

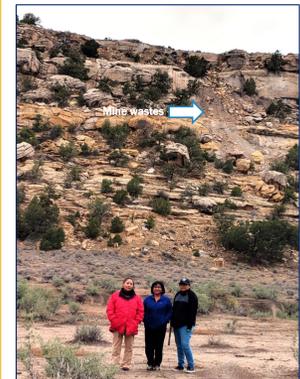
A Family's Uranium Exposures in Waterfall Canyon, Navajo Nation, Northeastern Arizona



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Our Family in Waterfall Canyon

Problem Statement: My family drank water from a contaminated spring and lived near abandoned uranium mines for parts of 60 years, and yet our area is not included in current Federal assessment and clean-up plans.



Authors (L-R) Frances John, Evelyn Etsitty and Joezy Redhouse stand in Waterfall Spring Canyon. Debris from the Etsitty #1 abandoned uranium mine is seen on the hillside above them. This is one of several mines where their father/grandfather and uncles worked during the 1950-60s.

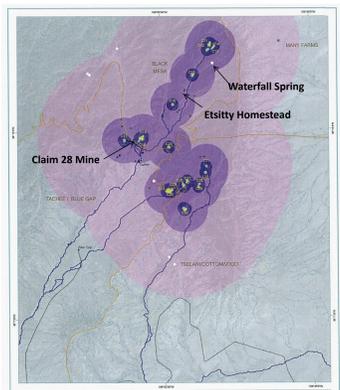


Background: The Etsitty Family has resided in Waterfall Canyon since at least the 1940s, before mining began. Five generations of our family have been exposed to uranium mining. Our family – the late Bessie and Edward Etsitty and their son, Ansem, and their two living daughters, Evelyn Etsitty and Frances John – witnessed uranium being prospected for and rolled out with trucks when living in Waterfall Canyon on the Navajo Nation in northeastern Arizona. Edward Etsitty and Kee Chee Etsitty, and their father, Tacheeni Etsitty, worked in the mines in the 1950s and 1960s. Not knowing that particles in the uranium ore were harmful to humans, they would come home with their clothes covered in dust, and would live and eat with their family members. Frances's children and grandchild also lived at the family camp and were exposed to the dusts on their grandfathers' clothing. The entire family has lived within three-quarters of a mile of an abandoned uranium mine since then.

Tacheeni Etsitty, my great-grandfather, is pictured (at left) after getting off work at one of the mines. After work, he would ride his horse down the mesa to Waterfall Spring to water the horses and quench his own thirst.

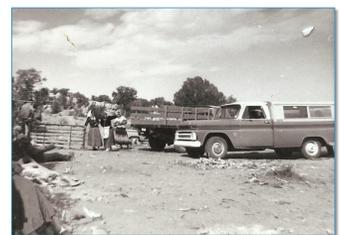
Mining History

Twenty different abandoned uranium mines (AUMs) were developed in the Blue Gap-Tachee/Black Mesa/Tselani-Cottonwood area of the Navajo Nation in northeastern Arizona. They are shown on the map at the left. The US Environmental Protection Agency (USEPA), U.S. Army Corps of Engineers, Navajo EPA and the Navajo Abandoned Mine Lands Department have identified at least 523 AUMs on the Navajo Nation. Most of these mines produced uranium for the Government's nuclear weapons program during the Cold War.



Map adapted from USEPA 2007 (Abandoned Uranium Mines and the Navajo Nation), pages 60 and 26.

Mines in the Blue Gap/Tachee/Black Mesa region operated between 1952 and 1968. Several small mines are located on the mesas near Waterfall Spring. Together, these mines produced about 1,500 tons of uranium ore in the mid-1950s. A mine located about a mile north of the Etsitty Homestead, Etsitty #1, produced 129 tons of ore. Wastes from this mine spill over the lip of the mesa, as shown in the photo above.



In the late 1950s, our family was told clear their summer camp on top of the mesa because a uranium mine was to be built there. The family hauled their materials away in pickup trucks and flatbeds, as shown in the photo above. (Photo courtesy of Evelyn Etsitty and Frances John)

Even the Claim 28 Mine, where scientists have found unsafe levels of heavy metals and radiation, is not fenced or signed to warn people to stay away. Many people in the community don't know the locations of the mines because they weren't living during the 1950s and 1960s.

Environmental Exposures: Waterfall Spring Uses

Human Use: As children, Ansem, Evelyn, and Frances played around the uranium mines and drink water from a pool at the base of a cliff. This pool, known as Waterfall Spring, was our family's sole drinking water source until 1994 when a community water system came to our family's homestead. Waterfall Spring remains the main source of water for our livestock. Scientists tell us it has unsafe levels of uranium, radium and other elements. The water quality data shown in the table at the bottom of this poster shows that uranium has consistently exceeded the drinking water standard since 1998.



The authors, Josephine and Evelyn (center), help remove sludge from Waterfall Spring in June 2018 as part of their annual "spring cleaning."

Livestock Use: Our family has cared for and maintained the spring for generations, as shown in the photos (left and below, top right). We have cleaned sediment from the bottom of the concrete sump. This allows water to flow to a trough (center right) where livestock – sheep, cows and horses – and wildlife drink the water. This is done annually by our family to maintain flow from the spring. Maintaining the spring year round provides a water source for our livestock during the winter when hauling water from the Chapter House windmill or other water sources is hampered by muddy or snowy roads.



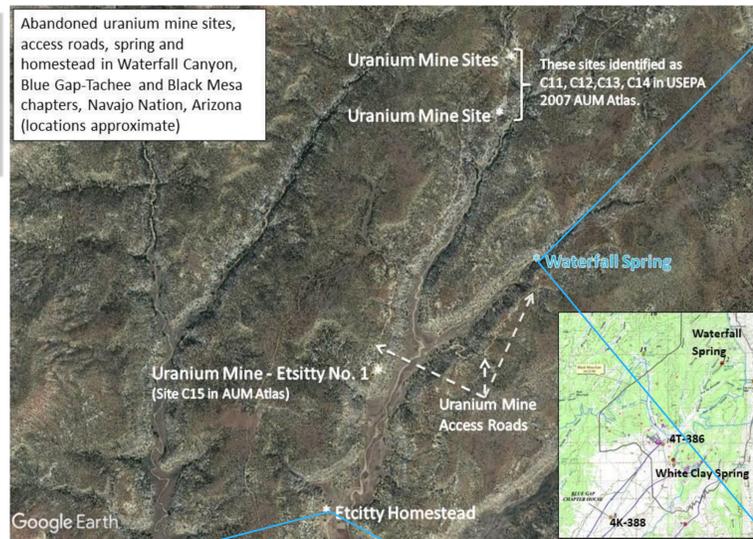
Abandoned uranium mine on mesa north of Waterfall Spring.



Grandfather Edward Etsitty and Grandmother Bessie Etsitty rode their horses around the mine sites north and west of Waterfall Spring.



We still raise sheep at our camp in the mouth Waterfall Canyon, about 1.5 miles to Waterfall Spring. (Family photos courtesy Evelyn Etsitty and Frances John)



Map by Paul Robinson and Chris Shuey; base image from Google Earth; Etsitty No.1 Mine at https://www.epa.gov/sites/production/files/2017-04/documents/85_Etsitty_No_1_AUM_Screening_Report.pdf; sites C11-C15 located in USEPA Abandoned Uranium Mines, 2007.



Actions to Lessen Exposures: Our family no longer drinks from Waterfall Spring; we have running water in our homes. Recently, we started hauling water for our livestock from a different source that is not contaminated. But this source is many miles away, and hauling water over rough and muddy roads is not easy. Our sheep still travel up the canyon to drink at Waterfall Spring during the winter. (Photo credits above: Chris Shuey)

Waterfall Spring – Water Quality and Risk Communication

Selected Water Quality Parameters in Waterfall Spring Over Time*

Parameter	Units	Standard	11.4.98	11.11.13	6.3.14	3.29.15	7.6.15	9.4.15	Known Health or Aesthetic Effects
Aluminum	ppb	50-200	160	50	ND	78.8	270		Respiratory distress in workers
Arsenic	ppb	10	ND	ND	6.6	7.2	2.7		Lung, skin cancers; diabetes
Conductivity	uS/cm	782		2340			2037		Increased salts in water
Gross alpha activity	pCi/l	15	52				69	78	Increased risk of cancer
Iron	ppb	300	ND	ND		2884	2234		Gives water red-brown color
Nitrate	ppm	10		6.34	14.8	ND	10.3		Oxygen deficit in infants
Sulfate	ppm	250		153		536	616		Laxative effect on digestive system
Radium (total)	pCi/l	5	6.3				5.5	5.77	Bone cancer
Uranium (mass)	ppb	30	92.6	71.7	135.0	84.0	73.6	96.0	Kidney disease; increased cancer risk
Vanadium	ppb	None	19.4	1.5	158	20.5	1.63		Mild respiratory effects; nausea at high levels

*Water quality data for Waterfall Spring prior to November 1998 have not been found. The 11/4/98 data are from samples collected and reported by USEPA and US Army Corps of Engineers in the 2000 Abandoned Mine Atlas. All other water quality data reported by UNM METALS Superfund Research Center team in 2014 and 2015, and by Tolani Lake Enterprises Environmental Justice Project in 2016. Red italics indicate concentrations exceeding primary or secondary water quality standards for human consumption. Abbreviations: pCi/l = picoCuries per liter, a measurement radiation in water; ppb = parts per billion; ppm = parts per million; uS/cm = microSiemens per centimeter.



Waterfall Spring Use Recommendations

Human	STOP!
Domestic	STOP!
Livestock	CAUTION!

- STOP! Don't drink!
- Use Caution
- OK to use

Health and Policy Concerns

Health: People in the Blue Gap-Tachee area, including members of our family, have many different diseases, from high blood pressure and heart disease to diabetes and cancer. We don't know if any of our health problems are related to exposures to uranium in water or to living near abandoned uranium mines. But we remain concerned and believe that cleaning up the mines and Waterfall Spring, or replacing it with a cleaner water source, would lessen our illnesses and protect our young family members for the rest of their lives.

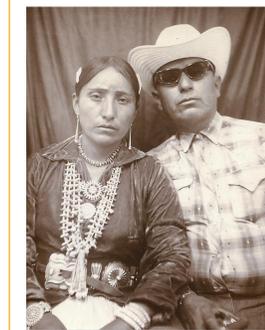
Policy: At Chapter meetings, we continue to advocate for clean-up of Waterfall Spring and all abandoned mines in the area. Our family sometimes thinks that our area has been forgotten because USEPA is only addressing the Claim 28 Mine. EPA officials stated recently that the only way they can address our area is either to find the companies who are responsible for the mines or enter into another settlement with the Navajo Nation.

We are concerned that people are only talking about Claim 28 and not about uranium in Waterfall Spring or the uranium mines above it. We thought all uranium mines were involved when they first began presentations at chapter meetings.
 – Evelyn Etsitty



Evelyn today (above) and as a toddler in early-1960s (right).

Embracing Diné Fundamental Law



My grandparents, Bessie and Edward Etsitty, were traditional people who respected the land and followed Diné lifeways.

Our family would prefer to have all the uranium wastes removed, taken away. We'd like to see the soil restored, the plants come back. In this way, like our grandparents, we are guided by Diné Natural Law:

"The Diné have a sacred obligation and duty to respect, preserve and protect all that was provided for we were designated as the steward of these relatives through our use of the sacred gifts of language and thinking.

"Mother Earth and Father Sky is part of us as the Diné and the Diné is part of Mother Earth and Father Sky. The Diné must treat this sacred bond with love and respect without exerting dominance for we do not own our mother or father."

– Diné Fundamental Law, 1 N.N.C. §§205.D. and E.

Family's Recommendations

- We ask the Navajo Nation Environmental Response Trustee II to expand her upcoming water study around the Claim 28 Mine to include Waterfall Spring and other water sources in the area that may be affected by nearby abandoned uranium mines.
- We encourage Blue Gap-Tachee, Black Mesa and Tselani-Cottonwood chapters to adopt resolutions urging the Federal Government and the Navajo Nation to speed up the process of cleaning up AUMs, including consolidating mines in the same region into one disposal facility.
- We recommend that the Navajo Nation Council and the President and Vice President of the Navajo Nation direct their legal and environmental staffs to find ways to support speeding up the clean-up process for AUMs.
- We recognize and recommend that Diné Fundamental Law should guide clean up of mine sites toward the goal of restoring the land, water and health of the livestock, wildlife and human beings who are connected to it.

Acknowledgements

The Etsitty family appreciates the support of the UNM College of Pharmacy and UNM METALS Superfund Research Center, Southwest Research and Information Center, the leadership of Blue Gap-Tachee Chapter, and our many neighbors who are also impacted by uranium mining wastes.