

## **U.S. Department of Energy Office of Legacy Management’s Tribal Interactions – 12513**

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### **ABSTRACT**

Effective government-to-government interactions with tribal nations and maintaining stakeholder relations with members of tribes are increasingly important to the U.S. Department of Energy (DOE) Office of Legacy Management (LM). As of October 2011, LM was responsible for long-term surveillance and maintenance of 87 sites and facilities in the continental U.S. and Puerto Rico, including some sites on tribal lands. The sites on tribal lands can affect natural resources that are managed or used by tribes, or the sites can potentially affect areas of cultural significance to tribal nations in Alaska, Arizona, Colorado, New Mexico, Utah, Washington, and Wyoming.

Tribes are separate sovereign governments recognized in the U.S. Constitution and are significant stakeholders for LM sites. The tribes are individual nations with diverse histories, cultures, customs, religions, and laws. LM has regular communication with the affected tribes to inform members of issues, to allow the tribe to participate in decision making, to provide technical reviews, and to ensure tribal concerns are addressed.

Four LM sites are in the Navajo Nation. Three of those sites contain uranium mill tailings disposal cells regulated under long-term surveillance and maintenance programs that require monitoring and annual inspections. The fourth site was remediated but still has a groundwater plume that LM is responsible for. DOE and LM have worked with the Navajo Nation for almost 30 years on technical issues and to ensure tribal concerns are addressed.

### **INTRODUCTION**

Among the U.S. Department of Energy (DOE) Office of Legacy Management (LM) sites, the largest group of sites with tribal governments and stakeholders are sites that were remediated by DOE under Title I of the Uranium Mill Tailings Radiation Control Act (UMTRCA), Public Law 95-604. The 22 Title I sites were inactive uranium processing mills that were no longer licensed when UMTRCA was enacted in 1978 and consequently reclamation had not been performed. Congress assigned the responsibility to DOE to remediate the land and groundwater to U.S. Environmental Protection Agency (EPA) Standards established in Title 40, *Code of Federal Regulations*, Part 92. Title II of UMTRCA addressed the licensed sites that were active in 1978, when UMTRCA was first passed. Each of these sites was later remediated by the private company holding the U.S. Nuclear Regulatory Commission (NRC) license. Remediation was managed under the regulatory authority of either the NRC or the agreement state (Colorado, Texas, Utah, and Washington).

Many UMTRCA sites are located in arid and semiarid regions of the western U.S. near uranium ore deposits where mining and milling activities took place. Uranium can be found in sandstones of the Chinle Formation, in the Shinarump Member in the Navajo Nation, and in the sandstones of the Morrison Formation [1]. A uranium mining boom was fueled by the U.S. Government’s uranium purchasing program. By 1955, hundreds of mines were producing ore, and numerous mills and buying stations were located on the Colorado Plateau, in the heart of Indian country.

Native Americans guided prospectors and miners to large deposits of uranium-bearing ore on reservation land (Figure 1). In some tribes, during the uranium boom, more than 80 percent of the workforce was employed in the uranium industry. Almost all of the mines and mills have since been abandoned, leaving a legacy of tailings and processing residues on tribal lands. For example, four UMTRCA Title I sites are located in the Navajo Nation, the largest tribal reservation in the U.S.



Figure 1. Navajo uranium miners (circa 1955).

Between fiscal year (FY) 2012 and FY 2020, LM is expected to take responsibility for 17 additional UMTRCA Title II sites. Many of these sites are located on or near tribal lands in the western U.S., including the Church Rock, New Mexico, Disposal Site, which is only 1 mile away from the Navajo Reservation. As these sites are closed, the site licenses will be transferred to DOE, and LM will conduct long-term surveillance and maintenance (LTSM) at the sites. Six UMTRCA Title II sites are already managed by LM.

Under UMTRCA, DOE is required to enter into cooperative agreements with tribes affected by legacy uranium sites. This allows DOE to fund an affected tribe's participation in monitoring, review technical documents, perform independent technical studies, support stakeholder participation, and perform other activities. The agreements can also fund installation of alternate water supply systems so that contaminated groundwater will not be used as a water source. LM has had cooperative agreements for UMTRCA sites with the Navajo Nation, the Hopi Tribe, and the tribes on the Wind River Indian Reservation in Wyoming.

In addition, LM interacts with tribes at several of the Nevada Off-site Test Areas, which are locations in five states where the U.S. Atomic Energy Commission (AEC) conducted underground nuclear tests away from the Nevada National Security Site (formerly the Nevada Test Site). Cooperative agreements also support work to evaluate the potential for environmental contamination on Amchitka Island, Alaska, which was the site of three

underground nuclear tests. In the summer of 2011 at Amchitka, Aleut Indians were part of a team that collected samples of marine and terrestrial organisms to determine whether contaminant migration from the nuclear tests is resulting in radionuclides concentrating in food resources. LM also has government-to-government interaction with the Jicarilla Apache Nation in northern New Mexico concerning the Gasbuggy, New Mexico, Site, which is the location of one of three off-site tests that were conducted under the AEC's "Atoms for Peace" Plowshare Program to attempt to enhance natural gas production.

Along with the UMTRCA sites and Nevada Off-site Test Areas, LM is responsible for other sites, including the former Monticello uranium mill site. The Monticello Mill Tailings Site is located next to Monticello, Utah, and is approximately 60 miles north of the Ute Mountain Reservation. Although the site had similar characteristics to other UMTRCA sites, it was cleaned up under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Both the State of Utah and EPA have been involved in the remediation of the site through a Federal Facility Agreement. Figure 2 is a map of LM sites in Indian Country.

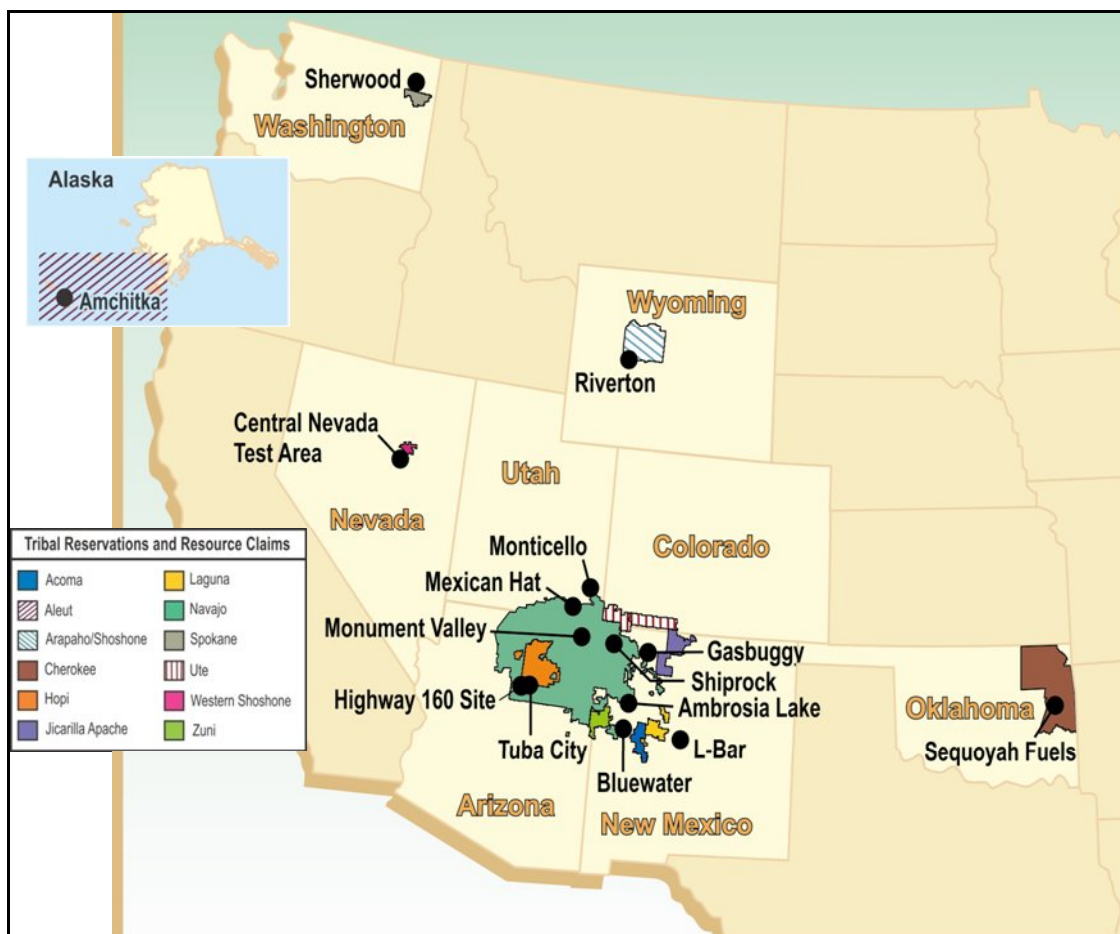


Figure 2. LM Sites in Indian Country.

LM conducts its public outreach activities in accordance with DOE's *Public Participation and Community Relations* policy (DOE Policy 141.2). LM's goal is to ensure that stakeholders are adequately involved in the process and informed of LM's plans and actions. LM's 2011–2020 Strategic Plan describes its vision and principles in more detail [2]. These include working

together with tribes so that they understand LM and its goals, working with communities and tribal nations, and meeting the public's expectations for outreach activities.

## **NAVAJO NATION BACKGROUND INFORMATION**

Some basic knowledge of the Navajo Nation is useful in understanding LM interactions and outreach activities with tribal nations. The Navajo Reservation is by far the largest reservation in the U.S. and is similar in size to the state of West Virginia. Because of the arid environment, the Navajo consider all water a valuable resource. The population has been growing and is now over 250,000 on the reservation. (A person's ancestry must be one-fourth Navajo to be a member of the Navajo Nation, and there are more than 300,000 enrolled members.) The economy is primarily based on tourism, services, and mining. A 2004 study by the Navajo Division of Economic Development found that at least 60 percent of all families have at least one member making arts and crafts.

The Navajo Nation is a sovereign nation with its own executive, judicial, and legislative branches of government. The government has 88 council delegates representing 110 Navajo Nation chapters or communities. The Navajo Nation has what is considered to be an exceptionally sophisticated form of Indian government, and it has taken authority over many regulatory areas, such as administering the Clean Water Act [4]. In 2005, the Navajo Nation banned all uranium mining on the reservation and, with EPA, it is gradually working to clean and mitigate abandoned uranium mines. The Navajo Nation exceeds national averages in rates of certain cancers, diabetes, and several other diseases [3]. Some people attribute some of these diseases to uranium exposure that could result from the former uranium mills, abandoned uranium mines, and contaminated groundwater.

The Navajo people, refer to themselves as “Diné,” and believe they passed through three different worlds before emerging into this world, which they believe is the Fourth or Glittering World. The Diné believe there are two classes of beings, the Earth People and the Holy People. To Navajos, rain is one of the four main elements of Earth; light, air, and pollen are the others [5].

The Navajo language does not have words for many technical terms such as radioactivity or uranium. Consequently, it can be challenging to communicate technical issues to the elders. LM uses native Navajo speakers as translators at community meetings when possible. Because the Navajo people traditionally have a long view of the world and place high value on water, they do not always agree with DOE's strategies, with EPA UMTRCA standards, or with decisions to leave contaminants in place, even if the contaminants are contained and managed in engineered disposal cells.

## **LM INTERACTIONS WITH THE NAVAJO NATION**

LM works with the Navajo Nation at UMTRCA Title I sites near Shiprock, New Mexico; Monument Valley, Arizona; and Mexican Hat, Utah. LM works with both the Navajo Nation and the Hopi Tribe at the UMTRCA Title I site near Tuba City, Arizona. All four sites are associated with former uranium mills, and uranium mill tailings disposal cells have been created at three of these four sites. DOE has spent over \$100 million constructing the three disposal cells and remediating the four sites, including remediating 31 vicinity properties near the former uranium mill sites [6].

DOE and LM have been working with the Navajo Nation for almost 30 years on the cleanup of the four former uranium mills and associated contaminated groundwater. Since the surface cleanup program was completed in 1998, LM has focused primarily on groundwater issues and the LTSM of the three disposal cells. The following is a description and history of the remediation of the four sites, followed by examples of some of LM's interaction and outreach activities with the Navajo Nation.

### **Tuba City, Arizona, Site Description and History**

The Tuba City, Arizona, Disposal Site is located off Highway 160, approximately five miles east of Tuba City. The Tuba City site borders Moenkopi Wash, which flows down to the village of Moenkopi, Arizona, approximately 4 miles away, which is on the Hopi tribal lands. Because this area has been the subject of a land ownership dispute between the Navajo Nation and Hopi Tribe [7], DOE has interacted with both tribal nations on issues regarding the Tuba City Disposal Site.

Fourteen residential structures are located within one mile of the disposal site. Rare Metals Corporation (and its successor, El Paso Natural Gas Co.) operated the uranium mill at the site from 1956 to 1966. DOE remediated the site between 1988 and 1990 and constructed a disposal cell on the site to consolidate 1.6 million cubic yards (yd<sup>3</sup>) of radioactively contaminated soils and debris. The cell covers approximately 50 acres and has a 5.5 foot (ft) thick cover comprised of a radon barrier (clay) and stone riprap.

As a result of contaminated water that seeped from ponds during the operation of the mill, a legacy groundwater plume remains that contains uranium, molybdenum, selenium, and nitrates exceeding EPA UMTRCA groundwater cleanup standards. DOE constructed a wellfield, transmission system, and treatment plant to contain the plume and treat the water to drinking water standards. A solar thermal heating system was constructed to heat groundwater before it goes into the mechanical evaporation unit. A solar photovoltaic system was also built to augment electricity used by the plant.

The technology for the groundwater treatment system at Tuba City was made with consultation with both the Hopis and Navajos. Both cultures place great value on water and wanted LM to choose a technology and system that maximized the amount of water that could be returned to the aquifer. A mechanical evaporation treatment system distills the water, so that only about 10 percent is lost in the brine waste stream that is pumped to an evaporative pond. Approximately 90 percent of the treated water is returned through an underground drain system so that the aquifer is replenished.

### **Monument Valley, Arizona, Site Description and History**

The Monument Valley, Arizona, Processing Site is approximately 15 miles south of Mexican Hat, Utah, in a remote part of the Navajo Nation. A uranium processing mill operated at the site from 1955 to 1968. DOE remediated the site between 1992 and 1994. More than 900,000 yd<sup>3</sup> of radioactively contaminated materials were excavated and relocated to the Mexican Hat Disposal Cell. All that remains at the Monument Valley site is a contaminated groundwater plume comprised primarily of nitrates and ammonium. DOE has successfully used phytoremediation test plots to attenuate the nitrates.

Several groundwater monitoring wells, located to the side of the site in a drainage, have shown elevated levels of uranium. LM is investigating the source, which may be abandoned mines upstream of the drainage.

A few residents live within several miles of the former millsite. Because the groundwater was contaminated around the former millsite, DOE funded the construction of an alternate water system to supply clean water to those residents.

### **Shiprock, New Mexico, Site Description and History**

The Shiprock, New Mexico, Disposal Site is located just south of Shiprock in the northwest corner of New Mexico near the Four Corners. Kerr-McGee (and its successor, the Vanadium Corporation of America) operated the uranium mill from 1954 to 1968. The DOE remediated the site between 1983 and 1986 and constructed a disposal cell on site, consolidating 1.9 million yd<sup>3</sup> of radioactively contaminated materials. The cell covers approximately 77 acres and has an 8 ft thick cover comprised of a low permeability radon barrier and rock riprap. The cell sits on a bluff above the San Juan River and is near a residential area and the fairgrounds.

As a result of contaminated water that seeped from ponds during the operation of the mill, there is a legacy groundwater plume that contains uranium, ammonia, and several other contaminants above cleanup standards. DOE constructed a network of wells, transmission lines, and an 11-acre evaporation pond in 2003 to capture and treat the water.

### **Mexican Hat, Utah, Site Description and History**

The Mexican Hat site is located 1.5 miles south of the town of Mexican Hat, Utah, and about 10 miles north of the Utah-Arizona border. Texas-Zinc Minerals Corporation (and its successor, Atlas Corporation) operated the mill from 1957 to 1963. The DOE remediated the site between 1992 and 1995 and constructed a disposal cell on site, consolidating 2.5 million yd<sup>3</sup> of radioactively contaminated materials along with the material from Monument Valley. The cell covers approximately 68 acres and has a 4 ft thick cover comprised of a low-permeability radon barrier and rock rip-rap. Because groundwater contamination is sporadic and ephemeral, no remediation is required.

### **DOE Funding for Navajo Nation Participation in LM Activities**

A cooperative agreement with the Navajo Nation funds their consultation and participation in LM activities. Under the agreement, the Nation coordinates communication with the public, conducts public meetings and works with affected residents; constructs alternative water systems; performs additional independent environmental sampling or adds additional monitoring wells; and performs remediation when authorized by Congress.

### **Highway 160 Site at Tuba City, Arizona**

Congress funded the cleanup of a small abandoned landfill, known as the Highway 160 Site, north of the Tuba City disposal cell. The site was missed during DOE's UMTRCA cleanup program and was found years later by the Navajo Nation. Because DOE's congressional authority had expired, new legislation was required to authorize and fund the cleanup. The legislation was passed in FY 2009, providing \$5 million to DOE for the cleanup. Working through a cooperative agreement, funding was transferred to the Navajo Nation EPA so they could manage the cleanup work. Some funding was retained so that DOE Environmental

Management's (EM) Moab, Utah, technical assistance contractor (TAC) could conduct the radiological characterization of the site. The TAC has recently performed vicinity property surveys in Moab and has on-site laboratories to analyze Ra-226 and uranium, the primary contaminants in the soil.

LM's disposal cell near Grand Junction, Colorado was used so that all of the contaminated material could be disposed at no additional cost to the project. LM was assigned by Congress to keep the Grand Junction Disposal Cell open until 2023 for disposal of radioactive waste related to the former UMTRCA sites and found after 1998. LM operates the disposal cell at no cost to the generator/transporter of radioactive material. Over 400 truckloads were transported from the Highway 160 Site to the Grand Junction Disposal Cell, involving approximately 4,100 yd<sup>3</sup> of radioactive soil and debris [8] (Figure 3).



Figure 3. Bags of radioactive material ready from Highway 160 site placed in Grand Junction Disposal Cell.

The project was a total success and completed almost one year ahead of schedule by DOE and the Navajo Nation working together. Both LM and EM, who have personnel with decades of experience cleaning up uranium mill tailings, provided technical assistance by delivering past examples of work plans, reviewing documents, and meeting regularly with the Navajo Nation EPA and its subcontractor.

### **Public Education and Outreach at Tuba City, Arizona**

LM and its contractor conduct tours for local schools of the Tuba City treatment plant, phytoremediation work, and the disposal cells. One recent tour involved 26 students and teachers who were part of a summer Native American Environmental Youth Camp program hosted by the U.S. Forest Service and Diné College, located in Tuba City [9]. The students were able to tour the treatment plant and solar photovoltaic and heating systems.

### **Grazing Rights Issues**

The three disposal cells are on withdrawn land that allows LM to maintain the disposal cells in perpetuity. LM must conduct investigations and construct groundwater wells and piping outside of the disposal cell property. Although on most parts of the reservation there is not privately owned property, most of the land is covered by grazing rights held by nearby families. Although families are issued grazing rights, there are still numerous conflicts. The Navajo Nation assists DOE in working through any issues related to grazing rights and, if compensation is needed to compensate for lack of grazing, who should receive it.

### **Meetings, LM Website, and Training**

DOE meets regularly with the Navajo Nation EPA and Navajo UMTRA staff. At a minimum, quarterly meetings are held to discuss issues, strategies, and concerns. All groundwater monitoring data is shared with Navajo Nation technical representatives and discussed.

In addition, LM posts data on its website for the public to access. The website offers links to the Geospatial Environmental Mapping System for current and historical environmental data.

In 2010, LM hosted a Native American Cultural Awareness Training for two days. The training was developed in conjunction with Navajo and Hopi tribal representatives in an effort to enhance working relationships and understanding. Training topics included cultural awareness, background, history, and procedures utilized by the Navajo Nation. Over 50 DOE and contractor staff attended the training and provided very positive feedback about the unique cultural awareness training [10].





Figure 4. LM, Navajo Nation, and Hopi Participants in Native American Cultural Awareness Training

### **Internships**

LM has a summer intern program for college students from tribal nations and historically black colleges. In the summer of 2011, interns from both the Navajo Nation and the Hopi Tribe participated in the program. The intern from the Navajo Nation assisted LM with hosting a public meeting in Shiprock, including providing translation to Navajo elders in their native language. The intern from the Hopi Reservation assisted with research on whether shrubs that become established on UMTRCA cells are uptaking contaminants such as uranium through their root system. The work she performed was part of her graduate work at the University of Arizona.

### **Local Hiring**

LM makes efforts to employ workers from the local communities. LM's contractor hires Navajo and Hopi operators at the Tuba City Treatment Plant. A local resident near the Monument Valley site is hired to maintain fences and perform general maintenance.

### **Workshops and Seminars**

Since 2009, LM has participated in and presented several papers at the Navajo Uranium Contamination Stakeholder Workshop. The annual workshop, attended by hundreds of people, has been held in Grants, New Mexico; Tuba City; and in 2011 in Farmington, New Mexico. The workshop involves representatives from the Navajo Nation, EPA, LM, Bureau of Indian Affairs, Indian Health Service, NRC, and the Centers for Disease Control and Prevention. Topics of the workshop include providing an update on the "Navajo Five-Year Plan," a multi-agency effort requested by the U.S. House Committee on Oversight and Government Reform. Issues

addressed as part of the Five-Year Plan and that are also topics of discussion at the Navajo Uranium Contamination Stakeholder Workshop include contaminated structures, abandoned mines, and contaminated water sources [11]. Through its CERCLA authority, EPA has been able to take the lead in cleaning up contaminated structures, providing alternate water sources, and cleaning up several large abandoned mines on the Navajo Reservation.

Also discussed at the November 2011 meeting was a proposal to co-dispose approximately 900,000 yd<sup>3</sup> of mine waste with mill tailing waste at the Church Rock, New Mexico, UMTRCA Title II disposal site. This effort will involve collaboration between EPA, DOE, and NRC in addition to the Navajo Nation. The mine waste is from the Northeast Church Rock Mine, located on the Navajo Nation, which is the largest underground uranium mine in the U.S.

### **Preservation of Human Remains**

During remediation of the Monticello uranium mill tailings site, human remains were found. All excavation was stopped and the area was secured. The state historic preservation officer determined the area to be ancient human burial area. DOE contacted representatives of tribes in the area. In consultation with the tribes and the Utah State Historic Preservation Office, the human remains and associated artifacts were reinterred in a nearby uncontaminated parcel in compliance with the Native Americans Graves Protection and Repatriation Act.

### **CONCLUSIONS**

Effective government-to-government interactions and stakeholder relations with tribal nations have become an increasingly important LM responsibility. LM has regular communication with the affected tribes to inform members of issues, allow tribe members to participate in decision making, provide technical reviews, and ensure tribal concerns are addressed.

Four LM sites are on the Navajo Nation. Three of these sites contain uranium mill tailings disposal cells. The disposal cells fall under the LTSM program, which requires monitoring and annual inspections. DOE and LM have worked with the Navajo Nation for almost 30 years on numerous issues. The importance of effective LM and tribal-nation programs will continue to grow as the number of sites that fall under LM responsibility is projected to increase to over 125 by 2020.

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