AML Project: Inventory and Characterization of abandoned Mine Lands in New Mexico

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Abstract

The New Mexico Bureau of Geology and Mineral Resources (NMBGMR) and the Mineral Engineering Department at New Mexico Tech in cooperation with the New Mexico AML program is conducting research to develop a better procedure to inventory and characterize legacy, inactive, or abandoned mine features in New Mexico. Fieldwork involves completion of mine inventory forms which detail location, lithology, feature condition, vegetation, and potential environmental and physical hazards. The results of this study will prioritize the mine features in selected mining districts in New Mexico for safeguarding and remediation. Some sites have the potential to contaminate surface water, groundwater, and air quality. Heavy metals in mine waste or tailings and acid mine drainage (AMD) can potentially impact water quality and human health. Laboratory work on these samples includes geochemistry from a professional lab as well as in-house petrography, electron microprobe, x-ray diffraction, paste pH, and particle size analysis.

Definition and Goals of AML

Abandoned Mine Lands (AML): Lands that were mined and left unreclaimed where no individual or company has reclamation responsibility and there is no closure plan in effect. These may consist of excavations, either caved-in or sealed, that have been deserted and where future mining is not intended.

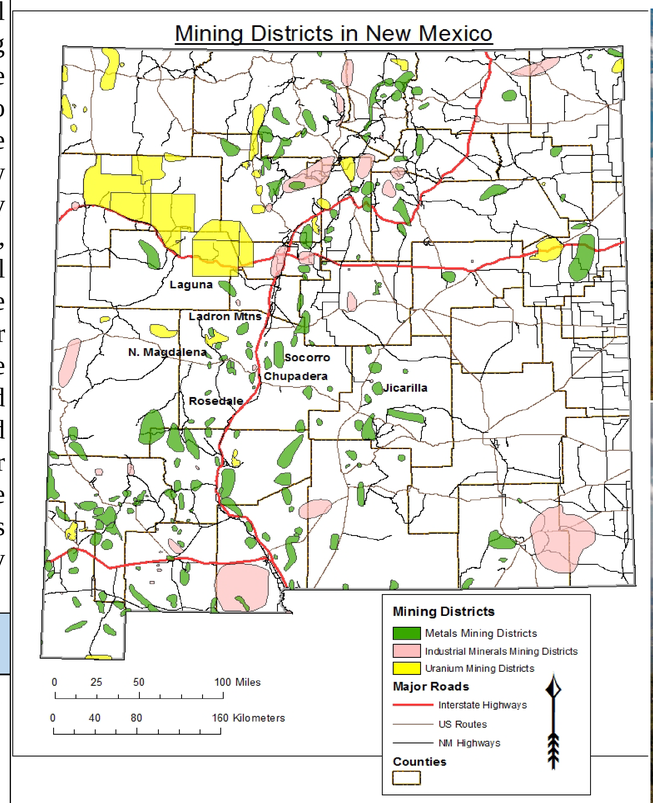
Project Goals:

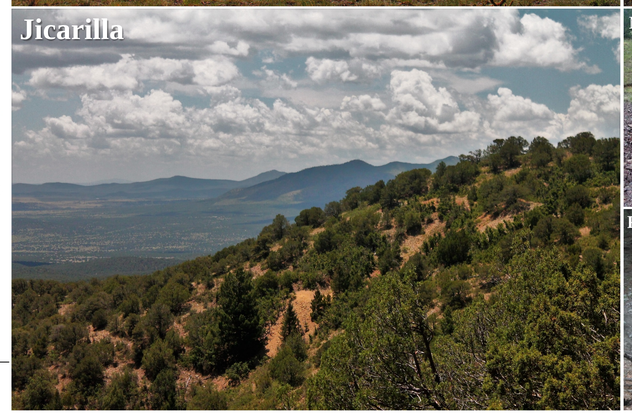
- To develop a relatively quick and inexpensive procedure to inventory and characterize abandoned/legacy mines in order to provide data on mining districts, mines, and mills in New Mexico.
- To characterize existing waste rock piles for backfill material, determine if there is potential for leaching metals or AMD, and help plan and assess reclamation procedures.
- Provide background data that could assist in the planning of future mining operations, such as mineral resource potential.

Procedures:

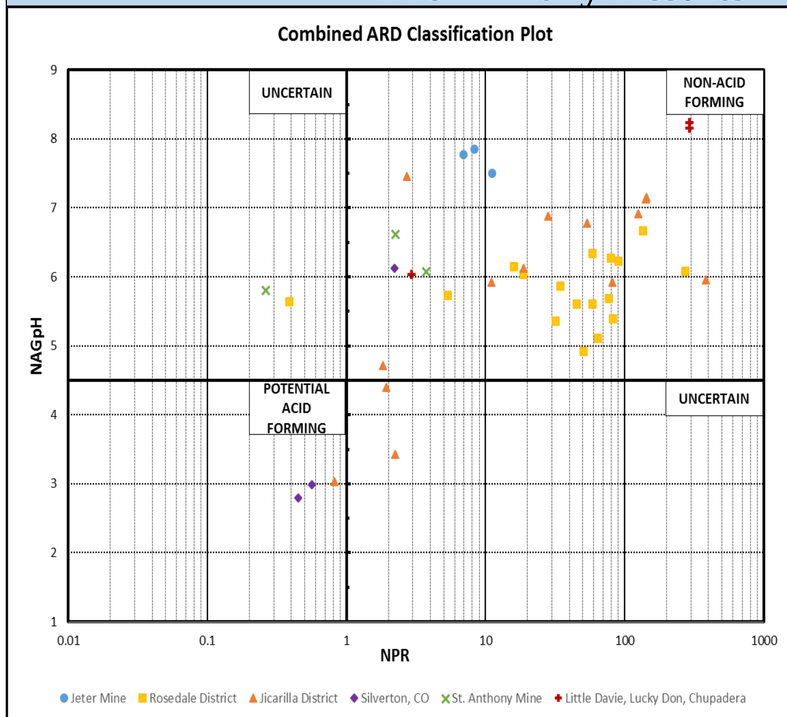
- Sites are located and mapped with GPS in the field. Lithology, setting, and other characteristics of the site are added to a mine inventory sheet which later is digitized in a relational database.
- Paste pH is used as a proxy for determining potential AMD, particle size analyses are used to determine metal partitioning in mine waste, x-ray diffraction is used to determine mineralogy and electron microprobe tells us what elements are in the minerals.

Project Areas





Preliminary Results



Acid Potential (AP)
Neutralization Potential (NP)
Net Neutralization Potential (NNP)
Net Potential Ratio (NPR)

$$AP = S(\%) \times 31.25$$
$$NP = C(\%) \times 83.3$$
$$NNP = NP - AP$$
$$NPR = \frac{NP}{AP}$$

Rosedale: 1 Uncertain
Jicarilla: 2 Uncertain, 1 Potential
North Magdalena: Pending

- Uncertain treated as potentially acid forming and will be remediated
- Other mines are not part of AML, but serve as comparisons for different deposit types.

Preliminary Conclusions

Rosedale: Low environmental risk, moderate to high physical risk. Open shafts near campgrounds and hunting areas should be closed.

Jicarilla: Moderate to high environmental risk, low to moderate physical risk. Waste rock tested positive and uncertain for potential acid generation. While there are many open shafts, the area is remote, so danger is lower.

North Magdalena: Work is ongoing and geochemical results from samples taken at North Magdalena have not yet been produced by the lab. Once received, we will plot these on the ARD diagram to determine acid generating potential. So far, it appears physical hazards are the primary threat at this district. Many open shafts close to town and easily accessible terrain make for a dangerous area.

Acknowledgements

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