EXAMINING POTENTIAL GEOCHEMICAL INDICATORS OF FENITIZATION IN SOIL SAMPLES COLLECTED FROM THE GALLINAS MOUNTAINS, LINCOLN COUNTY, NEW MEXICO

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Fenitization is an alkali metasomatic alteration associated with carbonatite and alkaline intrusions. Typically, fenitization occurs with enrichments of potassium (K), sodium (Na), and rare earth elements (REE). REEs are comprised of the 15 lanthanide elements, yttrium, and scandium. REEs are increasing in demand with their use in smart phones, LED lights, solar technologies and electric vehicles. Occurrences of fenitization associated with REEs, such as at the Gallinas Mountains mining district, Lincoln County, NM, are therefore of considerable economic and strategic interest. In the 1950s some REE, occurring as bastnaesite, were produced from the Gallinas Mountains. Several companies have conducted exploration programs to identify REE potential therein. Four types of deposits are found in the district: epithermal REE-F veins, Cu-REE-F veins, REE-F breccia pipe and iron skarn deposits; all are associated with Tertiary alkaline or alkali-calcic igneous rocks, REEs and fenitization. In 2010 a series of 240 soil/rock chip samples were collected and analyzed with a Bruker handheld XRF instrument. Samples range in K concentrations from 0.7-3.8%, and maximum concentrations of La (2071ppm) and Ce (3547ppm), indicating zones of fenitization and mineralization that need further confirmation. Analytical precision is within +/-10%. Of the REEs, only La, Ce, Nd, and Y were detected by the instrument. Rb shows a very strong positive correlation with potassium, suggesting these elements are in K-feldspar, which could be related to the fenitization. As K-feldspar is a common host of Rb, this is expected. There is no apparent correlation between K and the four REEs tested (Nd, Ce, Y, and La). Further fieldwork has indicated that REE anomalies are concurrent with general alteration and REE veins.

Keywords:
REE, fenitization, alteration, fenite, Gallinas, Rare Earth Element