Geology and Mineralogy of Sphordi Phosphate Deposit, Bafgh, Central Iran

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Bafgh is a highly mineralized Infracambrian district in Centeral Iran with many magnetite-apatite ore deposits (about two million tons iron ore) and a few Zn-Pb, U, Mn and REE mineralization. This district is restricted by two main strike-slip faults of Kubanan to the east and Poshtebdam to the west. The highly mineralized Infracambrian rocks are consist of metamorphosed rhyolite, tuff, alkali granite, syenite, magnetitite, dolomite, gypsum, limestone, black shale and sandstone. The Infracambrian sequence is overlain unconformably by younger formations. The igneous rocks are tholeiitic, calc-alkaline and alkaline in magmatic series and bimodal. The bimodal nature of the volcanism in the area interpreted as a signature of extensional tectonic setting such as back-arc basin. On the other hand, black shale and thick sequence of limestone and dolomite are similar as those of formed in intracontinental and passive continental margins. Goghart (200 million tons iron ores) and Chadormalu (400 million tons iron ores) are now operating for iron and Sphordi (60 million tons ores with 30 % Fe oxide and 14 % P_2O_5 and 2 % REE) is now operating for P. The hosted rocks in Sphordi deposit are two types: 1) metasomatic rocks consist of clinopyroxene, Ca-amphibole, garnet, scapolite, apatite, calcite, quartz and albite and 2) Rhyolitic tuffs. Although apatite in Sphordi deposit mainly occurs as powdered apatite interstitial to magnetite crystals but large euhedarl and subhedral crystals of apatite (some apatites are more than 1 kilograms in weight) are most prominent feature of the deposit. Several mineralization styles were suggested for genesis of the Sphordi phosphate deposit such as Kiruna magnetite-apatite type, carbonatite magnetite-apatite type, stratabound volcano sedimentary P-rich iron deposit and metasomatic-hydrothermal skarn type. This study will discuss geology and chemical composition of rock forming minerals in the Sphordi deposit.