
Mineralogical study of uranium-niobium-rich alteration zone at the Lofdal carbonatite-silicate complex, Namibia

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The Lofdal Farm Area, located in northwestern Namibia is host to a middle Neoproterozoic (ca. 750 Ma) rift-related silicate-carbonatite intrusive suite. The complex consists of nepheline syenite and carbonatite plugs, and diatreme breccias, surrounded by a wide area (200 km²) of carbonatite and phonolite dyking accompanied by hydrothermal alteration. The core of the complex, referred to as the “Main Intrusion”, outcrops as a large carapace of nepheline syenite (1.5 km² exposure area) intruded by a calciocarbonatite (sovite) plug. Airborne radiometric surveys have identified a large uranium anomaly along the western and NE extremities of the Main Intrusion. A grab sampling program over the main U anomaly has identified enrichment averaging U 500 ppm and Nb 5000 ppm (0.5%). Of interest in this study, are the enrichment processes responsible for anomalous concentrations of uranium. These enrichments appear to be related to a late stage metasomatism of the nepheline syenites, by alkaline fluids released from the crystalizing

carbonatite plug, a processes termed fenitization. This study will utilize petrography and electron microprobe analysis to provide mineralogical and textural descriptions of the metasomatized syenites which can be compared with unaltered samples to describe this process. Preliminary results show the presence of a Nb mineral resembling fersmite, which displays strong zonation and in some samples includes late stage rim growth characterized by increased levels of Na and U, likely attributable to fenitization fluids. A more critical examination of the fenitization process will provide clarification on the source(s) of the uranium, mode of transport, and condition changes responsible for causing its precipitation from solution.