

RESPONSE ACTIVITIES ON URANIUM-IMPACTED TRIBAL LANDS

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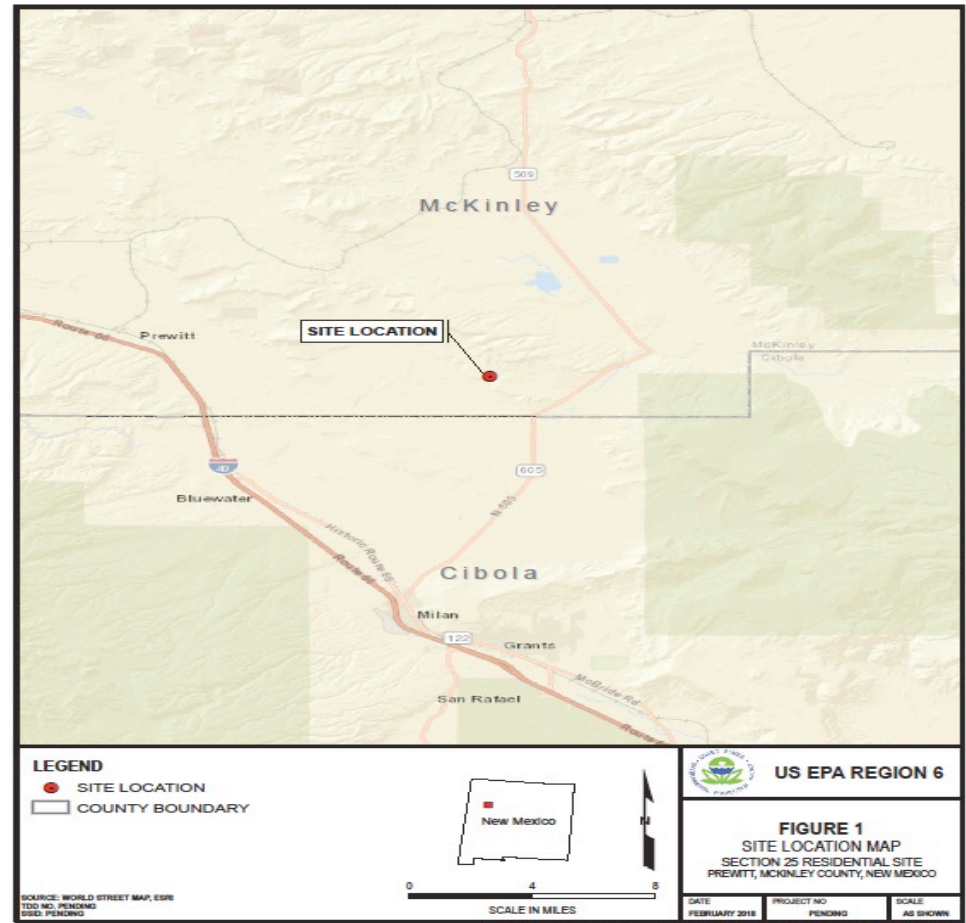
What are the issues?

- Legacy mining activities have negatively affected the health and environment of numerous Native American communities in the American Southwest, as well as in other parts of the United States.
 - Quantifying those direct impacts is beyond the scope of this presentation.
 - However, we will briefly touch on aspects of tribal life that must be considered during responses on tribal lands



Section 25 Residential Site

- Site is approximately 10 miles north of Milan, NM
- Primary residence is on a 180-acre parcel of land



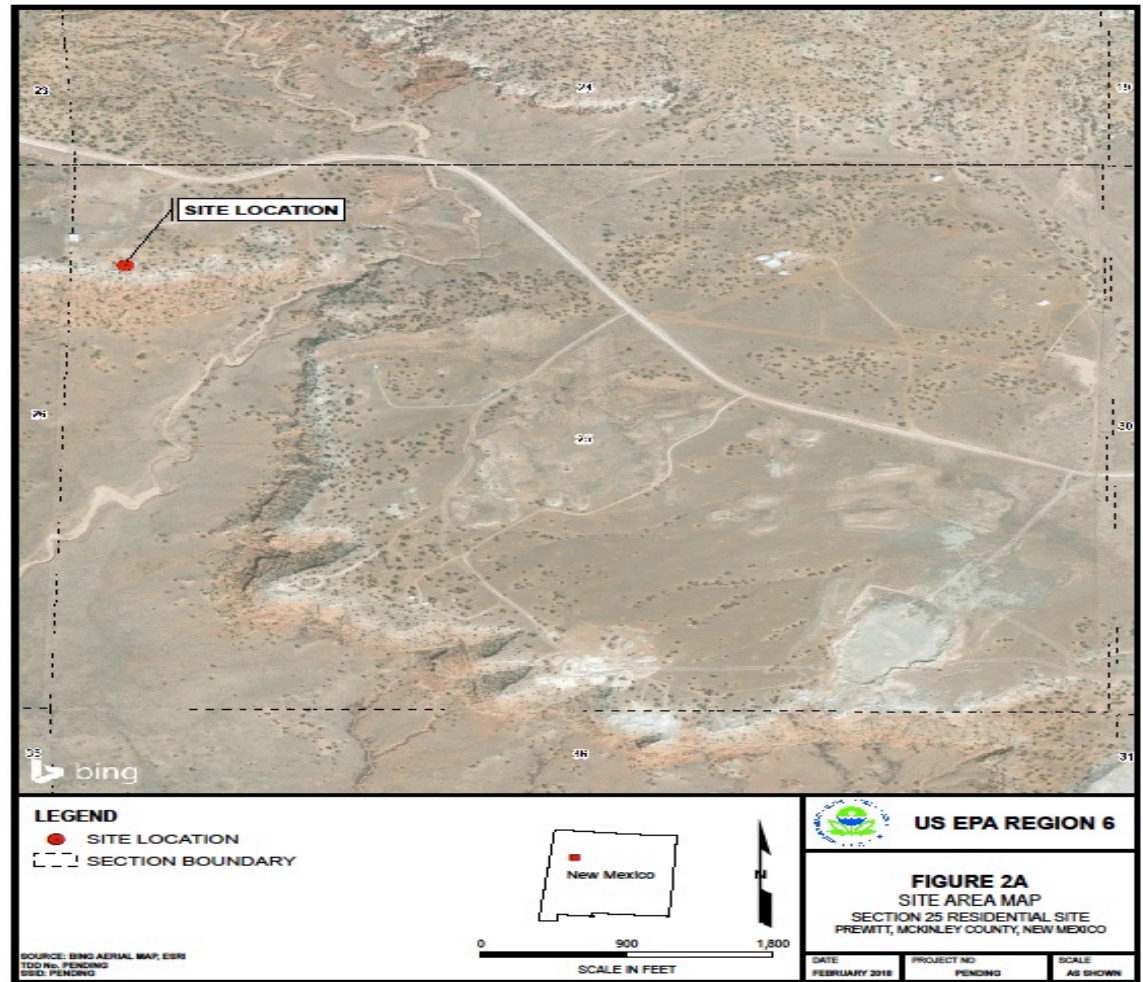
Residential Site Geology



Residential Site Geology

- Sandy soils and sandstone are readily apparent
- Previous photo showed an outcropping of Todilto Limestone
 - Rare; most limestones do not contain Uranium
 - Limestone's relatively low permeability, low porosity, and few organic co-precipitants typically make it inhospitable for uranium capture during formation
 - Todilto is unusual and well-known by mining engineers – dozens of uranium-producing mines have been established in the Todilto formation.
 - This particular outcropping is about 100 meters away from the house.
 - Home is located in an area literally termed, "Poison Canyon".

Five abandoned uranium mines are located within 500 meters of the Section 25 residence. For reference as to the scale of mining activities, Section 25 and Section 30 have close to one hundred uranium deposits that have produced uranium ore from both open pit and underground mines.



- Typically, living close to an abandoned mine results in concerns about polluted ground water, high concentrations of heavy metals in soils, low pH runoff from storm flooding, and extreme difficulty revegetating the land.
- Studies show that the concentrations of radon in soils in these types of geological materials are known to be elevated, as compared to other areas. U.S. Geological Survey has found radon activities up to 100,000 pCi/L in uranium-bearing strata in New Mexico. EPA's action level for indoor air is 4 pCi/L.
- Therefore, proper characterization of such sites must include analyses for radon, especially when human health is an issue.
- Under “emergency” auspices, responders need to “triage” response activities.

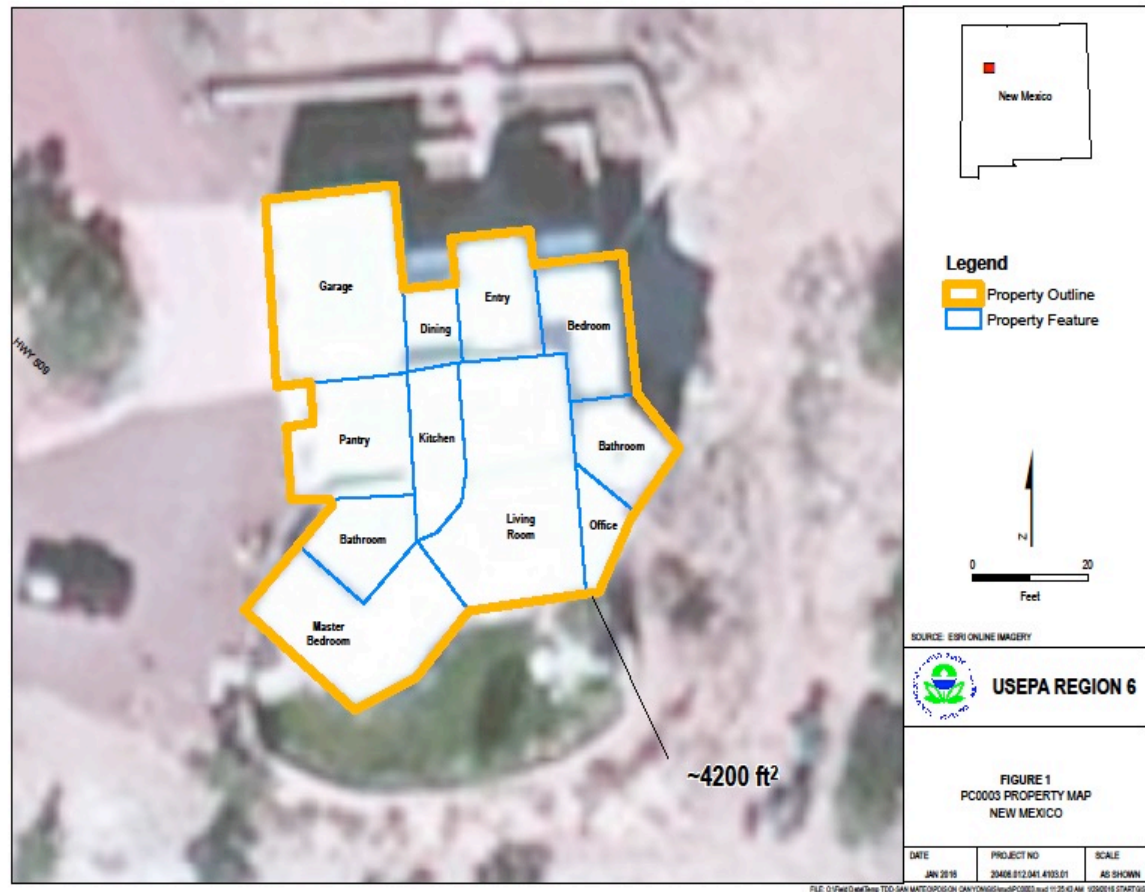
Gamma Spectroscopy

- Uses a spectrometer to analyze the gamma ray spectrum at a location
- Typical unit consists of four discrete parts that work together:
 - Translating software
 - Unit electronics
 - Cooling mechanism
 - Detector
- Used to require an entire room in a lab; now field deployed
- Used to require weeks of hold times and analyses; now results are near-instantaneous
- Does not require a PhD to operate
- Now able to do large areas quickly and with good accuracy
- Most common for gas, but can be used for water results as well.

Section 25 Residential Site

- A 7-day Radon test was conducted initially in 2010. This test was actually part of a wider study of the San Mateo Creek watershed. The results at the Section 25 residential site were 16.5 pCi/L. This is over 4-times the acceptable residential level of 4 pCi/L.
- At that time, the homeowners declined to have a remedial cleanup conducted.
- EPA's Regional Health Physicist has established that if two test results, six years apart, are both over 4 times the acceptable level, that is a rationale for emergency action. The health physicist then recommends waiving the 90-day test and immediate installation of a mitigation system
- A 7-day test was conducted again in 2016, yielding results again of 16.5pCi/L.
- The residence has 2 full-time adult residents, with small grandchildren visiting on a routine basis.
- In 2017, the homeowners contacted EPA, requesting installation of a radon mitigation system, and resumption of the investigation of radioactive contamination.

- The Section 25 Residence is approx. 4200 sq. feet with two levels.
- In addition to the relatively large size of house, another technical challenge is that the house boasts a walkout basement. This hampered installation of the remedial equipment.



Radon Mitigation System

- Various systems commercially available**
- Regardless of vendor, primarily consists of two parts**
 - 1) Method to prevent influx of new radon**
 - 2) Method to remove current radon**

Total Costs for the Section 25 Residence: about \$48,000. Initial reports are that the system is successfully remediating the radon concentrations at the Section 25 Residence.

What are some of the reasons to delay or refuse remedial actions at one's property?

- (An extrapolation of multiple data points: not necessarily pertinent to Section 25 Residence...)
- Historical distrust of the American government among many Native Americans
- Historical distrust of outsiders in general among Native Americans
- A big one for the Native American communities – fear of disruption, or even termination of their tribal lifestyles
 - Tribal lifestyles – or more accurately, tribal lifeways – is an umbrella under which fits human health, ceremonial activities, cultural identity, food choices, resource usage, and disposal actions.
 - Spiritual health might be more pressing than physical health at any discrete point in time; are you prepared for that discussion?

Tribal Lifeways

- Every rock, plant, and animal in the tribal environment is potentially a food, medicine, or cultural resource on tribal lands. Losing these valuable resources, even temporarily, is a source of stress for tribal peoples. They may decline to follow what you consider sound advice for that reason.
- Tribal peoples have multiple pathways for environmental exposure that health scientists may not fully consider:
 - Use of untreated water not only for drinking and bathing, but potentially for ceremonial purposes as well. How do you quantify exposure from a sweat lodge?
 - A greater number of activities that use or incorporate the land and land resources
 - On-site food production/preparation, including hunting, fishing, farming, and gathering activities, in higher percentages than typical “Western” lifestyles.

How does this affect response at mining sites on tribal, and tribal-adjacent lands?

- Standard risk assessment techniques may be inadequate for measuring exposures to contaminants. It is necessary to be as informed as possible about the activities on these lands. Talk to the people there!
- At the same time, scientists and engineers will also need to respect tribal sovereignty. If the tribal peoples choose to keep some of their activities confidential, then that needs to be respected. A “best-guess” may need to suffice.
- Hundreds of abandoned mines on tribal lands; problem cannot be easily minimized, and one-size-fits-all approaches might lead you astray.
- Recall that 5 abandoned uranium mines were within a short distance of Residence 25. Lots of potential for exposure.
- Speaking of exposure, there is the other side of the coin...

Overwhelming size!

- Several of the abandoned mines that are Superfund sites are very large; the size of entire counties in other states.
- The San Mateo Creek site will be considered for addition to the National Priorities List next year. The site is over 200 square miles. Imagine cleaning up an area the size of the city limits of Dublin, Ireland – plus Paris, France -- plus Brussels, Belgium – and being half-done.
- These challenges will require innovative and multidisciplinary solutions. We cannot recycle our old ways of thinking and still reach the finish line on such large sites.
- What can you bring to the table to help with these challenges?

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- Please note, the views expressed or conclusions drawn in the presentation are those of the individual and do not necessarily represent the official views or policies of the agency.