ORIGIN AND MINERAL RESOURCE POTENTIAL OF ROSEDALE DISTRICT, SOCORRO COUNTY, NEW MEXICO

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OUTLINE

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Discovered in 1882, mining started in 1886. Two major properties produced in Rosedale district are Rosedale and Bell mines. 28,000 oz (Au) and 10,000 oz (Ag) was estimated total metals produced (1882-1981) and amounted to ≈ $328,000.

Rosedale Mining Co. constructed 10-stamp mill in 1891 and a cyanide plant in 1900. Inactive until the mid 1930’s and finally closed in 1941.

Three mill tailings facilities constructed at the Rosedale mine: Longtail, Elizabeth and Rose Bell Mine (Golden Bell) patented in 1930 and produced some metals in 1900’s.

- Rose repository area with a callow settling and pulp-thickening tank in background (Nov. 21, 2007)
- Foundations of Bell
- Rose repository area with a callow settling and pulp-thickening tank in background (Nov. 21, 2007)
- Longtail repository area showing deeply incised gray mill tailings (Nov. 14, 2007)
Located in Socorro County, New Mexico and northeastern slope of the San Mateo Mountains, about 25 miles south of Magdalena and about 30 miles north of San Marcial.
METHODOLOGY

- Interpretation of available historical data
- Waste rock pile mapping and sampling
- Laboratory analysis
  - Geochemistry (ICP & XRF)
  - Petrographic studies
  - X-Ray Diffraction (XRD)
  - Electron Microprobe (EMP)
- Evaluation of the mineral-resource potential
- Characterization of the waste rock piles
The district is tectonically active and lies within a structurally complex area of the Mogollon-Datil volcanic field.

Timing of the mineralization and alteration in the Rosedale district was probably shortly after emplacement of the late-Oligocene South Canyon Tuff.

Mineralization occurs in well-developed epithermal veins that are brecciated and sheared in rhyolitic porphyry.

Mineral Assoc.: FeO3 and MnO2. Sulfides appear above the water table.

Rosedale and Bell Mines are two main vein mineralization deposits related to parallel basin and range fault which usually dips 75° to the west.

Argillic and Silicic alterations typically overprint cross-cuts fault zones.

Structural zone trends N-NE (1 km wide) and the Mt. Withington caldera boundary vertical fault lies 5 km SE. Gently folded rocks with anticline trends of 345°.

Structure and alteration of Rosedale modified from Ferguson, 1990.
RESOURCE STUDY

- Mapping and sampling of waste rock piles, prospect pits, short adits and shafts
# Field Observations

<table>
<thead>
<tr>
<th>Mine Area</th>
<th># Mine Features</th>
<th>Mine Feature</th>
<th>Depth of workings (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosedale</td>
<td>28</td>
<td>Shafts (14 levels), Pits, Adit, Tailings, Mill Foundations, Trenches</td>
<td>2-732</td>
</tr>
<tr>
<td>Bell</td>
<td>16</td>
<td>Tailings, Shafts, Adit, Mill foundations, Pits</td>
<td>2 - &gt;50</td>
</tr>
<tr>
<td>Bell South</td>
<td>7</td>
<td>Adit, Shafts, Pits</td>
<td>3 - &gt;10</td>
</tr>
<tr>
<td>Big Rosa Canyon</td>
<td>33</td>
<td>Shafts, Adit, Pits, Trenches</td>
<td>2 - &gt;30</td>
</tr>
<tr>
<td>Robb Mine</td>
<td>10</td>
<td>Adit, Shaft</td>
<td>3 - 20</td>
</tr>
<tr>
<td>Lane Mine</td>
<td>4</td>
<td>Shafts, Pits, Trenches</td>
<td>2 - &gt;30</td>
</tr>
<tr>
<td>Oak Spring</td>
<td>1</td>
<td>Drillhole</td>
<td>-</td>
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</tbody>
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Petrographic studies - 15 rock chip fragments analyzed under reflected light indicated the presences of the following:

- Pervasive argillic and silicic alteration
- Moderate amount of Fe$_2$O$_3$ and MnO$_2$ stringers confined to veins and fractures
- Dominant quartz (±crystals) and plagioclase groundmass
- Quartz veins usually has glassy to milky massive textures
- Vesicular quartz veins with leached-out mineral
Results from 22 samples showed elevated concentration of Au averaging about 1.21 ppm at Rosedale Mine and 0.23 ppm at Bell Mine for waste rock pile material.

Au showed a positive correlation with Ag and Mn however, presented no correlation between K, Na, and the base metals.

Evaluation of the chemical relationships between Au and Ag, and Mn, which appears to correlate well indicates:

- Average Au:Ag concentration of samples from Rosedale Mine area is low (0.05) whereas Au:Ag ratio of samples from Bell Mine area is also low (0.03)
- Average Au:Mn concentration of sample from Rosedale and Bell mine area is 0.003

Ratio of average Au:Ag for Rosedale and Bell is expected to differ but constant ratio of Au:Mn for both areas is possible
16 samples analyzed showed similar patterns: high percent concentration in quartz, high in sanidine or microcline, and trace amount of pyrite and hematite.

Moderate concentration of pyrite in Rosedale samples.
Sample element with asterisk (*) showed pyrite phase but the analysis was conducted on oxides phase. ** Ag below detection limit.
○ Hematite from oxidized pyrite (A-D BSE images)

○ Fe$_2$O$_3$ alteration confined to quartz vein (A-B)

○ Altered biotite by Fe$_2$O$_3$ and quartz. FeS$_2$ intergrown with and minor (Zn,Fe)S replaced by Fe$_2$O$_3$ and quartz (D)
CONCLUSION

- Mineralization occurs in structurally controlled veins and field evidence indicates high potential of Au±Ag deposit in the district.
- Geochemistry showed elevated Au values. However, Rosedale area showed a more consistent pattern vital for further investigation.
- Au showed some correlation with Ag and Mn for geochemistry, however average ratio concentration is low.
- Noticeable amount of pyrite phase in Rosedale samples.
- Pyrite and Sphalerite phases are completely altered to hematite.
- Cu phase observed in EMP analysis is another base metal sulfide in trace amount.
- Waste rock piles are suitable as backfill of unprotected mine features.
- Mine features can be used for exploration target definition within the district.
RECOMMENDATION

- Investigation of cross and/or parallel structures on mineral deposition
- Representative number of mineralogical analysis required to draw meaningful correlation between all element associated with mineralization in the district.
- Subsurface investigation to determine depth of oxidation
- Potential for placer deposit in Rosedale district.
Geological field mapping – alteration zones, structural and lithological controls on mineralization

More detailed interpretation of petrographic, mineralogical and geochemical data

Geologic map modeling and interpretation in ArcGIS

Geologic model for Rosedale district
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QUESTIONS

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