ABSTRACT

The majority of our electronic equipment, such as smartphones, laptops, computer chips, wind turbines, hybrid and electric cars, depend on rare earth elements (REE) and other critical minerals. This coupled with the anticipated rise in demand for critical minerals and the potential shortage of production capacity from China and other nations has made it necessary to examine the New Mexico (NM) mine wastes for its minerals and the potential shortage of production capacity from China and other sites.

INTRODUCTION

"Mineral commodities that have important uses and no viable substitutes, yet face potential disruption in supply, are defined as Critical to the Nation’s economic and national security" (Schulz, 2017). The majority of our electronic equipment, such as smartphones, laptops, computer chips, wind turbines, hybrid and electric cars, depend on these rare earth elements (REE) and other critical minerals. This coupled with the anticipated rise in demand for critical minerals and the potential shortage of production capacity from China and other nations has made it necessary to examine and evaluate the NM mine wastes for its critical mineral and future mining potential. The NM Mines Database lists more than 9,000 mines, of which more than 7,000 are inactive or abandoned. Although the actual mineral production was typically for precious and base metals rather than critical minerals, the majority of these mines have existed mine wastes that were generated during mineral production and may have potential for critical minerals. As a result, any essential minerals discovered in a mineral deposit would be also present in the mine wastes (mine waste dumps, tailings, etc.) Although the main focus of this project is the critical mineral endowment of mine wastes, we also intend to assess the stability of the mine features and typical environmental characteristics of the mine wastes (acid base accounting, pH, leaching tests, etc.), considering that these assessments are necessary to secure a safe working environment during mining, reclamation, and/or waste processing.

PURPOSE

- Determine the acid generating potential of mine waste in NM
- Characterize and estimate the critical mineral endowment of mine wastes in two mining districts in NM (i.e., Copper Flat at Hillsboro and Carlisle-Center mines in Steeple Rock district).
- "beta-test" USGS procedures for sampling mine wastes. Future mining of mine wastes that potentially contain critical minerals can help pay for reclamation and clean up these sites.

METHODS

- Use of sampling techniques developed by USGS staff, the BLM (Bureau of Land Management, 2014), USGS, and EPA
- Preparation of a Site Health and Safety Plan (HASP)
- General geologic mapping (GIS), sampling of waste and rock piles.
- Laboratory studies; Geochemistry, Petrography, Electron Microprobe analysis, XRD
- The use of geologic and geochemical data to determine potential of acid production within the wastes, estimation of the volumes and tonnages of waste and rock piles.
- Particle size analysis.

PRELIMINARY RESULTS

TABLE 1: Shows location of mine sites (in decimal degrees, NAD27), prominent geologic features and known critical minerals.

<table>
<thead>
<tr>
<th>Mine Name</th>
<th>District</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Prominent Geologic Features</th>
<th>Known Critical Mineral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carlisle-Center</td>
<td>Steeple Rock</td>
<td>108.063512</td>
<td>-108.060055</td>
<td>Volcanic-basaltic system</td>
<td>Au, Bi, Cu, Sn, Pb, Zn</td>
</tr>
<tr>
<td></td>
<td>Hilibbros</td>
<td>32.852103</td>
<td>32.894017</td>
<td>With little sulfidation and Au-Ag veins. Acidic-plutonic (granite, quartz, and carbonate)</td>
<td>Au, Bi, Cu, Sn, Pb, Zn</td>
</tr>
</tbody>
</table>

FIGURE 4: Location of the Copper Flat at Hillsboro, Black Hills in Burls Mountains, and Carlisle-Center mine in Steeple Rock area, southern NM.

None of the samples have a potential to generate acid drainage though some samples were slightly acidic when a paste pH test was done.

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REFERENCES

- McConnon, V.T., 1990, Geology and geochemistry of the mineralization and alteration in the Steeple Rock district, Grant County, New Mexico: Socorro County, New Mexico: 104 p.