



Radiation Waste: Effects of Uranium Contamination on the Navajo Nation Ponderosa Pine Community

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Introduction

Uranium mines are a significant environmental concern for tribal members of the Navajo Nation. The Navajo Nation is divided into 110 chapters and 55 of these chapters are receive water access by the Environmental Protection Agency due to contamination in water sources from previous mining activities (US EPA 2015). In the Chuska mountains on the Navajo nation 430 people are living with the aftermath of abandoned mines. At the top of the mountain, several abandoned mines tested positive for contaminants(US EPA 2018). The watersheds at the foot of the mountain that sustain Navajo livestock and crops are subsequently poisoned by leaching of mine contaminants, like toxic metals (e.g., radionuclides) and uranium levels are especially high. These radioactive contaminants are known to pose a risk to human health and the surrounding ecosystem. This research will address how is uranium waste affecting Navajo communities and what is being done to address contamination?

Location and History

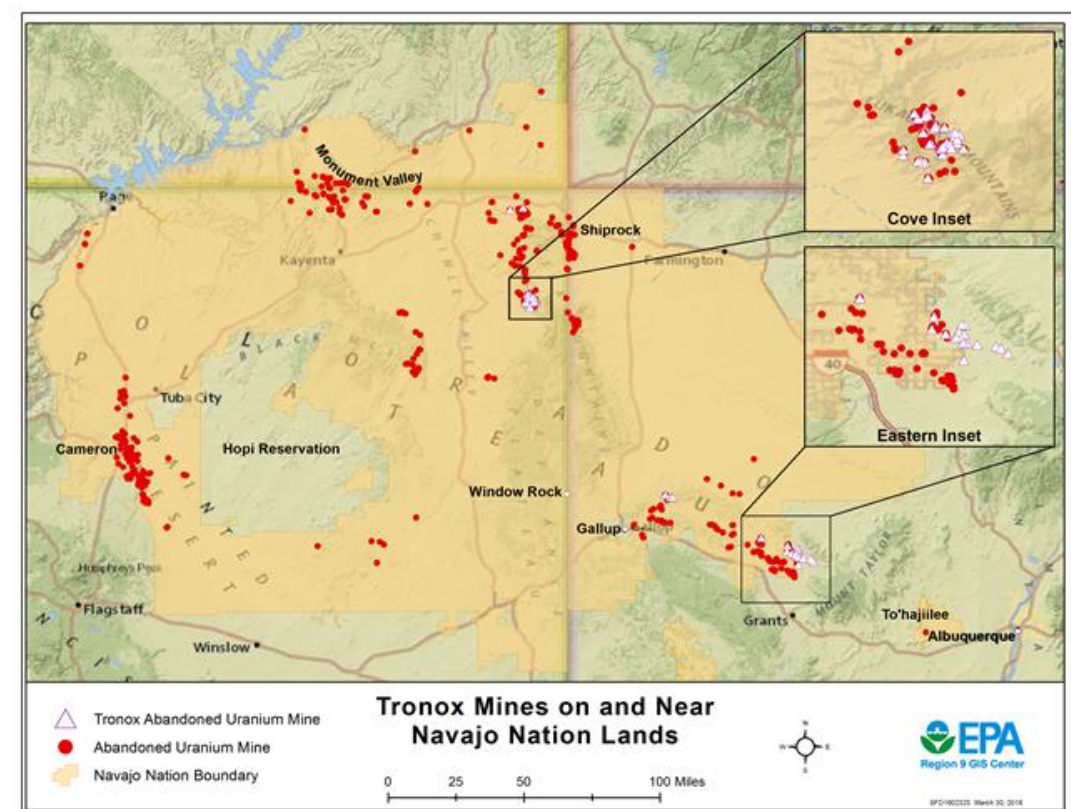


Fig.1. Shows a map of red dots that indicate as abandon uranium sites on the Navajo Nation (US Environmental Protection Agency (EPA) 2016)

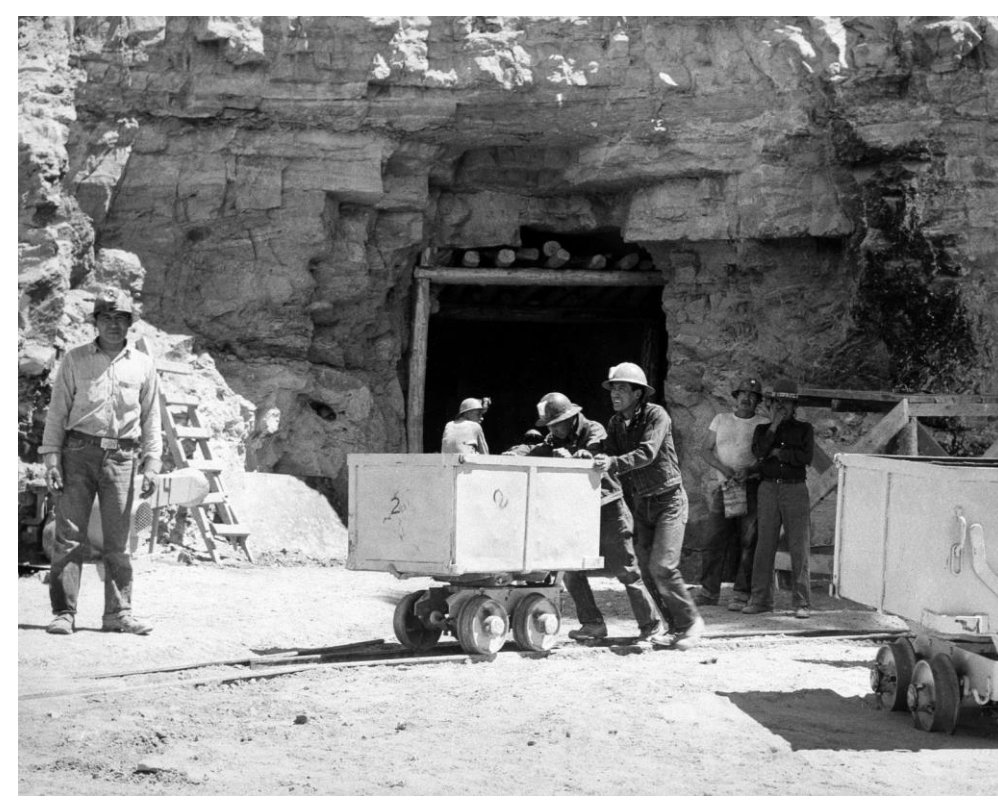


Fig. 2. Photo was taken on May 7, 1953 of Navajo miners working without respirators. (Welch and contamination 2016)

During the Cold War era (1940s-1980s) the Atomic Energy Commission (AEC) actively mined uranium on the Navajo Nation for use in the construction of atomic bombs ("Uranium – Ground Water & Drinking Water" n.d. pg. 22). By the 1980s, increasing rates of lung cancer and other respiratory problems, linked to heavy uranium exposure, among the mining communities forced the closure of mining operations across the Navajo Nation. Currently, these areas are sites for waste clean-up and remediation. Kerr McGrees mining corporation, currently known as Tronox Mines, is taking actions in remediating past abandoned Kerr McGrees mines.

EPA's clean up of Kerr McGrees mining corporation

Location	Mining Start and End	Number of Mines	Types of mining	Mine cleanup
Cove Az, Lukachukai Mountain	1940s-1968	53	- Oil - Natural gas - Uranium mining	32

Table 1. Shows the number of mines on Lukachukai Mountain. The Tronox remediation sites are shown in Figure 1. (US Environmental Protection Agency (EPA) 2018)

Chuska Mountain, also known as Lukachukai Mountain, consists of the Ponderosa Pine community where wildlife such as deer, mountain lion, and bears utilize the area as their home. For the Navajo people, who call the Mountain home, this natural system is their lifeblood. They rely on the Ponderosa Pine ecosystem for herbs, livestock grazing, firewood, and natural elements (e.g, sand, water) used in ceremonial practices. Contaminated water affects the community, their livestock, and their relationship to the mountain.

Bioaccumulation Effects

Exposure to uranium radiation impacted residents and those working near sites. Research indicated uranium contaminants sample in water sources in the Chuska and Carrizo Mountains were above the Maximum Concentration Level (MCL), thereby increasing their risk of cancer (Dias da Cunha et al. 2014 pg.482). Further impacts show contamination in soil particles and vegetation in ecosystems where livestock (etc. sheep, cattle, horses) and wildlife reside or graze. Contaminants in soil and vegetation pose a health to livestock and wildlife, decreasing population size and affecting organs (Pandey, Pandey, and Singh 2015 pg. 37). Being physically contaminated by uranium can be difficult to detect because it is odorless and its yellow color resembles that of corn pollen commonly used in traditional practices. Methods of exposure to uranium mining contaminants:

- Physically working in or around active or inactive mine sites
- Dust particles travelling from the mine
- Using contaminated water (e.g., to irrigate crops)
- Harvesting herbs from contaminated areas
- Consuming water from affected wells

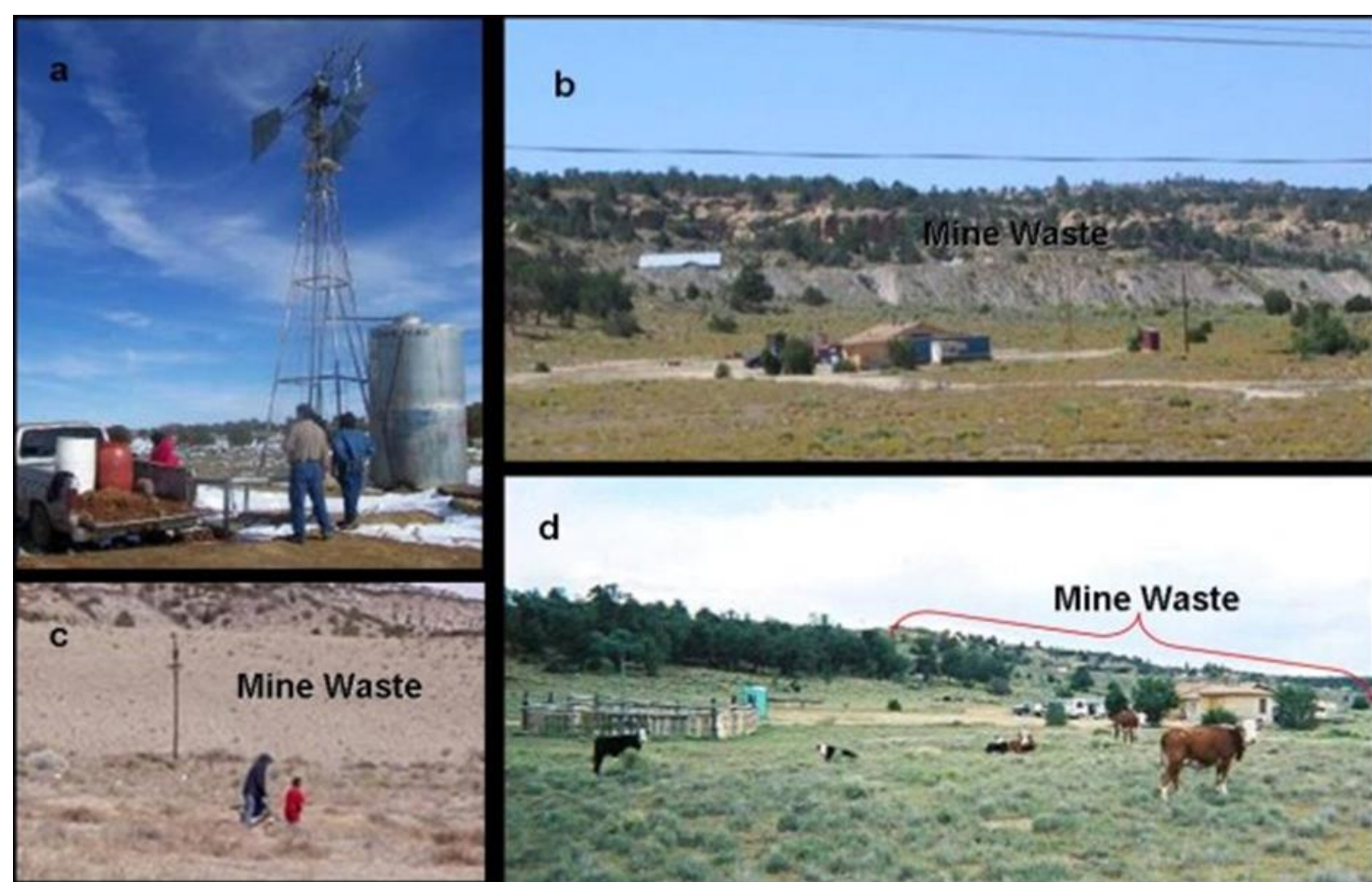


Fig.3. a) Navajo residents hauling water from wells. b) residents living near the abandon uranium mine sites. c) Children playing on and near abandon sites. d) Livestock gazing near the abandon uranium sites. (deLemos et al. 2009)

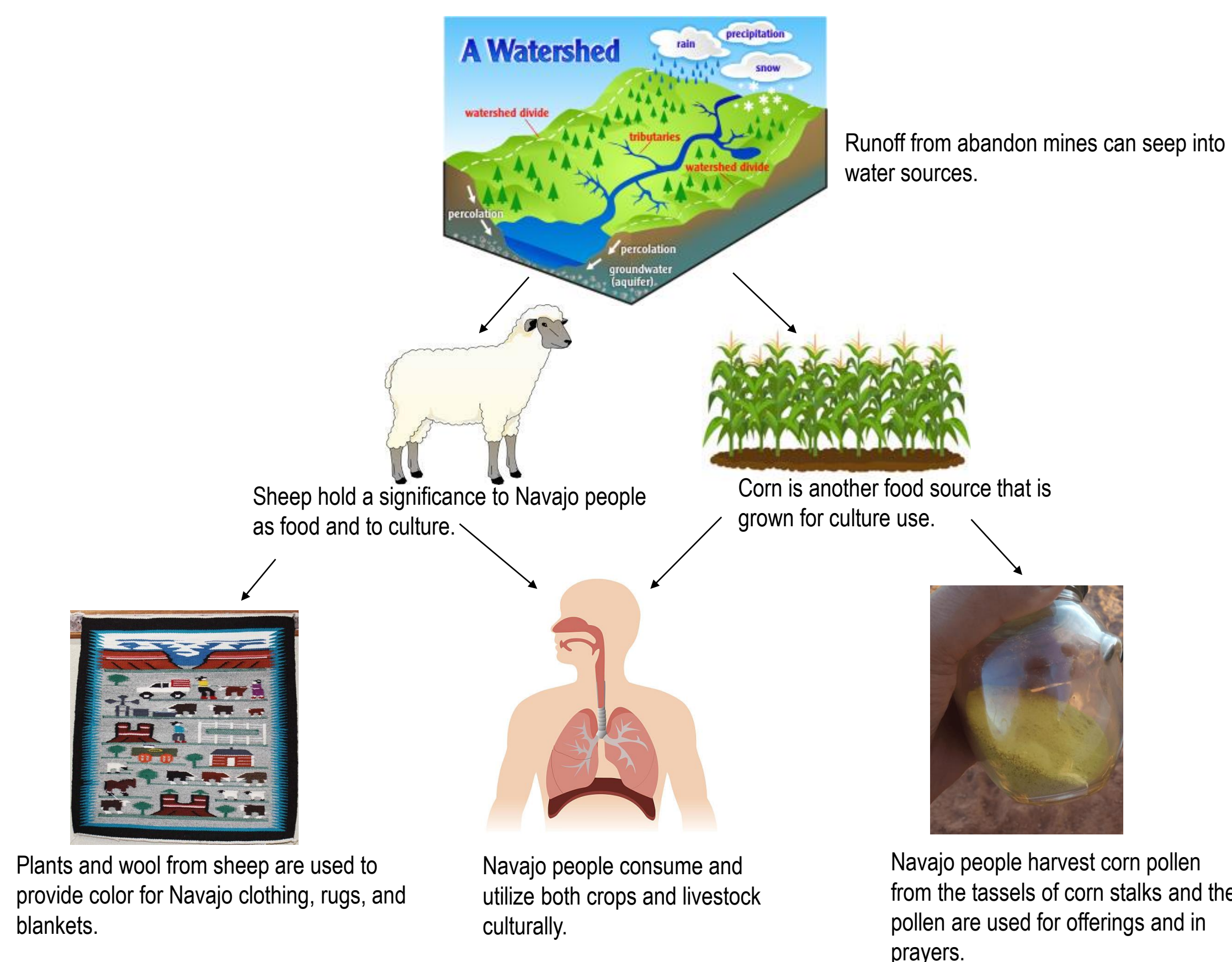


Fig. 4. Shows how residents are affected by uranium contamination through bioaccumulation.

Cultural Effect



Fig.5 Navajo women and child walking from the Hogaan. This photo was taken in the region of Lukachukai Mountain. (Getdsug n.d.)



Fig. 6. This photo was taken in 1980, of Navajo medicine men using colored sand for painting for ceremonial purposes (Indian Health Service (IHS) 1980)

Contamination of water resources negatively impacts the mental well-being of the Navajo peoples of the Ponderosa Pine community and creates a cultural disconnect between the mountain and the people who rely upon it to maintain a traditional lifestyle. Residents often turn to traditional cultural practices as a method of coping with traumatic health or psychological issues resulting from contamination by uranium mining operations. As Markstrom And Charley (2003) state, "...areas once used to gather herbs for ceremonial and medicinal properties were impacted. Areas considered sacred and linked to explicit oral traditions became desecrated from contamination (pg.29)." Traditional methods of gathering medicinal herbs, and other natural sources (e.g. water, wood for fire, colored soil), are disrupted due to contaminates. Negative impacts include:

- Leaching of uranium particles contaminated soil in regions where residents collect and haul sand for ceremonial practices such as Native American Church (NAC) or using the color for sand painting in a ceremonial setting.
- Trees that absorbed contaminants from uranium runoffs were harvested to construct hogaans (home), corral, and hauling firewood
- Declining populations of wildlife and livestock result in fewer or lower quality skins/furs available for bedding or clothing, less feathers for ceremonial use, and provides an understanding to the Navajo people that wildlife is not at peace with nature as ecosystems in the mountain is changing .

Addressing the Negative Effects

The Navajo people are aware of the health and psychological issues from the aftermath of uranium mining. Working as a community and seeking help to cope with health and cultural issues is an avenue to connect the Navajo people as a whole. Finding remediation techniques is important for future Navajo Nation protocols (US EPA 2016). Navajo people are bringing awareness in the following ways:

- Community input for EPA cleanup
- Providing training and jobs for residents to start remediation efforts
- Providing water access for residents living in or near contaminated regions
- Land use foundation of farming, grazing, and cultural living (US Enironmental Protection Agency (EPA) 2018)

Conclusion

Community involvement includes chapter meetings with representatives. At meetings it takes time for the community to open up about their issues with uranium waste. With the involvement of the EPA and other agencies, communities know how to address and approach contaminated areas with cultural and environmental respect. Remedying the problems associated with contaminated sites requires reconstruction of contaminated homes, decreasing radiation exposure, and overall improvement of access to clean water. Addressing these problems does not erase negative health effects completely nor does it address access to ceremonial and sacred grounds within contaminated areas. Healing ceremonies (sweat lodge, NAC, cedar or sage burning for prayers, ingestion of medicinal herbs etc.) are used to help deal with both the physical and cultural effects of living around uranium mining sites.

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Acknowledgments

The research was funded by the Kansas NSF EPSCoR grant #0078563 and Haskell Environmental Research Studies Institute (HERS). The HINU and KU library staff contributed to the findings of my research. Kate Ingenloff, a mentor, and directors of HERS contributed to the development of this research.