There are tens of thousands of inactive or abandoned mine features in 274 mining districts in New Mexico (NM) (including coal, uranium, metals, and industrial minerals districts) with about 15,000 abandoned legacy mine features varying from shallow prospect pits to deep mine shafts in the state. There is a need to classify these wastes or “abandoned deposits” to understand their composition, properly estimates the quantity and evaluate the potential economic value. Since most of the earlier operations and exploitation was focused on heavy metals, it would be good to now turn our attention to examine these wastes for potential critical minerals. Hence this project seeks to 1) characterize and estimate the critical mineral endowment of mine wastes in three mining districts in New Mexico (Copper Flat at Hillsboro, Black Hawk in Burro Mountains, and Carlisle-Center mines in Steeple Rock district) and 2) “beta-test” USGS procedures and provide feedback. Potential critical minerals at these deposits include As, Bi, Te, Zn, Co, Ni, Mg, Mn, and fluorite.

It is necessary to perform paste pH test and particle size analysis on samples collected since these factors can affect weathering and the migration of heavy metals. Also, acid rock drainage (ARD) is a huge concern for mine waste management and soil pH is an effective indicator for ARD. Paste Ph conducted on samples collected from the waste rock piles ranged from 3.66 to 5.67 and are mostly indicative of fine-grained pyrite or sulfide oxidation. The samples collected from the tailings however showed a slightly different pattern in pH, ranging from 6.30 to 8.62 probably due to the presence of carbonates. Difference in particle size fractions and its distribution along the slope are generally influenced by natural occurrences (e.g., gravity and pre-mining hydrothermal alteration) and operational activities such as material piling or dumping. This in turn also affects the general slope stability and possibly mineralogy distribution within the waste dump.

The benefits of this project are to ensure prospects for critical minerals in the New Mexico state are not lost to urbanization, settlement or other land use. This project would ensure that there are data and archived samples for future studies and advance research as these mine features may not be accessible after reclamation. Future mining of mine wastes that potentially contain critical minerals will directly benefit the economy of New Mexico. Possible re-mining of mine wastes could clean up these sites and pay for reclamation.