UMTRA Ground Water Project

FACT SHEET

U.S. Department of Energy
Grand Junction Office

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

This fact sheet provides information about the UMTRA Ground Water Project sites located at Rifle, 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 two UMTRA Ground Water Project sites located near the city of Rifle, Colorado, in Garfield County, are separate former uranium and vanadium ore-processing sites. The Old Rifle site is approximately 0.3 mile east of the city of Rifle; the New Rifle site is approximately 2 miles southwest of the city of Rifle (Figure 1). The Colorado River defines the southern boundary of both sites. The State of Colorado acquired these sites in 1988 and transferred the Old Rifle site to the City of Rifle in 2000. Transfer of the New Rifle site to the City of Rifle is planned.

Surface remediation of the Rifle sites began in spring 1992 and was completed in October 1996. Tailings and tailings-contaminated materials from both former processing sites were relocated to the Rifle Disposal Site that is located approximately 9 miles north of the New Rifle site.

Both Rifle sites are underlain by Colorado River alluvium. Beneath the alluvium, semiconfined ground water occurs in interlayered sandstone, siltstone, and claystone beds in the Wasatch Formation. In general, ground water in the alluvium and in the Wasatch Formation flows southwest. The alluvial aquifer is contaminated by seepage from the former mill tailings piles at both sites.

Old Rifle

Union Carbide Corporation and its predecessor, the United States Vanadium Corporation, owned and operated the Old Rifle uranium ore-processing mill from 1924 to 1932 and from 1942 to 1958; the mill was idle from 1932 to 1942. It processed vanadium ore during both operating periods and uranium ore during the later period. Ore was shipped to the mill by truck and rail from eastern Utah and the Uravan mineral belt, Meeker, and Rifle Creek mines in Colorado. U.S. Atomic Energy Commission (AEC) records from 1947 to 1958 show that 761,000 tons of ore was processed at the site. After 1958, most of the mill tailings at the Old Rifle site were reprocessed and deposited at the New Rifle site.

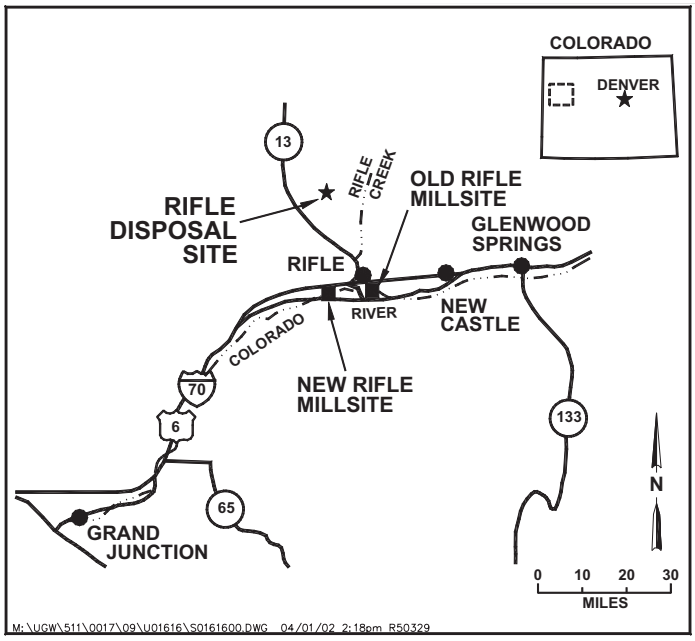

Figure 1. Locations of New Rifle and Old Rifle UMTRA Ground Water Project Sites

Present contaminants of concern at the Old Rifle site are arsenic, selenium, uranium, and vanadium. Tailings seepage has not contaminated the Wasatch Formation that underlies the alluvium at the Old Rifle site.

New Rifle

The New Rifle mill (Figure 2) replaced the Old Rifle mill in 1958 and was also owned and operated by the Union Carbide Corporation. The mill was constructed as part of a multi-site complex that included the upgrading facilities at Slick Rock, Colorado, and Green River, Utah. Ore and upgrade products from those sites were shipped to the New Rifle mill by truck and rail. From 1958 to 1973, the mill produced uranium and vanadium. AEC records show that the New Rifle mill processed 2.7 million tons of tailings from the Old Rifle mill, processed uranium ore, and refined upgrade products. From 1973 to 1984, part of the mill was used to produce vanadium; this operation involved processing vanadium solutions and did not produce tailings.

Contaminants of concern in ground water at the New Rifle site include ammonia, arsenic, fluoride,

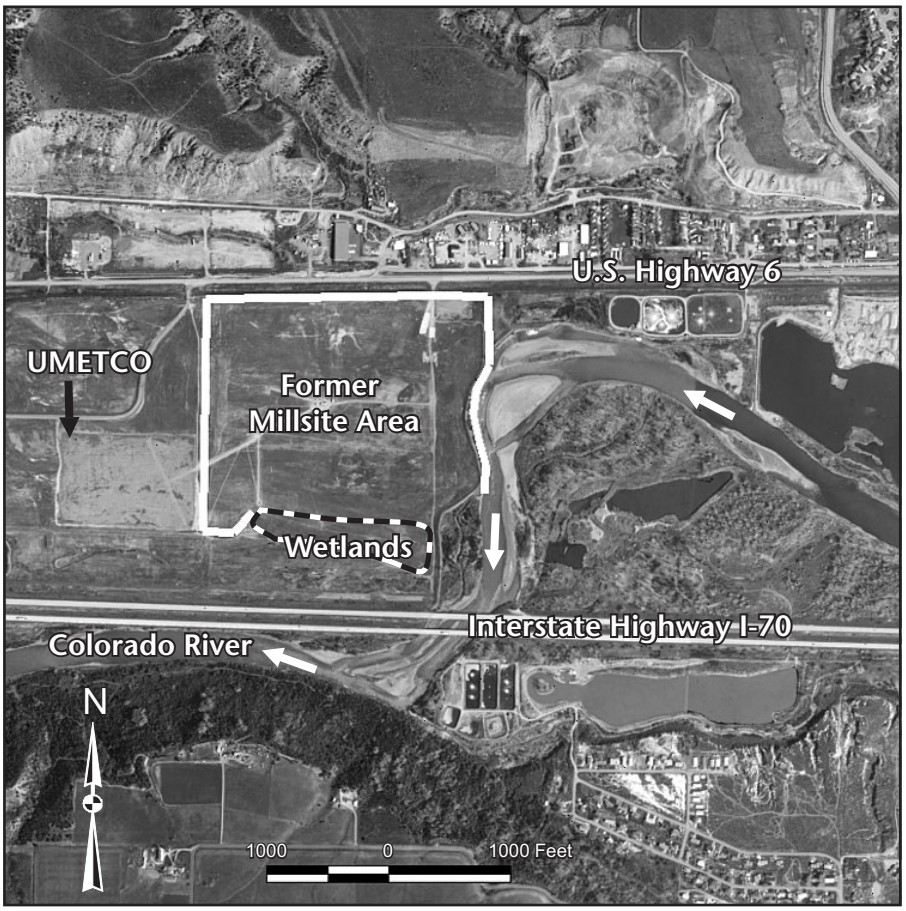

Figure 2. Location of Former New Rifle Mill

manganese, molybdenum, nitrate, selenium, uranium, and vanadium. Most of the higher concentrations of contamination are within the site boundary and immediately west of the site, but some uranium contamination extends into the alluvial aquifer approximately 3 miles west of the site. Laboratory analyses of Colorado River water samples collected east and west of the former millsite did not detect any trace of contamination.

Targeted Compliance Strategy

Old Rifle: The targeted compliance strategy for the Old Rifle site is natural flushing in conjunction with institutional controls and monitoring. Natural flushing is a process in which natural geochemical and biological processes and ground water movement decrease contaminant concentrations in the aquifer. Periodic collection of water samples for analysis of contaminants will be used to monitor the natural flushing process.

Interpretation of laboratory analytical results of ground water samples indicates that contaminant concentrations are decreasing over time. Ground water modeling results predict that contaminant levels at the Old Rifle site will decrease through natural flushing to background levels, established maximum concentration limits, or alternate concentration limits within 100 years. Alternate concentration limits are special concentration limits that are established within specified areas. These concentrations must not allow contamination in ground water to exceed maximum concentration limits or health-based standards if the ground water surfaces and is available to people or animals.

New Rifle: The targeted compliance strategy for the New Rifle site is also natural flushing in conjunction with institutional controls and monitoring. Six of the nine constituents of concern targeted for natural flushing are expected to attain background concentrations or maximum concentration limits established by regulation within 100 years. The three remaining contaminants—selenium, ammonia, and vanadium—are expected to meet alternate concentration limits that are protective of human health and the environment within 100 years.

The vanadium contaminant plume is primarily limited to an area beneath the former New Rifle millsite. DOE performed additional studies and data evaluation on vanadium since the initial ground water site characterization work to understand its geochemical behavior. Analysis of the additional data shows that vanadium tends to easily attach to sediments by various chemical and physical mechanisms, a process termed sorption, but that the vanadium is slowly released from the sediments to the ground water. Disturbing the ground water system, as occurred during surface remediation of the site, probably caused the release of sorbed vanadium into the ground water.

Analytical results of ground water samples collected regularly since completion of surface remedial action at the millsite in 1996 indicate that the vanadium concentration is decreasing in the ground water faster than had been predicted by the previous computer modeling. These sampling data were used to predict that the vanadium concentration in ground water should be reduced below the alternate concentration limit in less than 100 years.

Ground water samples will continue to be collected periodically and analyzed for all contaminants to monitor the natural flushing process.

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. The U.S. Environmental Protection Agency (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 can also be used to protect public health or the environment if at any time during the cleanup process 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).

Institutional controls for the Old Rifle site consist of deed restrictions on the land transfer to the City of Rifle and an environmental covenant between the State of Colorado and the City of Rifle that do not allow access to ground water without expressed written permission from the State of Colorado and/or DOE.

Institutional controls at the New Rifle site include zone district changes and deed restrictions. These institutional controls will prevent unauthorized access to contaminated ground water at the New Rifle site. In addition, DOE funded the extension of the current municipal waterline near the former millsite to provide potable water in the area where restrictions are required. The site will be transferred from the State of Colorado to the City of Rifle at a future date, at which time deed restrictions will become effective.

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 sites according to a Long-Term Surveillance Plan prepared specifically for the Rifle sites; activities will include ground water monitoring.

Program Documents

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

Old Rifle

- *UMTRA Ground Water Project, Final Site Observational Work Plan for the UMTRA Project Old Rifle Site*, August 1999
- *UMTRA Ground Water Project, Ground Water Compliance Action Plan for the Old Rifle, Colorado, UMTRA Project Site*, August 1999

New Rifle

- *UMTRA Ground Water Project, Final Site Observational Work Plan for the UMTRA Project New Rifle Site*, November 1999

Contacts

U.S. Department of Energy Grand Junction Office
2597 B ¾ Road, Grand Junction, CO 81503

Donald Metzler, Program Manager
(970) 248–7612

Audrey Berry, Public Affairs Specialist
(970) 248–7727

DOE Grand Junction Office
Toll-free (800) 399–5618

or visit the Internet site at
http://www.gjo.doe.gov/ugw

Colorado Department of Public Health and Environment

Jeff Deckler, Remedial Program Manager
(303) 692–3387

Wendy Naugle, Project Manager
(303) 692–3394