River and Lightner Creek. Ground water contamination of the alluvial aquifer in the mill tailings area is a result of contamination leaching from the tailings piles. Uranium, selenium, cadmium, and molybdenum are the constituents of concern in the ground water in this area.

Interpretation of analytical results of environmental samples of sediments and surface water collected from Lightner Creek and the Animas River indicate that the potential is low for any adverse toxicological effects to ecological receptors.

Raffinate Ponds Area

The raffinate ponds area occupies approximately 20 acres on another river terrace south of the mill tailings area along the west bank of the Animas River. A small intermittent creek (South Creek) forms the southern boundary of the raffinate ponds area. Raffinate liquids from the uranium ore milling process were discharged into a series of ponds on the terraced slope of this area. Raffinate is the spent solution remaining after removal of uranium and vanadium by solvent extraction in the milling process.

Ground water at the raffinate ponds area is unconfined, and water is added or recharged by infiltration of precipitation and runoff and by horizontal inflow from Smelter Mountain. Ground water flow at the raffinate ponds is predominantly through joints, faults, and fractures in the bedrock. The primary source of ground water contamination in this area is the raffinate or liquid from the milling process that was pumped into a ditch and then flowed to the settling ponds, where it was disposed of through evaporation and seepage.

Following completion of surface remediation, uranium and selenium are the only constituents in ground water samples that have consistently exceeded the maximum concentration limits. Interpretation of laboratory analytical results of ground water samples determined that concentrations of all contaminants related to uranium ore processing have decreased since the completion of surface remediation and continue to show a decreasing trend.

The Animas River flows south along the eastern edge of the northern half of the raffinate ponds area. No tributaries enter the Animas River between the two sites. The discharge outlet of the Durango municipal wastewater treatment plant is located opposite the north end of the raffinate ponds area on the east side of the Animas River.

South Creek, which flows along the southern edge of the raffinate ponds area, is dry below the site. Flow from South Creek recharges the raffinate ponds' ground water via infiltration into the Bodo Fault. South Creek does not flow beyond the site boundary except during heavy rainfall events.

Targeted Compliance Strategy

DOE has proposed separate compliance strategies for the mill tailings area and the raffinate ponds area to better address the constituents of concern and the ground water modeling results.

Mill Tailings Area: The targeted compliance strategy for the mill tailings area is natural flushing in conjunction with institutional controls and continued monitoring. Interpretation of laboratory analytical results of ground water samples determined that the selenium concentrations exceed the maximum concentration limits established by EPA. Further evaluation of the analyses determined that these concentrations are a result of natural sources of selenium and are not related to the uranium-ore processing.

Ground water from the bedrock formations beneath the raffinate ponds area is not a current or potential source of drinking water and does not yield water in usable quantities. Potable water is readily available from the municipal water system in the vicinity of the sites. Future use of ground water from the bedrock aquifer is unlikely, based on the planned future development of a pumping plant on the raffinate ponds site.

Institutional Controls

Institutional controls are “checks and balances” that effectively protect public health and the environment. Typically, institutional controls depend on some legal order such as zoning ordinances and laws to ensure that protection is effective. EPA standards permit the use of institutional controls at sites where “passive remediation” can occur through natural flushing of the aquifer within 100 years. Institutional controls may also be used to protect public health or the environment if at any time during the cleanup process the DOE finds them necessary and appropriate.

For the UMTRA Ground Water Project, institutional controls would reduce exposure to or reduce health risks by (1) preventing inappropriate intrusion into contaminated ground water or (2) restricting access to or use of contaminated ground water for unacceptable purposes (domestic-household use).

The EPA standards require that institutional controls

- Have a high degree of permanence.
- Protect public health and the environment.
- Satisfy beneficial uses of ground water.
- Are enforceable by administrative or judicial branches of government entities.
- Can be effectively maintained and verified.

EPA recognizes that a combination of controls may be needed to protect public health and safety. Key to identifying, implementing, and enforcing institutional controls is participation by local and state governments in the development process. While DOE is responsible for compliance with the EPA standards at UMTRA Ground Water Project sites, its authority to implement and enforce institutional controls is limited. This is particularly true where ground water contamination from uranium processing may have moved beyond the millsite to areas that are not within the DOE jurisdiction.

The need for, and the duration of, institutional controls depends on the compliance strategy selected for a site, the type and level of risk to humans and the environment, and existing site conditions. Movement of contaminated ground water may require restrictions for an extended period of time. As risks decrease over time, so should the need for institutional controls. Therefore, to ensure protection of human health and the environment and to satisfy requirements for beneficial uses of the water, it is important that the effectiveness of institutional controls be verified and modified as necessary.

Institutional controls will need to be developed to address the contamination associated with the Durango site. These controls will be selected using input from the landowners, in conjunction with local, state, and Federal Government agencies. The final institutional controls selected for Durango will need to be approved by the U.S. Nuclear Regulatory Commission.

Long-Term Surveillance and Maintenance

Once the compliance strategy has been finalized, it is the responsibility of DOE to ensure that the selected compliance strategy continues to be protective of human health and the environment. Ground water sites become part of the Long-Term Surveillance and Maintenance (LTSM) Program administered by the DOE Grand Junction Office. The LTSM Program manages the site according to a Long-Term Surveillance Plan prepared specifically for the Durango site; activities will include ground water monitoring in the mill tailings area.

Documents Available

The following program documents are available on the DOE Grand Junction Office Internet website at <http://www.gjo.doe.gov/ugw>:

UMTRA Ground Water Project, Environmental Assessment of Ground Water Compliance at the Durango, Colorado, UMTRA Project Site, November 2002

Finding of No Significant Impact, Ground Water Compliance at the Durango, Colorado, UMTRA Project Site, November 2002

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