

# Super-tiny particles containing uranium and other metals found in Jackpile Mine wastes

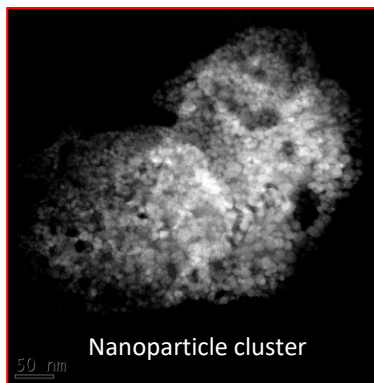


The UNM METALS Superfund Research Program (SRP) conducts field and laboratory research to better understand how metals in uranium mine wastes affect the air, land and water and the health of people who live nearby.

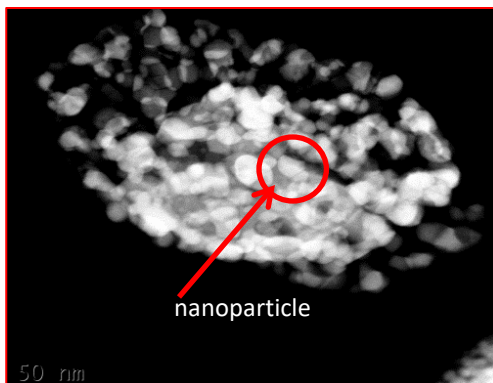
The METALS SRP is focused on mining Impacts in three Native American communities in the Southwest:

- Pueblo of Laguna/ Jackpile Mine
- Red Water Pond Road Community/Northeast Church Rock Mine
- Blue Gap-Tachee Chapter, Navajo Nation/Claim 28 Mine

For information about research being conducted on the Pueblo of Laguna, contact community liaison, Kyle Swimmer, at 505-262-1862, or [laguna.swimmer1680@gmail.com](mailto:laguna.swimmer1680@gmail.com), or visit [hsc.unm.edu/college-of-pharmacy/research-and-scholarship/metals/ind ex.html](http://hsc.unm.edu/college-of-pharmacy/research-and-scholarship/metals/ind ex.html).



Nanoparticle cluster



nanoparticle

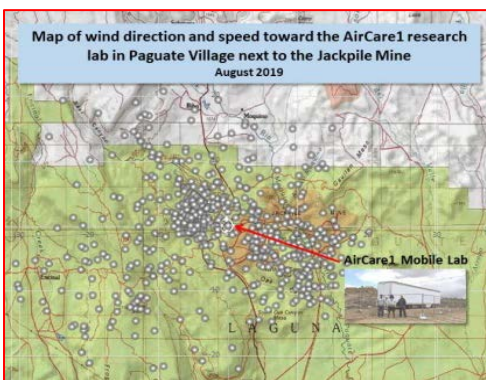
The photos above are “micrographs” of clusters of super-tiny particles collected from uranium-bearing layers inside the Jackpile Mine. Some of the particles contain both uranium and vanadium, another potentially toxic metal. They were produced by a high-powered electron microscope at the UNM Earth and Planetary Sciences lab. This microscope can “see” particles that are invisible to the human eye, but may be highly toxic to people who breath them.

UNM Professor Adrian Brearley, who studies the mineral content of these “nanoparticle” clusters, explains that the clusters are very small, *less than 1 micron*, but consist of many even smaller particles that can be broken off and potentially transported by air separately or attached to other kinds of dust particles.

A micron is one-millionth of a meter, or really tiny. Nanoparticles are even smaller. For comparison, a human hair is about 50 microns in diameter, as shown in the diagram to the right. Generally, particles 2.5 microns or less can be inhaled deeply into the lung where they may cause damage to the breathing sacs.



When released into the environment, these particles can be inhaled by humans or livestock or settle on the ground on forage and crops or dissolved into the water bodies. These particles are most easily transported because even light winds can loft them.



The map at left shows dots indicating speed and direction of wind flow around Paguete. About 30% of local winds is coming from the direction of the mine, suggesting that Paguete residents could be exposed to metal-bearing nanoparticles. Lab mice exhibit lung damage when exposed to particles like these from other mines.

## ***Air Monitoring Continues in Paguate, Old Laguna and Mesita*** ***UNM Research Team and Laguna ENRD collaborate to assess windblown particles, weather conditions***



*Air monitoring station next to the Paguate Community Center*



*This R2D2-looking machine is a Tisch PM sampler that collects airborne dust for later analyses of metals and other hazardous substances released to the air in each village.*



*Kestrel “met” station gathers data on wind speed and directions – and looks like a cell phone!*

“Particulate matter,” or PM, is the scientific term for what we normally call “dust.” As most of us know, dust can make you sneeze, collects on things you want to keep clean, and requires frequent sweeping of the indoors. Most of the time, we think of dust as an inconvenience, and in some cases, a nuisance.

But dust, or PM, can be cause serious breathing problems, from sinus irritation and allergies to upper respiratory distress. In some cases, the tiniest of dust particles can be breathed deeply into a person’s lungs, potentially causing lung diseases.

This is why the UNM METALS Superfund Research Center, in consultation with the Laguna Environmental and Natural Resources Department (ENRD), is collecting dust samples on filters inside PM samplers stationed at sites in the villages of Paguate, Old Laguna and Mesita. You might have seen these R2D2-looking machines at fenced yards in the villages (photos).

UNM METALS Laguna Community Liaison Kyle Swimmer retrieves the filters in the PM monitors and sends the samples to UNM Professor Melissa Gonzales, an exposure scientist, who is studying the sources and makeup of the dusts. The dust is tested for particle size, mineral content and a variety of trace metals, including uranium. As reported on the front side of this Research Brief, one objective of these studies is to determine if super-tiny “nanoparticles” are being released from the Jackpile Mine and into the air in and around Paguate where they may be breathed by people and their livestock or deposited on crops and soils.

The PM samplers are deployed with smaller instruments, called Kestrel meteorological stations, that record vital information on wind speeds and directions. UNM atmospheric scientist Joe Galewsky will use these data to conduct computer analyses – called dispersion modeling – to predict where and when the dust may deposit. The data will help the community understand how winds may distribute contaminated dust from the mine. And the dispersion modeling could be used to activate automated early-warning systems that would alert residents to extreme dusty conditions before they happen, lessening exposures.

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