



UMTRCA Title I

Grand Junction, Colorado, Disposal and Processing Sites

This fact sheet provides information about the Uranium Mill Tailings Radiation Control Act of 1978 Title I disposal and processing sites at Grand Junction, Colorado. These sites are managed by the U.S. Department of Energy Office of Legacy Management.

Site Description and History

The former Grand Junction processing site, historically known as the Climax uranium mill, sits at an elevation of about 4,600 feet above sea level and occupies 114 acres of the broad, arid Grand Valley in west-central Colorado. The former mill site is located in an industrial area along the north bank of the west-flowing Colorado River on land owned by the City of Grand Junction. Early facility operations began in 1899 as a sugar beet mill. In 1950, the Climax Uranium Company transformed the original site to operate as a uranium and vanadium mill until 1970. During 19 years of operation, the mill produced 2.2 million tons of radioactive tailings.

From 1950 to 1966, mill tailings—a predominantly sandy material—were available to private citizens and contractors, who used them as fill material and as a component of concrete and mortar. Radioactive tailings were hauled to more than 4,000 private and commercial properties in the Grand Junction area. In 1966, concerns about potential adverse health effects from mill tailings prompted the Colorado Department of Health to sample the tailings for radon-222, and preliminary results indicated elevated levels. The finding caused Climax to stop releasing tailings from the site. However, an estimated 300,000 tons of tailings containing radioactive uranium daughter products had already been removed.

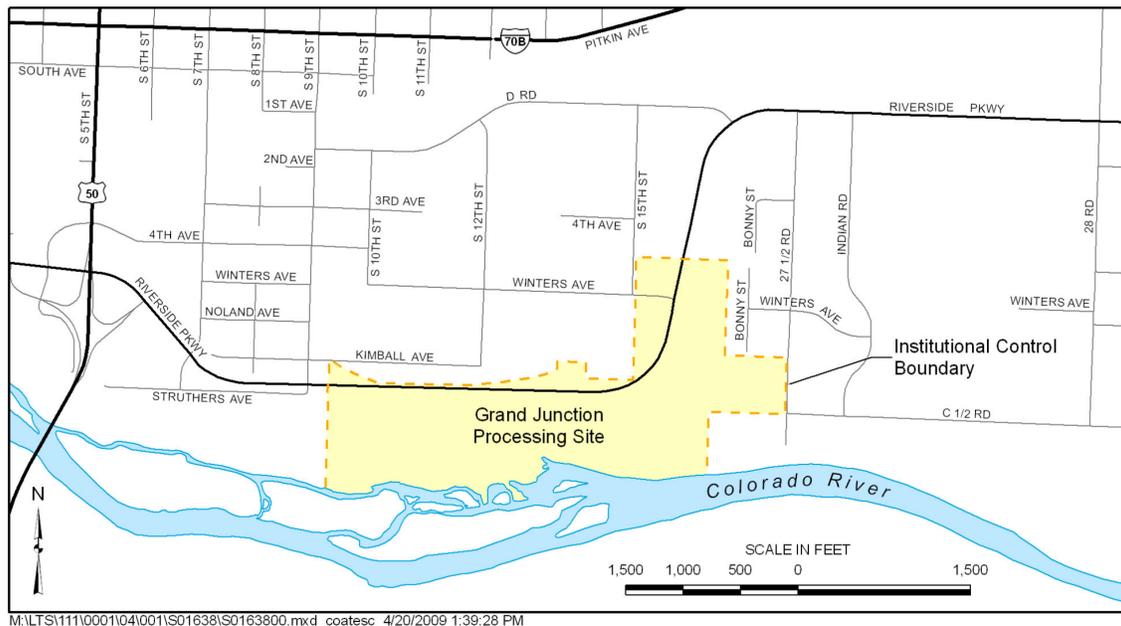
During 1970 and 1971, the Climax Uranium Company demolished 8 of the 12 main mill buildings at the processing site. Equipment that could be decontaminated was sold; equipment that could not be decontaminated was buried in the tailings pile along with building rubble. Activities to demolish the remaining buildings, except the old sugar beet warehouse, were completed in 1989. The sugar beet warehouse was cleaned, sold to a nongovernmental party,



Locations of the Grand Junction, Colorado, Sites

and presently sits on private property, outside the northern boundary of the fenced-in, City-owned site property.

Surface remediation of the processing site and contaminated private and commercial properties (i.e., vicinity properties) began in the mid-1980s. The U.S. Department of Energy (DOE) conducted radiological surveys at all vicinity properties and remediated those where mill-site-related radium-226 or radon levels exceeded established maximum concentration limits. Tailings and other contaminated materials removed from vicinity properties were stored temporarily at the processing site.



Grand Junction Processing Site Institutional Control Boundary and Riverside Parkway

Construction of the former Cheney disposal cell—now referred to as the Grand Junction disposal site—began in 1990. Approximately 4.4 million cubic yards of contaminated processing site materials, including vicinity property materials in temporary storage, were transported to the disposal cell, about 18 miles southeast of Grand Junction, by the end of 1994. DOE completed vicinity property cleanup in 1998 under the Uranium Mill Tailings Remedial Action Project.

The three main groundwater units beneath the former processing site are the unconfined alluvial aquifer (the uppermost aquifer), the underlying aquitard (composed primarily of shale units in the Cretaceous Dakota Sandstone Formation), and the confined aquifer in sandstones of the Dakota Formation.

The alluvial aquifer is composed of loose materials consisting of clay, silt, sand, gravel, and cobble. Groundwater is unconfined in the alluvial aquifer; depth to the water table ranges from 0 (near the river) to approximately 20 feet at the northern boundary of the site. The saturated thickness of the aquifer ranges from 5 to 20 feet. Groundwater generally flows west-southwest toward the Colorado River.

Past milling activities contaminated the groundwater in the alluvial aquifer beneath the site. Contamination extends approximately 3,300 feet downgradient from the site. Site-related contaminants in groundwater discharging to the Colorado River are quickly diluted and have no measurable effect on river water quality.

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 enforced 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 (NRC)- and State-approved disposal cells. The NRC general license for UMTRCA Title I sites is established in 10 CFR 40.27. The Grand Junction disposal site will be included under the general license when the cell is completed.

Processing Site

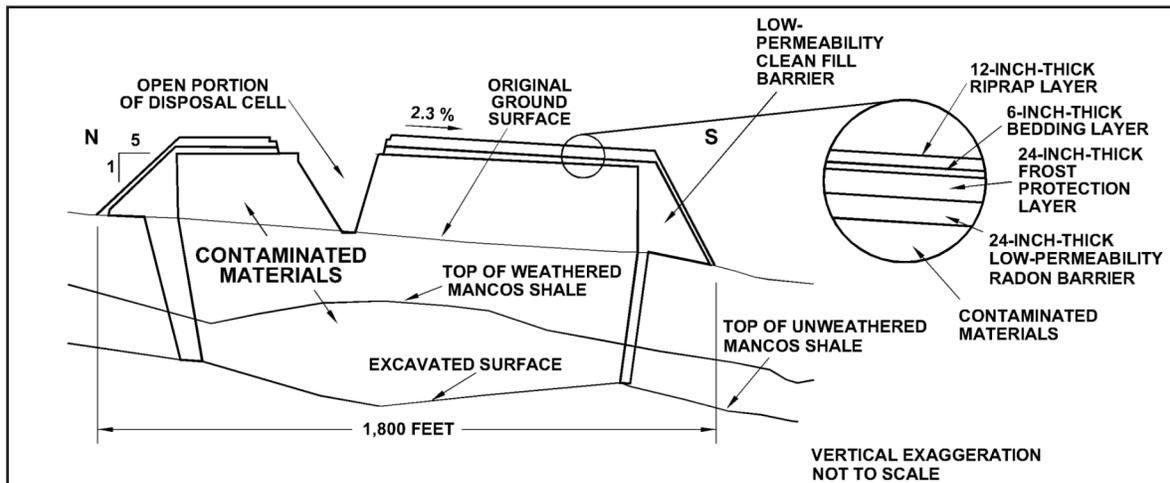
All surface and subsurface soils at the processing site were cleaned up to meet the standards in 40 CFR 192. After cleanup, the site was landscaped and the State of Colorado transferred property ownership to the City of Grand Junction through a quitclaim deed in March 1997.

The City paid homage to one of the early Latino communities that populated the former mill site area, by naming the property Las Colonias Park. The Grand Junction Parks and Recreation Department administers the site for the City. Phase I property development consists of:

- a concrete-paved riverfront trail constructed on a flood-control dike;
- various connecting trails;
- a covered picnic area;
- restrooms; and
- a playground for children.

Plans for Phase II include an amphitheater and additional parkland development.

In 2008, the City completed construction of the two-lane Riverside Parkway. It crosses the mill site property connecting the southern part of Grand Junction (see figure above).



North-South Cross Section of the Disposal Cell

Compliance Strategy

No remediation and supplemental standards—based on EPA’s criterion of limited use groundwater—is the selected groundwater compliance strategy proposed for the Grand Junction processing site. Supplemental standards may be applied at locations where groundwater is classified as limited use (not a current or potential source of drinking water) because it meets any of several criteria. Groundwater at the Grand Junction processing site is classified as limited use because of widespread, non-milling related contamination that cannot be cleaned up using public water system treatment methods, in accordance with 40 CFR 192.11(e)(2). Groundwater in the alluvial aquifer at the site and at background locations is not a present or potential source of drinking water because it contains elevated concentrations of naturally occurring uranium and selenium.

Institutional Controls

Institutional controls are safeguards that protect human health and the environment by restricting access to contaminated groundwater beneath the Grand Junction processing site.

Preliminary data indicate that natural processes such as dilution, dispersion, and sorption will reduce site-related contaminant concentrations in the groundwater. However, even if all processing-activity-related contaminants flush from the site, the naturally poor quality of the ground water will continue to be unacceptable for human consumption.

City of Grand Junction zoning and development codes already prohibit using groundwater within the city limits as drinking water and require landowners to tap into city water lines for a potable water supply; well water is permitted for uses such as irrigation and livestock consumption.

The groundwater upgradient and downgradient from the site—which is within city limits—is lower quality than other city areas. Because of this, language in the mill site property transfer deed states that the City agrees “not to use groundwater from the site for any purpose, and not to

construct wells or any means of exposing groundwater on the property unless prior written approval of construction plans, designs, and specifications is given by the Grantor [the State] and the U.S. Department of Energy.”

Disposal Cell Design

The disposal site is located about 18 miles southeast of Grand Junction. The U.S. Bureau of Land Management property surrounding the 360-acre site is used seasonally for grazing. The site is protected by a perimeter fence and a locked gate and no trespassing signs restrict access. The nearest residence is approximately 2 miles north of the site.

The 94-acre disposal cell sits at an elevation of about 5,200 feet above sea level on a westward-sloping, rocky surface consisting of about 40 feet of alluvium, colluvium, and terrace gravels underlain by a 700-foot-thick sequence of Mancos Shale. DOE chose the disposal site location because it was remote, lacked significant groundwater, and was underlain by a thick, impermeable layer of Mancos Shale.

Part of the Grand Junction disposal cell was completed in 1994. The rest of the cell will remain open until it is filled to capacity or until 2023 (whichever comes first) to receive additional low-level radioactive material expected from such sources as unremediated tailings buried under roads and along utility lines.

The open portion of the cell measures 1,200 feet by 750 feet, is approximately 30 feet deep, and can accommodate as much as 250,000 cubic yards of additional material.

NRC has conditionally approved the closed portion of the disposal cell, but the site will not be fully licensed until the open part of the disposal cell is closed.

Disposal Cell Design

The disposal cell is 2,400 feet by 1,800 feet and contains 4.4 million cubic yards of tailings and vicinity property materials that are compacted in layers to a height of 40 feet above the original ground surface. The cell is approximately 70 feet deep from its highest to its lowest point.

The cell cover is a multicomponent system designed to encapsulate and isolate the contaminated materials. The cover consists of (1) a low-permeability radon barrier (first layer placed over compacted tailings), (2) a frost protection layer, (3) a bedding layer, and (4) a layer of riprap. The cell design promotes rapid precipitation runoff to minimize leachate. Runoff is collected and directed away from the disposal cell by riprap-armored aprons that surround the cell.

Legacy Management Activities

The DOE Office of Legacy Management (LM) is responsible for ensuring that the Grand Junction processing site selected groundwater compliance strategy remains protective of human health and the environment. LM conducted a limited annual groundwater monitoring program, as a best management practice, collecting samples from select monitoring wells through 2006. Samples are now collected once every 5 years. Sampling at 5-year intervals will continue until concentrations of all analytes are below their respective maximum concentration limits or within the range of background values, or until the monitoring program is modified.

LM manages the Grand Junction disposal site according to a site-specific long-term surveillance plan that ensures the disposal cell systems continue to prevent release of contaminants to the environment. Under plan provisions, LM conducts annual site inspections to evaluate surface feature

conditions, performs necessary site maintenance, and monitors groundwater to verify the disposal cell's integrity.

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 Grand Junction disposal site will last indefinitely.

Contacts

Site-specific documents related to the Grand Junction disposal and processing sites are available on the LM website at http://www.lm.doe.gov/Grand_Junction_DP/Disposal/Sites.aspx (disposal site) and at http://www.lm.doe.gov/Grand_Junction_DP/Processing/Sites.aspx (processing site).

For more information about LM activities at the Grand Junction disposal and processing sites, contact:

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(970) 248-6070 (monitored continuously) or
(877) 695-5322 (toll-free)