THE CHARACTERIZATION OF LEGACY MINES IN JICARILLA MOUNTAINS, NEW MEXICO

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ABSTRACT

Gold-silver production in the Jicarilla district, Lincoln County occurred 1850-1897 from hundreds of pits, adits, and shafts. Many of these mines were abandoned with little or no remediation. It is important to recognize that these early mines were not breaking any laws, because there were no laws to break. Many state and federal agencies have mitigated the physical salinity hazards by closing these mine features, but very few of these remediation efforts have examined the long-term chemical effects. Many of these mine features do not pose any physical or environmental hazard and many more, pose only a physical hazard, which is easily dealt with. The objective of this research is to develop a better procedure to inventory and characterize abandoned mine features, not only in the Jicarilla district, but also procedures can be applied to other districts. Hazard ranking of mine openings and features, using appropriate ranking methodology will be utilized for most sites. Also we want to suggest remedial activities that would manage or mitigate dangers to the environment and public health, while taking into consideration historical, cultural and wildlife issues and mineral resource potential.

INTRODUCTION

Mining operations in the Jicarilla Mountains, Lincoln County began about 1850 (McLemore et al., 1991). Production has been minor and amounts to 2600 or hole As, 7345 or placer As, 57,561 or Ag, and 8800 short tons of Fe ore (McLemore, 2017). Three types of deposits are found in the district, namely placer gold deposits, Great PlainsMargin gold-silver veins and iron-skiaps deposits.

MAPPING STUDY AREA

Mining Districts in New Mexico

GEOLOGY

The Jicarilla Mountains were formed by a late-Eocene or early-Oligocene granodiorite to dacitic porphyry laccolith that intruded a sequence of Permian sedimentary rocks. Younger dike, sills, and laccoliths intruded both older granodiorite to dacitic porphyry and the sedimentary rocks. Compositions range from quartz syenite to granodiorite to quartz monzonite (V.T. McLemore, unpublished mapping). Contact metamorphism has locally transformed limestone to calc-silicate rocks, and some of the metamorphosed rock has been replaced by magnetite. Massive vein deposits of hematite and pyritic veins are exposed at the surface (TDS). Some of the pyrite and hematite contains metals (<1 ppm) gold.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

Jicarilla (iron sulfide) was observed in samples Jic334A from a waste rock pile, pyrite was observed in numerous waste rock piles (Gold-stam-A, Gold-stam-B, Jic334-A and Sally Mine) during field investigations. Laboratory results from paste pH of samples from these mine waste rock piles have pH >5 suggesting a possible acid-generating environment. XRD and electron microprobe analyses identified pyrite grains in these waste rock piles, some with quantitative analyses indicating arsenic (As) percentages between 0.02-0.5%. Printed tectures in microprobe analyses are consistent with arsenic being leached from pyrite. Pyrite and jarosite were not observed in waste rock pile samples with pH >5. Elevated values of As from ARP in some waste rock piles suggest possible As contamination potential.

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