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Title of Thesis: Geochemistry of Copper-Gold Deposits in the Nubian Shield; Case Study: Atud Gold Mine, Central Eastern Desert, Egypt

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Abstract:

The present work deals with the geology of gold deposits at Atud gold mine area, Central Eastern Desert, Egypt. The basement complex of the Eastern Desert is characterized by abundance of metamorphosed volcanic and volcanic-sedimentary successions of greenschist facies, dismembered ophiolitic complex, gabbro-diorite-tonalite-series, and unmetamorphosed volcanic and pyroclastic sequences. The gold deposits occur in different rock types of the Nubian Shield of the Eastern Desert. The Atud gold mine is considered to be a mesothermal vein type gold deposit containing quartz veins hosted mainly in Neoproterozoic dioritic rocks. It is spatially and genetically associated with a metagabbro-diorite complex emplaced at shallow levels in serpentinite and metasedimentary rocks. Petrographically, the gabbroic rocks of Gabal Atud comprise different petrographic varieties namely; olivine gabbro, pyroxene hornblende gabbro and altered hornblende gabbro. Using satellite imagery and aerial photographs for the study area, a geologic map showing the field relations, structural elements and stratigraphic lithology was described and discussed. Geochemical analyses, petrochemical calculations, and plotting on the international binary and ternary diagrams revealed that the serpentinites belongs to the metamorphic dunite, and Iherzolite associated with ophiolites. The metagabbros are of tholeiitic nature and are of the cumulate type. The gabbro rocks are of subalkaline nature, and plot mainly at tholeiite field. All of the gabbro samples clustered in the field of island arc ocean floor basalts. Copper-gold mineralization at the Atud mine occurs as fracture-filling auriferous quartz veins hosted in Neoproterozoic dioritic rocks and along their contact with metagabbro. Gold mineralization is associated with metasomatic alteration zones around shear zones and
quartz-carbonate vein arrays. The mineralized veins consist of quartz, carbonate and albite gangue enclosing minor amounts of pyrrhotite, arsenopyrite, pyrite and sphalerite. Trace amounts of galena, chalcopyrite, magnetite and rutile are also present.