

indicate surface mining sites, but no reports have been found to describe the resource (Figure 11). Mine potential for coal is not expected on available mineral interests, but small amounts could be extracted for individual use, therefore value could exist for nearby surface owners. Field examination will be necessary to further evaluate these small isolated deposits.

MINERALS

The complexity of the Proterozoic rocks in the Tusas Mountains makes it difficult to evaluate the economic mineral potential. This complexity, associated with large mineral ownership in an under-explored region, is exactly what intrigues and compels companies to explore. The main emphasis for mineral interest potential will focus on metamorphic and intrusive rock types with which mineral deposits are generally associated. Mineral sites, past production and exploration areas are indicated on Figure 12 by the crossed pick symbols. Some of these symbols also represent coal workings and the industrial mineral sites not evaluated in this report.

The nearest minerals found, adjacent to the offered mineral interests, are in the Hopewell district just east of the TA Grant. This district history dates back to 1890 when the Croesus Mine was patented, the Jaw Bone Mine patented in 1900 & 1905, the Red Jacket Mine in 1913, Mineral Point Mine in 1914 and the Iron Mountain Mine, not dated. Mineral commodities in this area are reported as gold, silver, copper, lead, zinc, iron and manganese. No data has been found that reports quantities produced. The gangue or mineral aggregates from these mines have been described as quartz, chlorite, siderite, iron oxides, hematite, diorite porphyry, schist, phyllite and tourmaline. The past descriptions of these deposits have classified them as irregular load (vein) and bedded deposits, which may not be consistent with current thinking. Recent field mapping, geochronology and petrologic analysis in the Tusas Mountains, have provided new constraints on the evolution of the Proterozoic rocks. These studies and re-evaluation of the

diverse volcanogenic environments of the gold deposits may imply that the configuration may not be classical structurally controlled veins, but exhalative, sea floor vent deposits represented in the Proterozoic metasedimentary and metavolcanic rocks. These sub sea exhalative or black smoker vents can be the source to produce massive sulfide deposits.

These Proterozoic rocks forming the core of the Tusas Mountains are also described as bimodal metavolcanic and volcanoclastic metasedimentary rocks, vitreous quartzite and interlayered pebble conglomerates and several small quartz diorite to granite stocks (Wobus 1984). It has been suggested that these rocks may have been generated by the opening and closing of successive back-arc basins underlain by continental crust. Figure 13 is a simplified geologic map of the Tusas Mountains indicating the location of the potential mineral bearing metavolcanics and associated supracrustal metasedimentary rocks. Figure 14 by Wobus (1984) illustrates the same area showing Proterozoic rocks associated with structural features. The major fault highlighted where Proterozoic rocks are exposed at the surface, runs northwest from Kiowa Mountain, west of Brazos Peak to Chama, New Mexico. This fault and others could have provided the long-lived structural permeability necessary for sustained hydrothermal discharge in the area, which is believed to be the prerequisite for the formation of potential subaqueous exhalative deposits. In fact, Wobus (1984) reported, "The metabasalt locally contains well-preserved pillow structures in the Brazos Peak 15-minute quadrangle northwest of the Tusas Range". These deposits are interpreted to be products of submarine hydrothermal discharge and may also represent a subaqueous counterpart to subaerial epithermal precious metal deposits. These deposits called volcanogenic or volcanic-associated massive sulfide deposits (VMS) are major sources of copper and zinc, with a lesser extent of lead, silver, gold, cadmium, selenium, tin, bismuth and other amounts of minor metals.