

Geochemistry and ore genesis of probably gold-bearing rocks, Okote and Moyale areas, Southern Ethiopia

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The Moyale gold occurrence is located in southern Ethiopia and has been for placer gold mining by locals. Some first geological, geochemical and drilling studies have been done recently by the Ethiopian Institute of Geological Surveys, yielding sufficient geological and drilling core data for a general overview of the area. The Moyale region lies within the Mozambique Belt that record multiple deformational, magmatic, and metamorphic events (Condie 1982). This belt is considered to be part of the Pan-African province with an age between 500-700 Ma and consisting of a region comprising chiefly of rejuvenated older sialic crust and a region of island-arc and oceanic rocks. Some workers used the term Pan-African to include ages of 1100 to 500 Ma (Berhe 1990). Berhe (1990) considered the Moyale region as a part of Arabo-Nubian shield and, based upon the rock assemblages, structural trends, and trace element data, he indicated the mafic-ultramafic rocks of Moyale area to be of ophiolitic nature. The Moyale area is part of the pan-African Mozambique Belt forming Eastern margin of the Tanzanian Craton. The rocks of the Moyale region are comprised of hornblende (\pm biotite) gneiss, ultramafics, amphibolite and granodiorite in the west, feldspar-biotite gneiss, potassic feldspar-biotite gneiss, potassic feldspar-quartz-biotite schist, calc-silicate gneiss, granite gneiss, chlorite-amphibole schist and basic rocks and schists in the eastern, and tonalite, amphibole, metagabbro and ultramafics in the central part of the region. Regional heavy concentrate exploration for gold indicated the occurrence of gold; in addition, extensive placer mining was carried out mostly in weathered quartz vein and host rock in the mineralized zone. Regional exploration indicates gold and base metal type

mineralization to occur dominantly in quartz vein and subordinately in their altered wall rocks. The gold content of quartz vein ranges from 0.1 to 215 ppm. The host rock contains up to 1.3 ppm in Chamuk, 5.7 ppm in the Haramsam area, and up to 1.0 ppm in the Hasemte area. The ore minerals present in quartz veins include gold, galena, sphalerite, pyrite, chalcopyrite and pyrrhotite in major part of the area. Similar ore mineral associations have been observed in the host rock in the Chamuk and Haramsam areas. The mineralization in the above areas is controlled by submeridional and East-West trending brittle-ductile shear that has affected the host rocks, granodiorite in Chamuk, amphibolite and quartzfeldspar-mica schist in Haramsam and metagabbro in Hasemte areas. Moreover, the mineralization is affected by intensive alteration. We have used geological, petrological, and geochemical techniques to study the rocks of the Moyale and Okote areas in southern Ethiopia to get detailed data on their composition and formation and to establish the relation of gold mineralization with shear zone, host rock and alteration type. Aside from detailed petrographical studies using the optical and electron microscopes, our studies include major element analyses by XRF and trace element analysis by neutron activation analysis, XRF, and ICP-MS, as well as Rb-Sr and Sm-Nd isotope analyses to provide constraints on the provenance of the host rocks.

References

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