



Thinking Zinc — *Béésh Dootł'izh Bantsáhákees*

A study to assess how taking the recommended daily amount of zinc may help repair damage from harmful metals among Navajo Nation residents



**Presentation to Diné Uranium Remediation Advisory Commission
September 9, 2021**

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Funding, Disclaimer, Approvals



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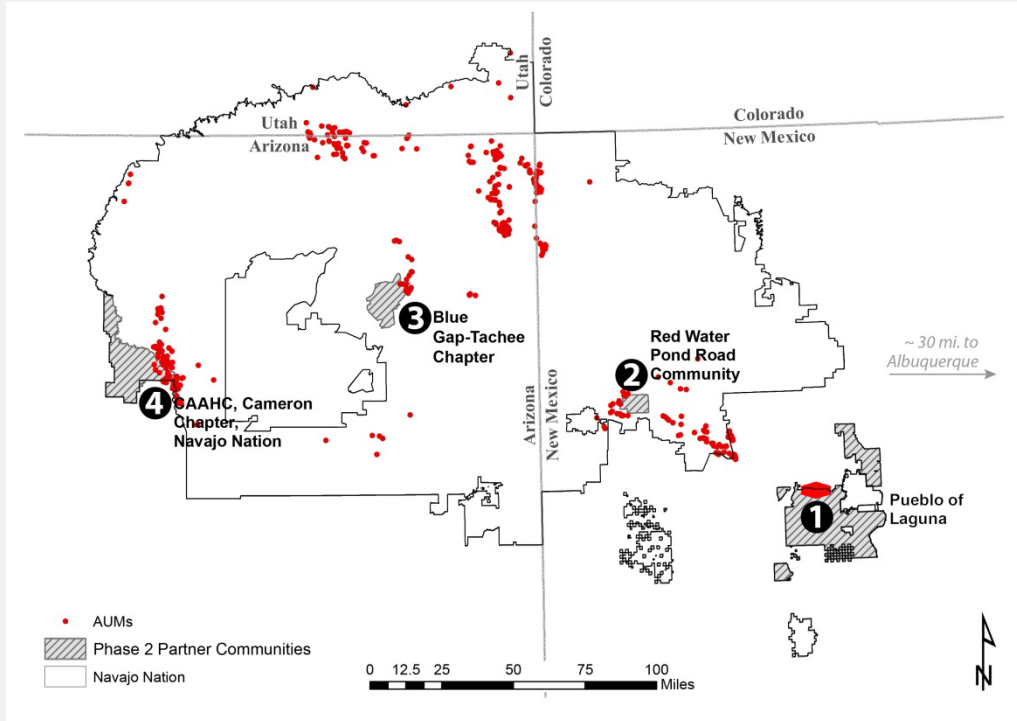
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Approvals:

*Human research is monitored and approved by UNM Human Research Protections Office (HRPO), the Navajo Nation Human Research Review Board (NNHRRB) and the New Mexico Cancer Care Alliance, as required by federal, state and Tribal law. **UNM HRPO approved Thinking Zinc on December 11, 2018 (HRPO #18-381). NNHRRB approved the study on January 22, 2019 (#NNR-18.330T).***

Communities Participating in Thinking Zinc



② Red Water Pond Road Community

(Tótchíí' Siká Atiin)

or

Where the Meadows Meet
Ahidaazdigai

③ Blue Gap-Tachee Chapter

(Bis Doot'izh Nídeeshgiizh)

(dirt, blue, spread apart)

Community-engaged responses to multi-generational exposures to uranium mining wastes



Red Water Pond Road Community, Church Rock Mining District (1968-86)



1975

4 generations... nearly 50 years



1984



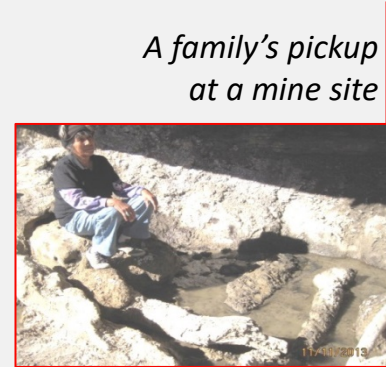
2009

Ceremonial hogan represents goal to restore land to balance and health



2014

Blue Gap-Tachee Chapter, Black Mesa East Mining District (1954-68)



A family's pickup at a mine site



~1960



Community members & researchers at Claim 28

2015



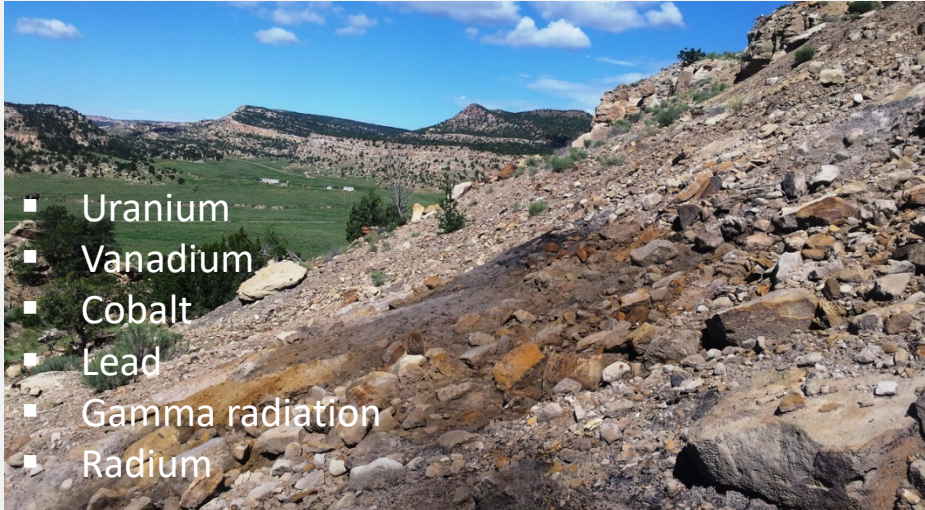
2014

1988: First chapter resolution calling for mine cleanup

Metals, Radionuclides in Mine Wastes

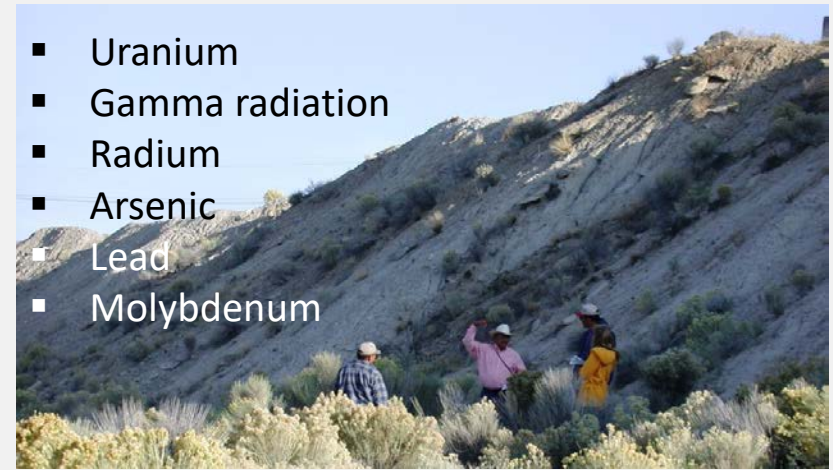


Claim 28, Blue Gap-Tachee Chapter



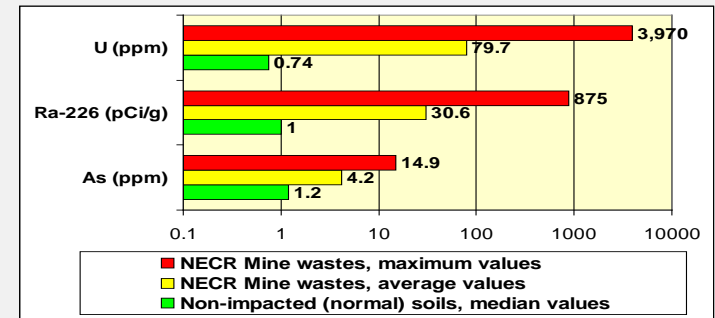
- Uranium
- Vanadium
- Cobalt
- Lead
- Gamma radiation
- Radium

Northeast Church Rock Mine, Church Rock and Pinedale Chapters



- Uranium
- Gamma radiation
- Radium
- Arsenic
- Lead
- Molybdenum

	Elemental Content, ug g ⁻¹							
	Si	S	Al	Fe	Mg	U	V	Ca
Native Soil	241,950	1,339	52,129	26,739	3,068	BDL*	BDL*	16,441
Mine waste1	235,563	223	69,533	15,259	181	2,248	15,814	855
Mine waste2	243,703	1,834	59,730	3,511	405	6,614	4,328	3,293





Western Science Perspective

How can metals affect DNA repair?



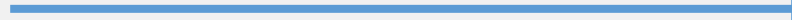
Normal repair function: "Go"




Zn  is necessary for the repair process



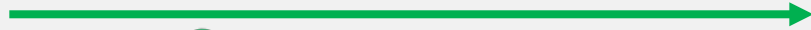
Repair function altered:
"Stopped" or "Slowed"



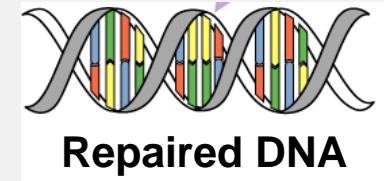
As or U  disrupts the repair process by replacing zinc in key proteins



DNA repair function restored: "Go"



Zn  protects the key proteins from As or U  and restores the repair process



Some metals, like uranium and arsenic, can damage your health. Here are some examples, along with their Navajo interpretations:



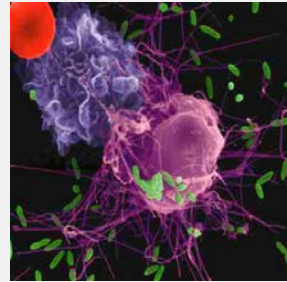
Kidney disease

Hatsq'áshk'azhî bąą dahaz'ą yileehgo
(Kidney, poor health, gets to be)



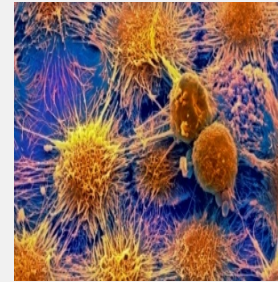
Cardiovascular Disease

Ajééh bąąh dahaz'ą yileehgo
(Heart, poor health, gets to be)



Immune Disorders

Ats'íís yich'ąąh naabaah yéę doo hózhó naalnish da yileehgo
(Body, protect from, does not fully work, gets to be)



Cancers

Ats'íís bit'óól dahdiniisééh áádóó ba'át'e' hóló yileehgo
(Body, cell growth, thereafter, bad behavior, gets to be)



Skin Problems

Hakági yeenít'jįh
(Skin, affects)

Community Outreach, Support, Art, Language



Recruitment poster

Zinc Bantsáhákees
THINKING ZINC



Mending a broken strand

Research volunteers needed

We are conducting research to understand if taking the daily recommended level of zinc protects our bodies from the effects of heavy metals in the environment.

To participate you are:

- 21-64 years
- Not diabetic
- Not allergic to zinc
- Not pregnant or nursing

You will:

- Have 4 study visits over 9 months
- Take a zinc supplement tablet
- Provide blood and urine samples
- Receive a gift card each visit

INTERESTED?

For more information or to participate, send email to zinc@src.org, call 877-545-6775, or visit www.src.org/Zinc




Thinking Zinc — *Beesh Doot'izh** *Bantsáhákees* [metal + blue (the one that is) + thinking about it]

- Participating Communities: Red Water Pond Road Community Association, Blue Gap-Tachee Chapter
- Both communities impacted by uranium mine wastes
- Community members took part in development of study design, Navajo language interpretation
- Native symbology used to illustrate biological functions
- Presented in Navajo to NNHRRB in January 2019
- Enrollment and sample collections began in RWPRC May 2019; four community “collection events” held prior to pandemic shutdown in March 2020
- Plan is to restart in Blue Gap-Tachee and surrounding chapters in October 2021

*From “Code Talker” by Chester Nez and Judith Schiess Avila, 2011.



Indigenous perspective

This painting shows how metals like uranium  can damage DNA and cells, through the lens of Mallery Quetawki, a Zuni artist and biologist.

Indigenous perspective

In this painting, Ms. Quetawki shows how DNA damage may be repaired, like re-stringing a broken bead strand. Zinc is necessary for this process.

Painting by Mallery Quetawki, Zuni Pueblo





Why take zinc?



- In the right amounts, zinc — a metal that comes from Mother Earth — is an *essential nutrient* that promotes good health.
- Studies have shown that many people do not get enough zinc in their diet to keep their body healthy, to achieve balance.
- Some Navajo women and men enrolled in the Navajo Birth Cohort Study were found to have insufficient levels of zinc.
- Taking a zinc pill is NOT a cure-all for all your ailments, and too much zinc may be harmful.
- Taking a zinc supplement at the recommended daily allowance of 11 milligrams zinc per day is considered safe.

Is zinc in our diets?



- Yes, but it might not be in high enough amounts
- Some Navajo foods that have higher levels of zinc include:
 - Lamb
 - *Blue corn mush from juniper ash*
 - Pinon nuts
 - Chicken
 - Beef
 - Eggs



Beesh Doot'izh Bantsáhákees Eligibility*



Research volunteers needed

We are conducting research to understand if taking the daily recommended level of zinc protects our bodies from the effects of heavy metals in the environment.

*To be eligible, you must be

- 21-64 years of age
- Not diabetic
- Not allergic to zinc
- Not pregnant or nursing

You will:

- Have 4 study visits over 9 months
- Take a zinc supplement tablet
- Provide blood and urine samples
- Receive a gift card each visit

Your eligibility to be enrolled in the study will be determined at your first visit to a community collection event.

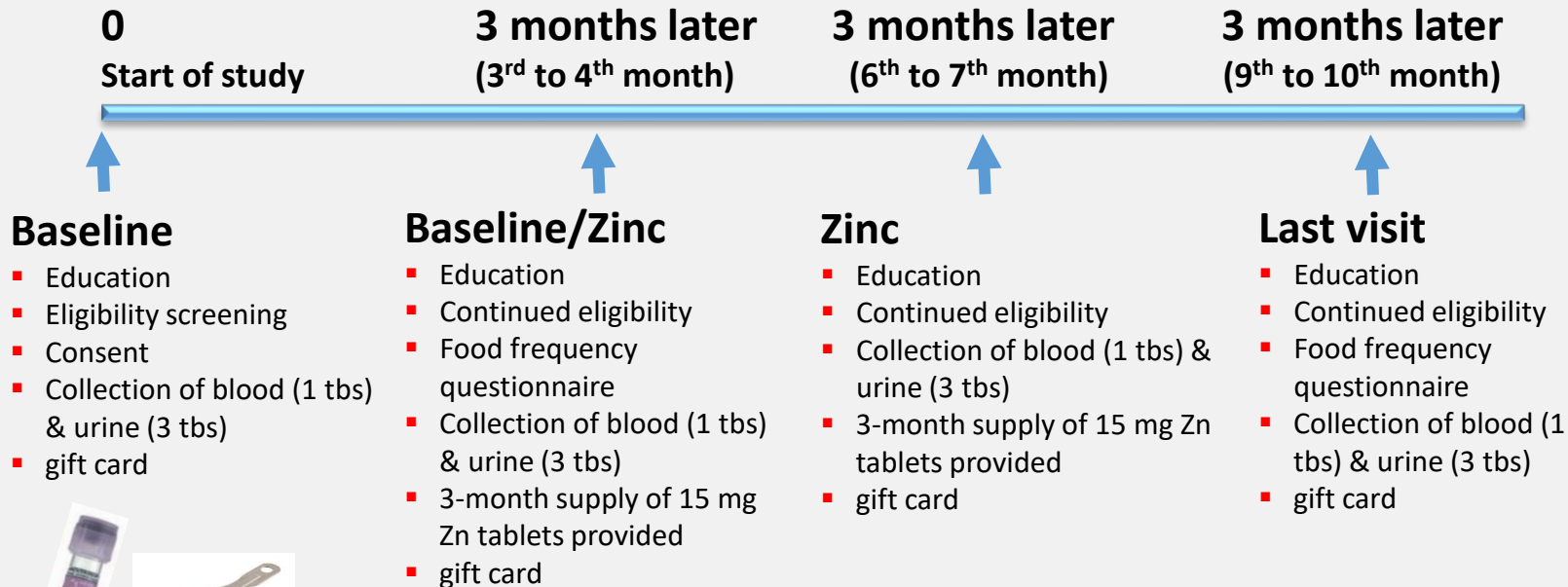
INTERESTED?

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Thinking Zinc Study Timeline



1 tablespoon (tbs)

Our staff will contact you during the study to remind you to keep taking your zinc tablets and to attend the next visit.

Status and Progress



- Approvals
 - Navajo HRRB January 2019; UNM HRPO December 2018
 - Registration: Clinicaltrials.gov NCT03908736
- Continued Community Engagement (CEC/SRIC)
 - >50 community activities (i.e. chapter meetings, booths at events, collection days)
- Enrollment (37 of 80 goal as of February 2020)
 - 24 women, 14 men, ages 21-64, median 59
 - First enrollment, sample collection in Red Water Pond Road Community, May 2019
- COVID-19 study pause, March 2020-August 2021
- Sample analyses and data reports —in progress
- *Resuming study September 2021*



Pinedale Chapter House
collection event, June 2019

Preliminary Data on Metals Levels in Urine



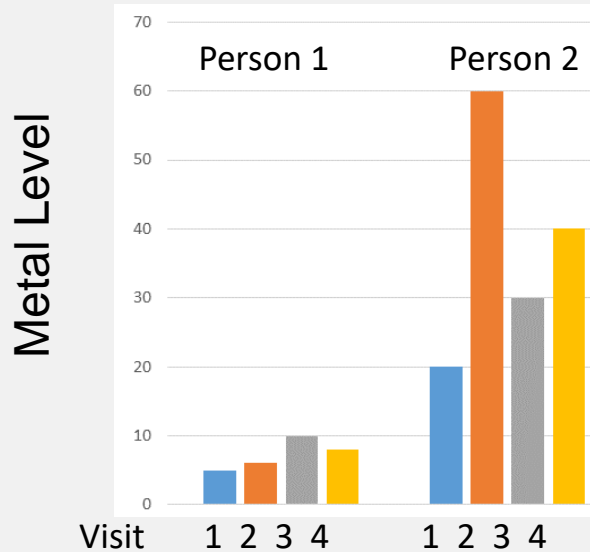
Table 3. Thinking Zinc Participant Pre-Zinc Urinary Metal Levels

Metal	PPB Median	Range	%<LOD	%>95 th percentile NHANES/NBCS	NHANES 50 th	NHANES 95 th	NBCS 50 th	NBCS 95 th
Antimony	0.11	LOD – 0.398	5%	16.7%/8.3%	0.044	0.191	0.064	0.32
Arsenic	6.097	0.48 – 142.97	0%	3.3%/6.7%	5.74	49.9	3.6	16.9
Barium	1.53	LOD – 151.69	1.7%	5%/1.7%	1.17	5.39	2.375	16.25
Beryllium	LOD	LOD – 0.021	70%	30%/11.7%	LOD	LOD	0.008	0.01
Cadmium	0.20	0.029 – 1.27	0%	5%/11.7%	0.179	1.08	0.072	0.6
Cesium	3.87	0.99 – 24.84	0%	6.7%/11.7%	4.19	11.4	3.205	9.305
Cobalt	0.60	0.056 – 4.64	0%	6.7%/3.3%	0.403	1.41	0.61	2.3
Lead	0.149	LOD - 2.211	1.7%	3.3%/6.7%	0.32	1.38	0.22	0.9205
Manganese	0.126	LOD – 2.98	18.3%	21.7%/0%	0.13	0.28	0.21	3.265
Molybdenum	32.95	LOD – 160.5	1.7%	6.7%/3.3%	35.9	124	37.7	140
Platinum	LOD	LOD – 0.122	63.3%	28.3%/28.3%	.009	.017	.005	.018
Strontium	127.27	9.67 – 1075.76	0%	23.3%/8.3%	97.5	299	110	500
Tin	1.04	0.067 – 55.30	0%	15%/8.3%	0.43	3.62	1.36	11.22
Tungsten	0.0345	LOD – 0.431	15%	1.7%/0%	0.059	0.321	0.093	0.69
Uranium	0.022	LOD – 6.65	3.3%	36.7%/20%	0.005	0.031	0.011	0.07
Vanadium*	0.13	0.061 – 10.00	0%	-----	n/a	n/a	n/a	n/a

Median metal levels are shown for Visit 1 and Visit 2 samples (n=60) collected before zinc supplementation. Values are in micrograms per liter (ppb), and are uncorrected for creatinine to compare NHANES values. LOD=limit of detection. For reference, the 50th and 95th percentile levels are provided for NHANES values and participants in the NBCS including women, men and babies (N=1661-1782 for each metal). Metals results highlighted in blue represent those where more than 10% of samples had levels in excess of the NHANES 95th percentile values. *Urine levels for vanadium are not included in NHANES reporting. Nixon et al (2002) reported normal urine vanadium levels to be 0.24 ppb [Nixon DE et al. 2002]. 41% of participants had urine V levels > 0.24 ppb.

- **Data Table** – example of the detailed information comparing urine-metals levels in Thinking Zinc participants with national values and values in NBCS participants
- Some *overall results* so far:
 - **Arsenic** is *similar* to national values
 - **Lead** is *below* national values
 - **Uranium** is about *4 times higher* than national values
- *We will provide metals information for each participant*

Different patterns of exposure over time



Upcoming: Report-back letters to each participant who completed 4 visits will be sent in Fall 2021

Illustration on the left shows what we are seeing so far in urine-metals levels in participants:

- “Person 1” has *small changes* in metal levels between visits, and the levels don’t vary much.
- “Person 2,” however, has *much bigger changes* in metal levels between visits, and those levels vary considerably.
- *We will find out whether there are activities that might cause the differences so people can find ways to modify their exposure risk.*

Ongoing Research Activities and Goals



Measurements of “biomarkers” of metal effects

- Multiple markers of immune system function
- DNA damage
- Markers of inflammation, a process that contributes to many diseases



Mallery Quetawki's vision of DNA strand

Goals

- Identify which metals and metal mixtures alter the measured markers
- Determine whether zinc supplements improve the measured markers

COVID Safe Practices



- UNM and SRIC policies – abide by Public Health Orders of the Navajo Nation and rules of the chapters, UNM, State of New Mexico
- ALL UNM and SRIC personnel must have proof of COVID-19 vaccination to have any contact with study participants or community members
- ALL UNM and SRIC personnel attending community events will wear masks, maintain physical distancing
- Tables for surveys will be spaced >6 feet apart; hand sanitizer and masks will be available for participants
- Outdoor enclosures (e.g., tents) will be used to maintain good airflow
- Will make appointments for participants



Ahéhee' – Thank You!

Acknowledging Community Partners, SRIC Staff



Blue Gap-Tachee Chapter, Tachee Uranium Concerns Committee (Faith Baldwin, Nadine Begay, Sadie Bill, Johnny Naize, Christopher Nez, Helen Nez, Seraphina Nez, Marcus Tulley, Aaron Yazzie)



Red Water Pond Road Community Association (Peterson Bell, Thompson and Rose Bell, Anna Benally, Grace and Bradley Henio, Edith Hood, Tony Hood, Jacquelyn Bell-Jefferson, Teracita Keyanna, Larry J. King)



Annette Aguayo, Rose Dan, Don Hancock, Sarah Henio-Adeky, Lynda Lasiloo, Johnny Naize, Teddy Nez, Sandy Ramone, Paul Robinson (retired), Chris Shuey, Kyle Swimmer, Maria Welch

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Daniel Beene
Jessica Begay
Marsha Bitsui
Tybur Casuse
Thomas De Pree, Ph.D.
*Tammi Duncan, Ph.D.
Xin Gao
Russell Hunter

Juliana Huestis
*Latasha James
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Casey Miller
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Craig Marcus, Ph.D.
Bhramar Mukherjee, Ph.D.
Michael Pollard, Ph.D.
Norb Kaminski, Ph.D.

**Individuals no longer with the METALS program.*

Past Trainees

*Sumant Avasarala, Ph.D.
Seth Daly, Ph.D.
*Jacquelyn Delp
*Cherie DeVore, Ph.D.
Tylee Griego
Sebastian Medina, Ph.D.
Sara S. Nozadi, Ph.D.
*Jennifer Ong, Ph.D.
*Lucia Rodriguez-Freire, Ph.D.
Nabil Shaikh, Ph.D.
*Carmen Velasco, Ph.D.

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who have contributed and supported
this work!**

- **Laguna Pueblo**
- **Red Water Pond Road Community**
 - **Blue Gap-Tachee Chapter**
 - **Cameron Farm Enterprise**

Our funders:

- **NIEHS**
- **UNM College of Pharmacy**
- **UNM Comprehensive Cancer Center**

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USEPA
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Blue Gap-Tachee Community Concerns

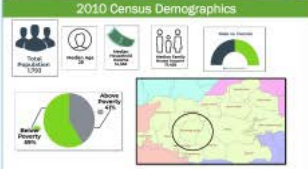


Disruption of Life Cycles in Blue Gap-Tachee Community, Navajo Nation

Johnny Naize¹, Aaron Yazzie¹, Wallace Kee¹, Latasha James^{1,2}
¹Blue Gap-Tachee Chapter, Navajo Nation, Arizona; ²Southwest Research and Information Center

Overview of our Community

The Blue Gap Tachee Chapter was established as a local government by Navajo Nation in 1962. In 1957, a two-story school was built on Tachee near Claim 28 (1.5 miles). A school and a Senior Center were built near at the current chapter location. The Blue Gap Tachee Chapter is home to 20 abandoned uranium mines (UMAs), which operated from the early 1950s to the late 1950s. Many local people worked in the mines during that time. Claim 28 is the largest area considered most dangerous because it is located within a 1/4 mile radius of many homes. Other nearby UMAs are in the mines near Blackfoot Canyon (see map below), which is located southeast of Claim 28. The Hoppy family resides in Hopewell Canyon where they raise sheep and depend on a contaminated spring for livestock water. Since the uranium mines were abandoned, the livelihood of the community has remained unchanged.



Mining History

In the 1950s, the mines yielded income stability for many of the Navajo living near the area, but for a short period. The workers and community knew very little about the health concerns the mines could pose later in their life.

"We were treated, we thought. And that job was available only for off of the Navajo, and for mining, one can just walk to it in the canyon. We thought we were very fortunate, but we're not, later on this will affect you in this way." (John Naize, 2010)

Uranium Extraction & Company

Company	Location	Operational Period	Production (lbs)
Blue Gap Tachee	Claim 28	1952-1957	1,200,000
Blackfoot Canyon	Blackfoot Canyon	1953-1958	800,000
Hopewell Canyon	Hopewell Canyon	1954-1959	600,000

Abstract

The community of Blue Gap Tachee contains the exposure to abandoned uranium mines tracing back to the beginning in the late 1950s. Before the disruption of life cycles, the community used the natural status of plants, fungi, lizards, the health and welfare of the community where everything was considered to be a beautiful site. Residents living near the area received painful memories of family members suffering from the effects of the uranium mines. Families resided in the area for many generations until they started having health problems leading to death of family members. Residence shared stories of their family members who worked at one of the mines near their home. They drank from hand-laid dikes used to store water for livestock. The water ran off the mines into the shallow ponds. It was until 1988 when the fire chapter resolution was passed, however Tachee residents were experiencing health problems and deaths at an unusual rate. As of today, the effects of uranium contamination are affecting generations. Elders in the community also noted the changes in the state of the land. Members are now urging NHEPA and federal government to begin remediation. The disruption of lifecycles in plants, traditional herbs and vegetation are being weakened by the elders. The plants native to the area no longer present in the area from the impact of uranium, and community clean-up.

Disruption of Life Cycles - Community Experiences

Helen Naiz has lived her whole life in the Blue Gap Chapter on the corner of the Navajo Nation near Tachee, Arizona. She had 11 children. One of her children was still born. She was an additional problem to Helen's responsibility, a disability that was not recognized at the time. Three of her children died before their third birthday. Their ailments became fatal and their eyes became a cloudy grey color as they became sick. Through all her work with each child, their help and support came from the local Catholic Church, Navajo and Hopi Medicine men, and social workers. There was no history of such sickness in either her family or her husband Leonard's until uranium mining came to Blue Gap in the 1950s. Helen said, "Leonard worked at one of the mines near their home, the family had to travel for drinking, making clothes, washing clothes and shoes, and for buying. It (Helen, Catholic Education, 2009)



Ongoing Research Conducted and Selected Results

Research Conducted by

- Navajo Birth Cohort Study (NBCS) is a prospective study of pregnancy and neonatal outcomes in relationship to exposure to uranium wastes.
- Navajo Nation Environmental Protection Agency (NNEPA) investigates and assesses abandoned uranium mines.
- Southwest Research and Information Center (SWRIC) works with the community to document the impacts of UMAs.
- University of New Mexico (UNM) College of Pharmacy works with communities to study the connection between environmental exposures and disease.
- UNM Metals Exposure and Toxicity Assessment on Tribal Lands in the Southwest (METALS) is dedicated to studying the toxic effects of metal minerals and uranium exposure on tribal communities in the Southwest.
- U.S. Environmental Protection Agency (USEPA) is funding and overseeing assessments and remediation of abandoned mines on the Navajo Nation.

Results: Summary of Water Quality Data in Blue Gap-Tachee Water Sources, and Use Recommendations

Water Source	Lead	Cadmium	Uranium	Other Contaminants
Blue Gap Tachee	High	High	High	High
Blackfoot Canyon	High	High	High	High
Hopewell Canyon	High	High	High	High

Traditional & Cultural Aspects of the Community

Elders in the community still uphold their cultural teachings. They still collect medicinal herbs from natural plants that grow in the area. Community members maintain that special connection to the land by planting, caring, and traditions. Although there was a disruption in their cultural practices, community members continue to live by their traditional beliefs. A community member stated, "They still collect the different types of dirt used for traditional sandpainting." The Navajo Senior South Navajo Tribal Health Institute in Kanab, philosophy connects the Navajo people to their ancestral homeland.



Community Recommendations

- NNEPA needs to take full control and accept the present/available remediate studies and interact with outside agencies to remediate abandoned mines. NNEPA and USEPA, in collaboration with Navajo Nation Government, must demand that Congress prioritize remediation of abandoned uranium mines on the Navajo Nation. Demand an immediate action by our state's members of Congress to sponsor a legislation to amend the current Superfund Regulation to exclude all abandoned mines whether they were considered least threat to human or nature. NNEPA should welcome and use all data, studies, analysis and investigators to accelerate remediation.
- UN Government must direct NNEPA to isolate and fence exposed areas. Navajo Nation is definitely aware of all abandoned uranium mines throughout the Reservation and the Nation Government is very ignorant on the danger of these abandoned mines. These sites have wastes and soils contaminated with harmful heavy metals. The Nation has the responsibility to protect the people and its environment.
- Seek professional advice from scientists who have done extensive research on uranium, arsenic, and other highly toxic contaminants in the environment, to properly discuss or remediate legacy wastes based on their exposure levels. Navajo Nation needs highly accomplished Navajo scientists and modern laboratory equipment and facilities to conduct its own analytical studies to recommend clean-up methods. The Nation must be willing to accept studies from outside scientists to assist in remediation.
- Establish cooperative collaboration with State and Federal agencies and other Tribes in to initiate data collection and develop an agreement to share valuable data. Navajo Nation must establish communication with outside agencies to begin gathering what data relating to all uranium mines and effects on human health and the environment. NNEPA can establish a data center to seek, receive and build a research facility.
- Lobby for increased funding for the Navajo Birth Cohort Study and for local statistical data base regarding Navajo-Neurology. The CDC-ITC will promote healthy family living and lower the rate of developmental disabilities (mental and physical). This program is very essential to the Navajo Nation.

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Presented at 10th International Conference on Metals Toxicity and Carcinogenicity, October 2018



L-R: Johnny Naize, LaTasha James, Aaron Yazzie

RWPR Community Concerns



UNM METALS Superfund Center

Living with Uranium Wastes for 50 Years and Four Generations — A Navajo Community's Perspective

Peterson Bell, Bertha Nez, Edith Hood with Teracita Keyanna, Jacquelyn Bell-Jefferson, Grace Henia and Anna Benally

Red Water Road Community Association, Canyon Chapter, Navajo Nation

October 2018 (in Review 2020)

Presented at 10th International Conference on Metals Toxicity and Carcinogenicity, October 2018

History of Our Community

The Red Water Road Community Association (RWPCA) was formed in 2006 by five community members a vision in Government decisions to clean up uranium mine and mill wastes near our homes on the Navajo Nation northeast of Gallup, NM. We take our organization's name from a local dirt road that is the main thoroughfare through our community — a road that separates the two underground uranium mines that still surround our community today. As shown in the map to the right, we still live in the midst of uranium mine and mill waste sites.

We trace our living in this place back at least 100 years. Our great-grandparents raised sheep, corn and squash and raised native plants that flourished when there was more rain and herbage. Our grandmothers, Katherine Chusee Bell, and her brother Henry, lived on the sheep when they were children (photos, top left). Our grandfathers, Tom Benally, was a sheep herder, barman and miner (photos, bottom left). In the 1940s, he had to reduce his flock during the sheep-reduction era mandated by the Federal Government (document, below right). The livestock-reduction era was traumatic for many who witnessed Government agents shooting and killing animals to enforce grazing restrictions.

Uranium Mining History

Uranium exploration began in the 1950s on parts of 500,000 acres of Tribal land, including the area that would become the site of the Northeast Church Rock Mine (NCRMC), also: the Navajo Nation approved a lease for Ken-Mo's Church Rock I and II. And in 1974, construction began on the United States Gorge (USG) uranium mill and tailings pile, which operated between 1977 and 1982. The two underground mines shut down in 1983 (map at right).

When we were young, our father was between two uranium mines and had a pile every day in our yard. There were not few things that prevented myself or other children's eye from coming. Playing and watching was a favorite activity. My brother had a pile of sheep that grazed on these piles also and there were even any coming from UNCC or Navajo ENR or USG. My entire generation was born affected and we will never be compensated for our not being able to see the opportunity. — Source: Keyanna

Citizen Science

- Twenty years after the mines and mill closed, RWPCA members did field work to document non-contamination in the community.
- Monitored gamma radiation as part of CIRAAP (2002-2007) (map below)
- Worked with grad students to assess uranium at soil near residences (2005-2008) (map)
- Adopted residential addressing scheme (2009)
- Created blood and urine samples as part of CMNH Kidney Health Project (2007)
- Testified at Veterans Hearing (2007)
- Commented on first Federal Agencies' Five-Year Plan (2008)

Exposures Across Generations

4 generations... 50 years
"I still enjoy in the early morning, but it is a constant state of reflection and depression over what happened to a whole generation of my exposure. In the other address it another family's children playing near. This is our place, we do breathe in the air and it is very bad."
— Catherine Benally, January 2018, 83, Blue Canyon, Navajo Nation

A 4th generation child is seen at a party in the same area as the hospital in a photo taken in the 1970s. A 4th generation child is seen at a party in the same area as the hospital in a photo taken in the 1970s. A 4th generation child is seen at a party in the same area as the hospital in a photo taken in the 1970s.

Changing Landscapes (2004-present)

Flash Floods Threaten Bridges, Mine Wastes, Mill Tailings
Flash floods threaten bridges, mine wastes, mill tailings. Flash floods threaten bridges, mine wastes, mill tailings. Flash floods threaten bridges, mine wastes, mill tailings.

Livestock Concerns (2005-2006)

1979 Mill Tailings Spill; mine dewatering, 1968-1986
Church Rock Uranium Mill Tailings Spill July 26, 1979. Church Rock Uranium Mill Tailings Spill July 26, 1979. Church Rock Uranium Mill Tailings Spill July 26, 1979.

Risk Reduction and Community Trauma: Contaminated Soil Removals, 2007-2012

RISK REDUCTION: A 2007 Remedial Site Evaluation found high levels of uranium, radium, arsenic and other metals in soils around homes in the "Strip-It" area north of the Northeast Church Rock (NCRMC) Mine (chart at right). USGPA ordered General Electric, the NCRMC Mine owner, to remove contaminated soils from around homes in 2007 (AD) and again in 2009-10 (B). A third removal action in 2012 (2012) focused on excavating soils beneath Red Water Road (C) in the United States Gorge (USG). About 150,000 cubic yards of soils were removed. A total of 2.26 million cubic yards of soil removal was adopted to date (chart).

	PC-1	do	Ma	St	U	V
Benally	1.24	3.7	4.38	1.03	280	1,800
City	285	208	279	279	279	279
Angel	2.02	4.2	3.1	6.7	29.1	48.1
Mill	49.5	14.6	214	116	800	50.2

TRAUMA:
We had to place our household belongings in storage containers and have boxes covered in plastic. In the first cleanup, several families were moved to a motel on the west side of Gallup (some 20 miles away). The second and third times, we were moved to an apartment and motel, about 15 miles away, for periods of weeks and five months. The children and grandchildren were not used to being away, and there were complaints about it. We knew there was no impact to remove the contaminated dirt to reduce our exposures, but we never thought that our "temporary housing" would cover such upheaval in our lives.
— Bertha Bell

Current Clean-up Plan

Approved by USGPA Region 9 in 2011 and by Region 4 in 2012, USGPA has issued an NCRMC clean-up plan to allow us to live in the USG and Church Rock area. An estimated amount of 3.5 million tons of tailings generated between 1977 and 1982. The plan was approved by the U.S. Nuclear Regulatory Commission, was used 10 years. RWPCA members are expecting to receive more information. We depend on them to be approved by the Church Rock State Nuclear Cleanup Act (2018).

What's the Future Look Like for Our Community?

- Uranium mining impacts on our community are now 50 years old, and only recently did the Government announce that it would begin considering the final cleanup plan that would take another 10 years to complete. As we think about the long and painful experience, we have four main areas of concern:
 - There has been a loss of place; our population has declined because the younger generation doesn't think it's safe to live here.
 - The health of the people is deteriorating and the livestock are less vibrant; no comprehensive health studies have been conducted.
 - Will the land be restored? Will support be?

Community Actions to Address Exposures

- We never planned on being environmental justice activists, but we had to take action to remember the Navajo Uranium legacy and to advocate for the restoration of our land, our families and our health. This is a lot of our actions over the past decade and a half:
 - Formed an organization (2006-2007)
 - Testified before Navajo Nation Council, NM Legislature and US House of Representatives (National Hearing "Do It Right" 2007) (below)
 - Participated in national monitoring, soil sampling and air monitoring as part of the Church Rock Airborne Monitoring Project (2007-2007), we had information of contamination from USGPA annual reports, providing USGPA to address concerns through the Superfund web. Digged out annual uranium tailings spill commemoration March (2009-2010)
 - Joined the Multicultural Alliance for a Safe Environment (MASE) as a core group (2009)
 - Collaborated with USGPA Region 9 on outreach research (2012-2016)
 - Participated in the Inter-Agency Committee on Human Rights (2012)
 - Spoke at the Inter-Agency Committee on Human Rights (2012)
 - Spoke at the Albuquerque Center for Peace and Justice Center (December 2016)
 - Participated in Human Rights meetings in Atlanta GA (October, December 2017)
 - Modelled human migration and exposure degradation (2010-2018) (below)
 - Collaborated with the UNM Indigenous Design and Planning Institute to develop a plan for new community (2012, 2017)
 - Attended Western Mining Association annual meeting at Salt Lake (2015), San Carlos Apache Rejuvenation (2016), and Phoenix, British Columbia (2018)
 - Conducted interviews and site visits with more media outlets, including New York Times, Huffington Post, National Geographic, USA Independent, and Navajo Times.

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L-R: Teracita Keyanna, Peterson Bell, Edith Hood