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# Uranium Mining on Navajo Lands

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**Prologue**

Since the discovery of the new world there have been conflicts over, and exploitation of, the Native Americans, their lands and their resources. First were the conflicts over living space and access to the land. By the 1830's, with the discovery of gold and other precious metals on Indian lands, the forced relocation of the Native peoples west of the Mississippi began. Since then there have been waves of prospectors, mining companies and government-funded corporations looking, and finding, valuable natural resources within Indian territory all over the country. Finally, after the Native Americans had been relocated on seemingly worthless lands in the west, another precious resource was found, uranium. With relocation no longer an option because the American population had now surrounded the Indians and their lands it was decided that mining for this dangerous resource would have to take place despite the Indian populations' presence. The results of uranium mining shattered the health of Navajo miners and their families and drastically contaminated their environment. This paper will examine the environmental and biological effects of uranium mining during the Cold War on the Navajo peoples in the American southwest as well as the continuing efforts to reclaim their environment in the wake of the United States' drive towards nuclear superiority. Early scholars often saw the Navajo as a peaceful group of sheepherders, content with their lot in life. Later, with their participation in World War II, much praise was given to their use of language as "code-talkers". Still more generally, Native Americans have often been portrayed as misguided innocents, hanging on to outmoded ways of life in the face of the conquering power of the United States. As more modern scholarship emerges, these stereotypes have either become outdated or have been revised to incorporate new

understandings of these people with often less Eurocentric interpretations and judgments being forwarded. However, as modern scholarship and methods have improved, many aspects of energy development and physical impact have been more commonly seen among historians than was evidenced in the past. This is a vast improvement, but one that requires constant efforts to keep informed as the policies affecting these people is undergoing rapid change.

**The Federal Government and Indian Land Policy**

When the United States assigned Indians to reservations in the nineteenth century they were usually assigned to land that was thought to be useless. It has now been realized that many western reservations lie on some of the world's richest mineral belts. It is estimated that reservations contain one-third of all western low-sulfur coal, one-fifth of the countries reserves of oil and natural gas, and over half of the nation's uranium deposits. The Navajo Nation covers more than 16 million acres of land and has over 255,000 enrolled members, 168,000 of whom live on the reservation.[1]

In 1868, the United States government entered into treaty negotiations with the Navajo Tribe. The resultant treaty formally acknowledged Navajo rights to a large portion of relatively barren land in western New Mexico. It was subsequently discovered that this barren swath of land was useable for cattle grazing, and the treaty area was adjusted to provide this area to non-Indian ranchers. The adjustment of the treaty boundaries pushed the Navajo into the homeland of another people, the Hopi.

In 1919, Standard Oil set about negotiating mineral leases on Navajo land. The traditional council of elders unanimously rejected the idea, so in 1920 the Bureau of

[1] Esther Yazzie-Lewis and Jim Zion, *Leetso, the Powerful Yellow Monster: A Navajo cultural Interpretation of Uranium Mining*. Eds. Dough Brugge, Timothy Benally and Esther Yazzie-Lewis (Albuquerque: University of New Mexico Press, 2006), 1.

Indian Affairs (BIA) replaced the council of elders with a "Grand Council" comprised of men picked by the government rather than by the Navajo people. The men on the new council were men who had been compulsorily educated in the Indian schools, and who "owed their status to the U.S. rather than to the people they ostensibly represented."[2] The new council promptly signed the mining leases, and from then on it was the only body the government would recognize as legitimately representing the Navajo people. This replacement plan, adopted within the Indian Reorganization Act (IRA) of 1934, soon became the model for dealings with all native peoples, to replace the traditional forms of native government with new and democratic bodies that would owe their positions to the federal government and therefore be more biddable to the will of the United States. This same replacement of tribal government was done to the Hopi tribe, as well.

The new tribal council of the Hopi, in cooperation with the Bureau of Indian Affairs (BIA), lobbied for the creation of Grazing District 6, a 650,013-acre area surrounding the main Hopi villages and marked off for exclusive Hopi use and occupancy, over the objections of the more traditional members of the tribe. They succeeded in 1943, forcing over one hundred Navajo families who had lived there for generations to relocate outside the boundaries. The IRA government of the Hopi had then enlisted legal council to protect their rights to the land, and instigated legislation to force the Navajo off of district 6. Aside from the forced relocation away from district 6, which had been found to be ideal for strip-mining, the Navajo were also ordered to reduce their stock significantly. The Navajo relocation program threatened to break the

[2] Ward Churchill, *Struggle for the Land: Native North American Resistance to Genocide, Ecocide and Colonization*, (San Francisco: City Lights, 2002), 137.

tribe. Being a land-based society, and having less than enough land to be resettled upon, many Navajo were to be relocated into more urban areas, which is the antithesis of Navajo life.

**What is uranium?**

Uranium is a naturally occurring radioactive ore that is found in low concentrations-a few parts per million-in soil, rock groundwater and surface water. Uranium ore is most often found in hard rock and sandstone in just a few places on earth, including the southwestern United States. Uranium decays very slowly, having a half-life of 4.5 billion years. As it decays it emits alpha radiation. The long half-life of uranium means that it produces less radiation than its decay progeny such as radon, but produces for a longer period of time. As uranium decays it turns into other radioactive particles, which in turn decay into other radioactive particles until a stable isotope is reached.[3]

The health risks associated with uranium mining and uranium decay are actually more affected by uranium decay daughters such as radon (gas), thorium (solid) and radium (solid). Radon has a very short half-life of 3.82 days. This brief half-life means that it decays faster and emits more radiation over a shorter period of time than uranium. Radon's decay process into lead-210 has been associated with alpha particle production that is capable of damaging the DNA of respiratory cells when inhaled.[4]

> "Radon isotopes are formed naturally through the radioactive decay of uranium or thorium…Uranium and thorium decay to other elements such as radium (a solid), which in turn decays into radon gas. Uranium and thorium have been present since the earth was formed and have very long half-lives (4.5 Billion years for uranium and 14 billion years for thorium). The half-life is the time it takes for half of the atoms of a radionuclide to undergo radioactive decay and change it into

[3] Argonne National Laboratory, EVS. *Uranium Human Health Fact Sheet.* August 2005.
[4] Karen B. Mulloy, David S. James, Kim Mohs, and Mario Kornfeld. Lung Cancer in a Nonsmoking Underground Uranium Miner. *Environmental Health Perspectives* 109, no. 3. (March 2001): 307.

> a different isotope. Uranium, thorium, radium and thus radon, will continue to exist indefinitely at about the same levels as they do now."[5]

**Early Experiences**

In 1941 the BIA discovered uranium deposits on the Navajo reservation and at the same time the Navajo Tribal Council passed a resolution to support the United States opposition to Nazi Germany.[6] With the beginning of World War II, many Navajo supported the United States by joining the military to fight for their country and by mining uranium to support the war effort at home. Between 1941 and 1988, at the height of the Cold War, the Navajo Nation contributed over 13 million tons of uranium to the U.S. government, which was the sole buyer during this time.[7]

On the Navajo reservation, where even by 1982 the average income was only $2,000 per year,[8] many young men found the promise of wages and steady income working in coal and uranium mines attractive. Royalties from energy development brought much needed income to the Navajo economy. These monies allowed for scholarships to Navajo students, and funding for the Navajo Community College. A few, like tribal chairman Peter MacDonald, were made rich by this new influx into the economy, but many were still poverty stricken after the implementation of the stock reduction and relocation program required of them after being removed from grazing district 6. Navajo energy resources provided electricity for Albuquerque, Phoenix, and Los Angeles while many Navajo homes did not even have running water.[9]

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[5] Agency for Toxic Substances and Disease Registry. *Draft Toxicological Profile for Radon*. September 2008.
[6] Yazzie-Lewis and Zion, *Leetso, the Powerful Yellow Monster*, 2.
[7] Ibid. 3.
[8] Harvey Wasserman, Norman Solomon, Robert Alvarez and Eleanor Walters, *Killing Our Own: The Disaster of America's Experience with Atomic Radiation*. (New York: Delta, 1982). 177.
[9] Diane O'Leary, interview by author, Garibaldi, OR, May 31, 2005.

By 1950, both the tribal (IRA) government and the U.S. government began to realize the extent, and possibilities, of the mineral deposits in the Four Corners region. Major corporations were very interested in this area as well. By 1955, Anaconda, Kerr-McGee, and other energy conglomerates were buying leases and opening uranium mining/milling operations to feed the ore-buying program of the Atomic Energy Commission (AEC). Other corporations interested in getting in on the energy market were Standard Oil, Mobile, Phillips and Gulf, clamoring to get oil and natural gas rights in the area. The worthless desert the government had removed the Indians to was emerging as a lucrative natural resource area.[10]

In 1952, the BIA awarded the Kerr-McGee Corporation the first contract to mine uranium on Navajo land. The company employed around one hundred Indian miners at two-thirds the off reservation pay scale. The same year a federal inspector at the Shiprock mine in New Mexico, found that the ventilation fans in the mine's main shaft were not functioning. When this same inspector returned in 1955, the fans ran out of fuel during his visit. Tests in 1959 showed that the radiation levels in the mine were ninety to one hundred times higher than was allowed for worker safety.[11] Nothing was done to correct this before the ore was gone and the mine closed in 1970. With the ore gone, Kerr-McGee pulled out, abandoning the mine and leaving the surrounding community to deal with the seventy acres of uranium tailings, which contain around 85 percent of the original radioactivity found in the raw ore and 99.9 percent of the original volume, and which the company had simply left behind in the middle of the town.[12] The company was not required to perform reclamation of its mine sites or any clean up activity. The

[10] Churchill, *Struggle for the Land*, 140.
[11] Churchill, *Struggle for the Land*, 242.
[12] Wasserman, et al, *Killing Our Own*. 178.

tailing piles of this radioactive waste begin less than sixty feet from the area's only significant water source, the San Juan River. There was no follow-up health care provided by the company or the BIA for the Navajo miners who worked underground at the Shiprock site. By 1975, eighteen had died of radiation-induced lung cancer; by 1980 another twenty had died from the same disease.[13]

The link between uranium mining and lung cancer was suspected in Europe as early as 1879. In 1932, Germany and Czechoslovakia had designated cancer in these miners to be a compensable occupational disease, and by 1951 the causal agent had been determined to be radon daughter isotopes.[14] In 1950 the U.S. Health Service began a study to determine the link between radon levels in uranium mines and the incidence of lung cancer in workers. The miners were not informed of the risks being studied, and the original published study excluded Navajo and other minority workers in an effort to study an homogeneous white population, although they were included in the initial report. In 1959 the U.S. Public Health Service (PHS) distributed pamphlets to uranium miners mentioning the risk of lung cancer, but the pamphlets minimized the health risks associated with uranium mining and it is unclear how widely circulated they were or what the English literacy and comprehension levels were of those who did receive the pamphlets.[15] The Navajo Tribal Council had outlawed union activity on the reservation in 1958, and by 1971 union membership was only about 300 people total.[16] The absence of unions to advocate for Navajo uranium miners meant that the Navajo Nation relied on its trust relationship with the federal government to provide for the health and education

[13] Ibid. 243.
[14] Doug Brugge and Rob Goble, *A Documentary History of Uranium Mining and the Navajo People*, Eds. Doug Brugge, Timothy Benally and Esther Yazzie-Lewis, 26, 30-31.
[15] Doug Brugge and Rob Goble, *A Documentary History of Uranium Mining and the Navajo People*, 32.
[16] Ibid, 38.

of its people according to historic treaty agreements. The federal government was remiss in this duty, failing to educate the workers and their families about the long-term health risks that were known at that time, as well as failing to provide adequate health care when illnesses related to mining uranium became apparent.

**The Church Rock Disaster**

On July 16, 1979, the nation's worst accidental release of radioactivity occurred when United Nuclear Corporation's uranium tailings dam failed at Church Rock, just outside the Navajo Reservation. Ninety four million gallons of radioactive water and 1,100 tons of radioactive mill waste flooded into the Rio Puerco, a significant water source for livestock and domestic use. Twenty miles downstream in Gallup, NM, sewers backed up and manhole covers were lifted.[17]

Residues of uranium, thorium, radium and polonium were detected. Traces of cadmium, aluminum, magnesium, manganese, molybdenum, nickel, selenium, sodium, vanadium, zinc, iron, lead and high concentrations of sulfates were also detected. This degraded the Rio Puerco as a water source and toxic metals were detectable at least 70 mile downstream. There are 140 million tons of radioactive tailings in the western United States. Next to the bomb tests, the Church Rock disaster is the largest single accidental release of radioactive poisons on American soil. [18]

Traditional mining techniques, including underground and open pit mining, extract uranium from sandstone by grinding the rock finely and leaching it with sulfuric acid. The acid carries off the desired isotopes. Leaching liquids are called liquor. The acid also dissolves thorium 230, radium 222, lead 210 and other isotopes.

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[17] Wasserman, et al, *Killing Our Own*. 177.
[18] Harvey Wasserman, et al, *Killing Our Own*, 177.

NRC commissioner Victor Gilinsky considers tailings to be "the dominant contribution to radiation exposure" of the entire nuclear fuel cycle. U.S. Representative Morris Udall (D-Arizona) stated at a congressional hearing that "at least 3…Federal and state regulatory agencies had ample opportunity to conclude that such an accident was likely to occur" and that even before the dam was licensed "the company's own consultant predicted that the soil under the dam was susceptible to extreme settling which was likely to cause [its] cracking and subsequent failure." Udall also pointed out that cracks had developed in the dam the year it opened and that state-required seepage devices and monitoring wells had never been built. A special report by the U.S. Army Corps of Engineers stated that if the dam had been built to legal specifications and according to approved design "it is possible that the failure would not have occurred." The New Mexico State Engineers Office added that the engineers who reviewed the accident agreed that "had the drain zone been constructed according to approved plans and specifications, and had the tailings beach been in place as recommended by [UNC's] engineers, it is likely the failure would not have occurred."[19]

After the accident, ten thousand sheep died. Local Navajo herding their animals along the banks said the water looked putrid yellow, like battery acid. A Navajo woman and several animals that waded through the river that morning developed sores on their legs and later died.[20] About 1,700 Navajo were immediately affected, as were their livestock, from the gross contamination of their only water source. For a year the state of New Mexico told the Navajo not to eat their mutton, and butchers would not buy it. After the incident, United Nuclear refused to supply adequate emergency water and food

[19] Wasserman, et al, *Killing Our Own*, 179.
[20] Colin Calloway, ed., *First Peoples: A Documentary Survey of American Indian History*, 2nd ed. (Boston: Bedford/St. Martin's, 2004), 479.

supplies. Rather than try to fix the damage the company offered the Navajo a $525,000 out-of-court settlement, after stonewalling for five years.[21]

By 1983 there were nearly a thousand significant nuclear waste sites surrounding the abundance of abandoned mines in Navajo territory, but they were designated by the EPA as too remote to be of significant national concern to warrant the expensive measures involved in cleanup and reclamation. On the neighboring Laguna Pueblo in New Mexico, the situation is just as bad, if not worse. In 1952 the BIA issued a 7,500-acre lease to the Anaconda Copper Company on which to start open-pit uranium mining and an adjoining milling operation. By 1980, the Jackpile-Paguate Mine was the largest in the world, covering 2,800 acres. According to Ward Churchill "It has been estimated that it would take 400million tons of earth—enough to cover the entire District of Columbia 45 feet deep—to fill it in. Of the earth removed, approximately eighty million tons were good grade uranium ore."[22]

Anaconda used "dewatering" or in-situ leach (ISL) mining techniques, which require the pumping of water to facilitate ore extraction. This water is permanently contaminated by contact with radioactive materials in the process. Since 1972, the Jackpile mine has used more than 119 gallons per minute through the dewatering procedure. Altogether more than 500 million gallons of radioactive water has been discharged from this one mine, the water is then pumped over the 260 acre tailing pile sitting on soft porous rock. This contaminated and highly radioactive water is left to evaporate, leaving the sandy tailings behind, but because of the geology of the site the contaminated water may be absorbed back into the aquifer, or if the pond is damaged it

[21] Ibid.
[22] Churchill, *Struggle for the Land*, 247.

may seep into the arroyos and drainage channels of the Rio Mequino, which is fed by a natural spring near the site.[23]

**National Sacrifice Areas**

After an extensive study of the difficulties and expense of rehabilitating land and water contaminated by uranium mining and milling by Los Alamos Scientific Laboratories, the premier U.S. nuclear research center, its scientists concluded in its 1978 Mini-Report that perhaps the solution to the problem is to zone uranium mining and milling districts so as to forbid human habitation. This finding coincided neatly with an earlier recommendation by the National Academy of Science whose suggestion that locales such as the Four Corners area be designated "National Sacrifice Areas" in the interest of U.S. economic stability and energy consumption. This was incorporated into the Federal Energy Department's Project Independence in 1974.[24]

By 1981, in Shiprock, where a seventy-two acre tailings pile sits in the middle of town, pediatricians were seeing an abnormal increase in birth defects among their patients. One doctor reported that she was disturbed by the number of babies being born prematurely with small heads. One child had been born with its esophagus and trachea joined, and another born without an abdominal wall. While hesitant to blame radiation for the increased incidence of birth defects, another doctor reported that in six months he had seen "three infants with heart diseases two with cleft lips and palates, two with skull defects, two with Down's syndrome, one with a section of backbone missing and several with thyroid conditions…A study by the Community Health Representative

[23] Churchill, *Struggle for the Land*, 247.
[24] Churchill, *Struggle for the Land*, 250.

Program found a doubling of spontaneous abortions, stillbirths and congenital abnormalities among children of uranium-mining families."[25]

Another region designated as a potential national sacrifice area is that around the Black Hills including parts of South Dakota, Nebraska, Wyoming, Montana, and North Dakota. This area contains the second largest concentration of land based Indians in North America (second only to the Navajo), including the entire complex of Sioux reservations. At the same time studies indicated that the pattern of stillbirths, infant deformities and cancer deaths seen in the Shiprock area were being seen in the Black Hills region near the mines and tailings, dramatically increasing in the affected area since 1970.[26]

Government spokespersons adamantly insisted that there was "no public health hazard" in its uranium mining and milling operations—which had closed down by 1982. During the period between 1985-87 the government finally "fixed" the problem of surface water contamination by moving the tailing piles away from the banks of Cottonwood Creek and moved them a few miles closer to the reservation, dumping the tailings on a barren plateau. It is "secured" there within a chain-link fence with razor wire and a few metal signs that say "hazardous wastes".[27]

**HRI Crownpoint ISL Project**

Hydro Resources, Inc. (HRI) Crownpoint ISL project consists of four uranium mines in the Navajo communities of Crownpoint and Church Rock. These mines would use a method called in-situ leach mining. This process involves injecting water

[25] Wasserman, et al, *Killing Our Own*, 187.
[26] O'Leary, interview by author.
[27] Churchill, *Struggle for the Land*, 247.

containing dissolved oxygen and sodium bicarbonate into uranium bearing rock.[28] The solution dissolves the uranium from the rock and the solution is then pumped back to the surface for processing. After the uranium is separated from the solution it is processed into yellow cake, which is the raw material, used for making fuel for nuclear power plants.

The ISL technology proponents claim it to be more environmentally safe than the older methods of underground or open pit mining. The reasons for this claim is that contrary to underground mines, workers are not exposed to the high levels of radon gas and it daughter isotopes that are linked to high cancer rates among workers, and contrary to open pit mines, there are no waste products in the form of tailings, mill ponds or giant holes in the ground. In this respect, these claims are accurate. But the potential for environmental damage due to failure of this technology is grossly understated. The potential damage to water supplies, in an area where water is precious because of its scarceness, seems to be ignored or minimized by these companies and the benefactors of uranium production.

This project would take place in the Westwater Canyon Aquifer. This aquifer is the only source of quality drinking water for Crownpoint and surrounding communities, as well as an important source of water for Church Rock and other communities who use it for livestock and household purposes. Approximately 10,000 people are estimated to get their water from this aquifer.[29]

The potential for environmental disaster from ISL mining is enormous. This mining technique involves drilling hundreds of injection and monitoring wells at each of

[28] Southwest Research and Information Center. "Facts and History About: HRI's Crownpoint Uranium Solution Mining Project." July 25, 2001. http://sric.org. accessed May 10, 2009.
[29] Ibid.

the proposed four sites. The injection wells are drilled into the water-containing soft sands below the surface, if an ISL injection pump fails through pipe breakage or leaks, the solution can be released into the aquifer where it will spread throughout the underground water system. These mining solutions could escape through narrow channels in the aquifer itself. According to the Southwest Research and Information Center, which works closely with the Navajo Nation, the monitoring wells that are intended to detect such leaks would be placed too far apart for complete and accurate detection of ISL failures. The restoration ground water to pre-mining conditions has not been achieved at any commercial-scale ISL site to date.[30]

**Radioactive Homes**

In a region where poverty is rampant, people use whatever building supplies are available. In areas close to mines, many Navajo used the waste from mine sites to build foundations, walls and even entire homes. These people did not know that the stone they were using would cause any harm to themselves or their children.[31] It is unknown how many homes and ceremonial buildings, called hogans, contain radioactive waste rock, but in November 2006, the EPA evacuated six families living in the Red Water Pond Road area because radiation levels were so high that no one should have been living there. The EPA scraped off the top eight inches of soil, sending it to a hazardous waste disposal site, then sent the families back to their homes. Although the EPA says the area is now safe for human habitation, residents are still concerned for their health. The EPA states that "some Navajo residents may have elevated health risks due to the dispersion of radiation and heavy metal contamination in soil and water" and that "ingestion of contaminated

[30] Southwest Research and Information Center. "Facts and History About: HRI's Crownpoint Uranium Solution Mining Project." July 25, 2001. http://sric.org. accessed May 10, 2009.
[31] Wasserman, et al, *Killing Our Own*, 186.

water has been identified as the exposure pathway of greatest concern."[32] In an effort to reduce the risk from contaminated buildings, the USEPA in conjunction with the NNEPA, began a joint effort to remove contaminated buildings and foundations from private properties around the Reservation. The USEPA began offering free radiation surveys in the 1990's. The EPA will provide temporary housing for families and livestock whose structures require demolition at no cost to the individuals. The EPA will also provide reimbursement for meals and accommodations to individuals who are being displaced. The EPA estimates that approximately 500 structures may need to be assessed for radiation. This action is being taken in conjunction with the Navajo Nation EPA under the Health and Environmental Impacts of Uranium Contamination in the Navajo Nation Five-Year Plan.[33]

**Abandoned Uranium Mine Cleanup**

The Church Rock Uranium Mining Project (CRUMP) began in 2003 to assess conditions in residential areas that are actually or potentially affected by abandoned uranium mines in the Church Rock area. With the assistance of the Southwest Research and Information Center (SRIC), the Navajo Education and Scholarship Foundation (NESF), the United States Environmental Protection Agency (USEPA), the Navajo Nation Environmental Protection Agency (NNEPA), and the New Mexico Environmental Department (NMED). CRUMP has received grants and in-kind assistance from these agencies valued at $100,000. In addition to this assistance, CRUMP also received $90,000 in grants from the Citizen's Monitoring and Technical Assistance Fund (MAT-

[32] "Navajo Challenge Uranium Mining Permit on Tribal Lands." *Environmental News Service*, April 19, 2008.
[33] Health and Environmental Impacts of Uranium Contamination in the Navajo Nation Five-Year Plan. 2007.

Fund). MAT-Fund, founded in the late 1990's, provides assistance and resources for independent research around facilities now owned or overseen by the U.S. Department of Energy to communities affected by contamination from the Federal nuclear weapons production complex. The grants awarded to CRUMP to help fund the project with its research goals, were "made largely because more than half of the 20 abandoned uranium facilities in the Church Rock area were developed by companies that sold uranium ore to the U.S. Atomic Energy commission for use in the nation's nuclear weapons program in the 1950's and 1960's."[34]

The main work of CRUMP has been the assessment of water quality in unregulated wells, surface radiation levels, trace metals in soil, indoor radon concentrations, and airborne dust in the Church Rock area, as well as help evaluate cleanup needs and plans for two specific abandoned uranium mines, the Old Church Rock Mine and the Northeast Church Rock Mine. CRUMP conducted its research in the Church Rock mining district, which includes all of the Church Rock chapter, and portions of Coyote Canyon, Ianbito, Nahodishgish, Pinedale and Standing Rock chapters. [35]

Among the technical data obtained during the course of the project, CRUMP found the following:

1. Mine water discharges to the Puerco River—the principle intermittent stream in the study area—in the 1960's, '70's and '80's were not safe for human or animal consumption, even though observational and anecdotal evidence indicated that residents often used mine water in the river and its tributaries for domestic uses and livestock water was routine for [at] least 18 years. The long-term effect of those discharges on surface water and shallow groundwater quality remain uncertain.

2. In the northern half of the study area where past uranium mining was concentrated, gamma radiation rates were significantly elevated over background

[34] Chris Shuey, *Report of the Church Rock Uranium Monitoring Project 2003-2007*. iii, May 2007.
[35] Shuey, *Report of the Church Rock Uranium Monitoring Project 2003-2007*. iii, iv. May 2007.

along public highways and roads, on the Navajo grazing lands and in certain residential areas in close proximity to three abandoned uranium mines and a closed uranium mill and tailings disposal facility that is a federal Superfund site.

3. Surface gamma radiation rates and uranium concentrations in soils near residences in the Red Water Pond Road area of Study Area A-1 were many times higher than background, indicating a potential public health emergency for residents of the area. CRUMP's assessment in this area was confirmed in November 2006 by soil sampling conducted by USEPA and contractors to the company that operated the Northeast Church Rock Mine in the area from 1968 through 1982. As a result, radium-contaminated soils are being excavated from around at least five homes in the area as a part of a USEPA-led "time critical removal action" that eventually will lead to reclamation of the mine site and its surroundings.

4. Indoor radon levels exceeded the USEPA's 4 picoCurie per liter-air "action level" in 25 % of 150 homes tested in 2004. And another 20% of homes tested had indoor radon levels between 2 and 3.99 pCi/l-air. Most of the homes having high radon levels are located in a portion of the community where the principal uranium-bearing rock formation is present at the surface.[36]

These findings led CRUMP to make the following Recommendations:

1. **The Federal Government should fund a clean-up program targeting abandoned uranium mines that produced uranium for the Government's nuclear weapons program.** Like many of the hundreds of AUM's [abandoned uranium mines] scattered throughout the Navajo Nation and in the Grants Mineral Belt in northwestern New Mexico, most of the abandoned mines in the Churchrock area were developed to sell ore to Atomic Energy Commission buying stations in the region. While safety hazards like open adits, portals and shafts, and high walls at open pits have been mitigated at many AUMs by programs like the Navajo Abandoned Mine Lands Reclamation Department, complete reclamation of mine wastes, pits and contaminated off-site lands has not been addressed…Congress should fund a program that allows tribes and states to investigate fully the extent of the AUM problem in their jurisdictions, including environmental assessments and public health studies in areas where people still live in close proximity to AUMs…Reparations for lands destroyed by past uranium mining or lost to permanent disposal of wastes should be included in the program. The Navajo Nation, state of New Mexico, and communities affected by AUMs should begin working with members of Congress from the Four Corners states to develop legislation and advocate for its enactment.

2. **Comprehensive studies of the health of people who live in uranium mining districts of the Navajo Nation, including the Churchrock area, are needed and should be expedited.** Only one population-based epidemiological study of

[36] Ibid. iv, v.

health effects possibly associated with exposure to uranium mining has ever been conducted on the Navajo Nation despite nearly 60 years of uranium development. No health study has ever been conducted in the Churchrock area despite its lengthy and well-documented history of uranium-related impacts…Funding for such studies should come from the Federal Government, which bares substantial responsibility for facilitating uranium development of the Navajo Nation.

3. **The Navajo Nation should enact its own statutory and regulatory authorities to address the unique environmental, land status, and public health conditions at abandoned uranium mines in Navajo Country.**

4. **All mine wastes should be removed from the NECR [Northeast Church Rock] Mine site to facilitate cleanup to pre-mining conditions and release of Section 35 for human and livestock use.** Section 35 is Navajo tribal trust land and should not be used for permanent disposal of radioactive waste from mining. The land should be returned to as close to its pre-mining condition as practical, and released for unrestricted use. However, human occupancy of the land should be carefully considered, and if implemented, monitored over time to ensure that people are not living on contaminated ground.

5. **USEPA's soul removal around five homes in the Red Water Pond Road community north of the NECR Mine should take into account the CRUMP uranium-in-soil findings.** CRUMP's soil assessment found migration of uranium in concentrations exceeding both background and Preliminary Remediation Goals at depths up to 3 feet below land surface…USEPA and NNEPA should review these findings to determine if removal of 6 to 12 inches of radium-contaminated soils around five homes is adequate to protect the health of the families affected.[37]

**Radiation Exposure Compensation Act – RECA**

The Radiation Exposure Compensation Act (RECA) was passed in 1990, in order to provide compensation for illnesses related to radiation exposure from above ground nuclear weapons testing and uranium mining during the period of January 1, 1947 through December 31, 1971. This legislation is designed to compensate individuals exposed to radiation during the United States' Cold War policy of nuclear armaments proliferation and mutual annihilation security.

[37] Shuey, *Report of the Church Rock Uranium Monitoring Project 2003-2007*. vii-x. May 2007.

Section three of the 1990 RECA legislation includes a Findings, Purpose and Apology statement.

(a) Findings.—The Congress finds that—

(1) fallout emitted during the government's above-ground nuclear tests in Nevada exposed individuals who lived in the downwind affected area in Nevada, Utah, and Arizona to radiation that is presumed to have generated an excess of cancers among these individuals;

(2) the health of the individuals who were unwitting participants in these tests was put at risk to serve the national security interests of the United States;

(3) radiation released in underground uranium mines that were providing uranium for the primary use and benefit of the nuclear weapons program of the United States Government exposed miners to large doses of radiation and other airborne hazards in the mine that together are presumed to have produced an increased incidence of lung cancer and respiratory diseases among these miners;

(4) the United States should recognize and assume responsibility of the harm done to these individuals; and

(5) the congress recognizes that the lives and health of uranium miners and of innocent individuals who lived downwind from the Nevada tests were involuntarily subjected to increased risk of injury and disease to serve the national security interests of the United States.

(b) Purpose.—It is the purpose of this act to establish a procedure to make partial restitution to the individuals described in subsection (a) for the burdens they have borne for the Nation as a whole.

(c) Apology.—The Congress apologizes on behalf of the Nation to individuals described in subsection (a) and their families for the hardships they have endured.[38]

Compensation categories in the original legislation of 1990 include on-site participants, individuals living in the down wind areas from the testing, and uranium miners. Eligible uranium miners must have been employed in a mine in Colorado, New Mexico, Arizona, Wyoming, or Utah. Compensable diseases for uranium miners include cancer and non-malignant respiratory diseases. Non-malignant respiratory diseases include fibrosis of the lung, pulmonary fibrosis, and corpulmonale related to fibrosis of

[38] Radiation Exposure Compensation Act. Public Law 101-426. October 5, 1990. http://www.gwu.edu/~nsarchiv/radiation/dir/mstreet/commeet/meet3/brief3.grf/tab_g/br3gle.txt Accessed May 17, 2009.

the lung. If the miner was employed on or within an Indian Reservation, diseases covered also include moderate to severe silicosis and pneumoconiosis.

The exposure level requirements for coverage under the 1990 Act for uranium miners are as follows:

For cancer: For a non-smoker, the individual must have been exposed to 200 working level months (WLM) or more. For a smoker whose cancer occurred before age 45, the individual must have been exposed to 300 WLM or more, or 500 WLM or more regardless of age when cancer occurred.

For non-malignant respiratory diseases: the miner must have been exposed to 300 WLM or more if the disease occurred before age 45, or 500 WLM or more regardless of age of disease incidence. Only non-smokers are eligible for compensation for non-malignant respiratory diseases under the original legislation.

Working Level (WL) is defined as the concentration of the short half-life daughters of radon that will release ($1.3x10^{*}$) million volts of alpha energy per liter of air. A working level month (WLM) is defined as the radiation exposure at one working level (WL) every workday for a month or equivalent exposure over a longer or shorter period of time.[39]

RECA was amended in 2000 to compensate for some shortcomings in the original law. The Amendments of 2000 added two new categories for claimants to include uranium mill workers and ore transporters, added new compensable illnesses, lowered the radiation exposure levels for uranium miners, added above-ground miners to the

[39] Radiation Exposure Compensation Act. Public Law 101-426. October 5, 1990. http://www.gwu.edu/~nsarchiv/radiation/dir/mstreet/commeet/meet3/brief3.grf/tab_g/br3gle.txt Accessed May 17, 2009.

definition of “uranium miner”, modified the medical documentation requirements and removed lifestyle restrictions such as smoking and alcohol use.

Uranium miners’ exposure requirements were modified in the 2000 amendments to allow miners to show that they had been exposed to 40 WLM of radiation, or employment for one year in a mine, as opposed to the minimum 200WLM requirement in the original act which equaled approximately sixteen years. Uranium mill workers must have been employed for at least one year during the period from January 1, 1947 through December 31, 1971. Compensable diseases for mill workers in addition to primary lung cancer and non-malignant respiratory diseases include renal cancer, and chronic renal diseases including nephritis and kidney tubal tissue injury. Ore transporters who worked transporting uranium or vanadium-uranium ores for at least one year during the covered period are also eligible for compensation for the same diseases as mill workers. The payment in compensation to qualified miners, mill workers and transporters is $100,000 in one lump-sum payment.[40]

**Epilogue**

The Indians who have been affected by mining and milling on or near their lands are not being compensated or provided with medical care by the companies who leave their messes behind, or in a timely fashion by the government agencies designed to protect their interests. They are being left in worse condition than they were in before the companies came, they are still poor (with a few exceptions), but now many are in need of medical care for themselves and their children, which they cannot afford. In the interests of national security they were exposed to deadly toxins without proper education or

[40] United States Department of Justice. Radiation Exposure Compensation Program. http://www.usdoj.gov/civil/torts/const/reca/about.htm Accessed May 17, 2009.

safety regulations. Their animals are sick, their land is dying and for many it seems that much of the reclamation and compensation efforts that have been made are too little, too late.

## Bibliography

Agency for Toxic Substances and Disease Registry. *Draft Toxicological Profile for Radon*. September 2008.

Argonne National Laboratory, EVS. *Uranium Human Health Fact Sheet*. August 2005. http://www.ead.anl.gov/pub/doc/Uranium.pdf (Accessed May 12, 2009).

Brugge, Doug and Rob Goble, *The History of Uranium Mining and the Navajo People*. American Journal of Public Health 92, no. 91 (2002).

Brugge, Doug, Timothy Benally, and Esther Yazzie-Lewis, eds., *The Navajo People and Uranium Mining* (Albuquerque: University of New Mexico Press, 2006).

Calloway, Colin, ed., *First Peoples: A Documentary Survey of American Indian History*, 2nd ed. (Boston: Bedford/St. Martin's, 2004).

Churchill, Ward, *Struggle for the Land: Native North American Resistance to Genocide, Ecocide and Colonization*, (San Francisco: City Lights, 2002).

Mulloy, Karen B., David S. James, Kim Mohs, and Mario Kornfeld. *Lung Cancer in a Nonsmoking Underground Uranium Miner*. Environmental Health Perspectives 109, no. 3 (March 2001).

Environmental News Service. *Navajo Challenge Uranium Mining Permit on Tribal Lands.* April 19, 2008. http://www.ens-newswire.com/ens/apr2008/2008-04-19-02.asp (Accessed May 12, 2009).

O'Leary, Diane. Interview by author. Garibaldi, OR. May 31, 2005.

Radiation Exposure Compensation Act. Public Law 101-426. October 5, 1990. http://www.gwu.edu/~nsarchiv/radiation/dir/mstreet/commeet/meet3/brief3.grf/tab_g/br3gle.txt (Accessed May 17, 2009).

Southwest Research and Information Center. "*Facts and History About: HRI's Crownpoint Uranium Solution Mining Project*." July 25, 2001. http://sric.org (Accessed May 10, 2009).

Shuey, Chris. *Report of the Church Rock Uranium Monitoring Project 2003-2007*. May 2007.

United States Department of Justice. Radiation Exposure Compensation Program. http://www.usdoj.gov/civil/torts/const/reca/about.htm (Accessed May 17, 2009).

Wasserman, Harvey, Norman Solomon, Robert Alvarez and Eleanor Walters, *Killing Our Own: The Disaster of America's Experience with Atomic Radiation*. (New York: Delta, 1982).