Ain Shams University
Faculty of Science
Geology Department

Geological Studies on a Recently Discovered Occurrence of Rare Metals Within Shear Zone at Um Samra area, Central Eastern Desert, Egypt

A Thesis Submitted by

Ahmed Mousad Mohamed Mohamed Ismail

M.Sc. in Geology (2011)
Assistant lecturer of Geology,
Nuclear Materials Authority

For the Doctor Degree of Philosophy in Science
(Ph.D.) in Geology

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بِسْمِ اللهِ الرَّحْمنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا ﷺ

إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

سورة البقرة الاية - (٣٢)

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Abstract

Um Samra - Um Bakra area is located in the southern part of the Central Eastern Desert of Egypt and covered by; 1) ultramafic rocks and volcanogenic sediments, syn-orogenic granites, olivine gabbros and post-orogenic granites. 2) post-granitic dykes (basic and intermediate) and veins (black, red jasper and quartz veins).

Um Samra-Um Bakra shear zone strikes N70°W, dips 45°/SSW, ranges from 20 to 500 m in thickness and extends 10 km in length. The shear zone consists of fine–grained granites, ferruginous, kaolinitized, rich in uranium, wolframite and Niobium-Tantalum (Nb-Ta) minerals. Two types of quartz veins recorded in the study area; a) barren milky quartz veins are limited only to the Um Samra - Um Bakra shear zone and b) mineralized quartz veins intruded post-orogenic granites (pyrite, arsenopyrite, covellite, gold, galena and bornite).

Three generations of silica veins differ in color, mineralization and age intruded the shear zone. The milky quartz veins is the youngest silica phase, barren, running WNW and dipping 70°/ SSW direction. The red jasper (second phase) has N 60°-76° W trend, dipping 45°/SSW discontinuous, brecciated, and rich in Cr, Ni, Sn, Zn and Cu-minerals. The oldest phase is represented by black jasper trending N75°W and dipping 50°-65° /SSW, and rich in Cr,

Ni, and Au mineralization. The black jasper veins are richer in Ni, Cr, Zn, Cu, Au and Y than red one.

The studied granites are classified as monzogranite, syenogranites and alkali feldspar granites and evolved from acidic differentiated magma calc-alkaline characters. Magma type is high-K nature, monzogranites plot in metaluminous area while the syenogranites and alkali feldspar granites plot in felsic peraluminous and low peraluminous field. All granites are A-type granites specifically A_2.

The radiometric investigation surveys in post-orogenic granites reflect weak positive relation between eU and eTh (r = 0.23) in fresh granites and (r = 0.38) in alterd granites. The radioactive anomaly recorded in altered granite in closed to red jasper vein with 2185 ppm an average.

The acid pug leaching experiments were conducted of uranium in high anomaly sample in altered granites. The obtained leaching efficiencies were about 98.8% for U.

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