Cancer Risk from Exposure to Uranium among the Navajo

Jani C. Ingram, Ph.D., Department of Chemistry & Biochemistry, Northern Arizona University, Flagstaff, AZ
Project Goals

• To determine environmental uranium information specific to the Navajo Lands.
• To bridge the gap between environmental science and cancer research by providing our results to our collaborators including Tribal leaders and community members.
• To provide a research experience for Native American students that is both scientifically challenging and of interest to them and their communities.
Project Overview

Environmental Uranium

CANCER RISK

Water

Soil & Dust

Navajo homes & wells

Plants & Crops

Livestock (sheep)
Key Issues: Collaborating with Native Nations

- Native Nations are sovereign.
- Every Native Nation has its own government and governmental processes.
- Cultural differences between majority populations and Native populations as well as between different Tribes are important.
- Face to face meetings important, particularly through visits to the Reservation
- Patience and respect are key.
Navajo Nation
Study Sites – Southwestern Navajo

Cameron

Blackfalls

Leupp
Study Site Pictures

Home in Cameron

Open pit mine

Blackfalls wells
Sampling on the Reservation
Collaborators

- Students and their families
- Specific Navajo communities and their leaders
- Navajo EPA (Federal government) and Navajo Natural Resources (Tribal government)
- Navajo Institutional Review Board.
- Other researchers working on similar projects on Navajo Lands
- Scientific collaborators
Student Researchers
Community Collaborators:

Cameron

Blackfalls

Leupp
Governmental Collaborators:

- Navajo Environmental Protection Agency
- Navajo Nation Institutional Human Health Review Board (Navajo IRB)
- Navajo Nation Department of Natural Resources
Other Researchers working on Navajo:

- University of New Mexico Dineh Project (Dr. Johnnye Lewis)
- Institute for Tribal Environmental Professionals (Mansel Nelson – Environmental Education Outreach)
- United States Geological Survey, Flagstaff (Dr. Margaret Hiza)
- Southwest Research and Information Center (Chris Shuey)
- Dine’ College (Perry Charley and Dr. Don Robinson)
Scientific Collaborators:

Margaret Briehl (Pathology)  
University of Arizona Cancer Center

Jamie Donatuto and Larry Campbell  
Swinomish Tribe

Michael Ketterer  
Metro State U  
Environmental Analytical Chem

Paloma Beamer (Public Health) and Karletta Chief (Soil, Water, Environmental Science)  
U of Arizona

Michael Lerma  
NAU  
Political Science

Nancy Johnson  
NAU Biology
Water Research

Well Map

Flagstaff
Arsenic
Traditional Food: Mutton

Navajos and Sheep:
- Mid 1600 sheep introduced to Navajos.
- Navajos transitioned from hunter/gathers to farming and pastoralism.
- The amount of livestock symbolize the good life.
Research Goals

• Quantifying levels of uranium in sheep grazing on abandon uranium mines.
• Model for dietary metal exposure, utilizing indigenous Health Indicator (IHI) to assess health impact.
• Model uranium exposure.
Sample Collection
5 from Leupp – control (May 2013)
5 from Cameron – mine site (June 2013)

Ingram NAU Research Group

Summer students from NAU, Dine’ College, Northland Pioneer College, Arizona Western College and community members working together

Dr. Ruby (“Rez Vet”) examination
Sample Collection

- Kidney
- Liver
- Heart
- Esophagus
- Small intestine
- Large intestine
- Stomach
- Hoof
- Wool
- Rib meat
- Leg meat
- Chest meat
- Lungs
- Fat
- Leg bone
Results

- Similar results from control (Leupp) and mining (Cameron) areas
- Next step to compare results to sheep raised off the Reservation
- Sample collection December 12, 2015 in 100 miles from the Reservation
Future Work

- Fate and transport of uranium species under environmental conditions that exist on Navajo Lands – uranium isotope ratio methods
- Bioavailability of uranium
  - Water exposure
  - Soil exposure
  - Plant exposure
- Livestock exposure – In Process
- Policy – T. Rock doctoral work
- Continue to work with Navajo Nation to investigate specific chemistry/biological issues of interest to their communities
Acknowledgments

Technical Assistance
• Dr. Michael Ketterer – ICP/MS (Metro State)
• Ben Moan – environmental lab (NAU)

Collaborators
• Cameron and Leupp Chapters
• Blackfalls Community

Funding
• Native American Cancer Prevention Program, National Cancer Institute
• National Institutes of Health – Training Grants at NAU
• National Science Foundation – Undergrad Mentoring in Environmental Biology and Research Experiences for Undergrads (summer)
• US EPA
Questions/Comments