

## **GEOCHEMISTRY, MINERALOGY AND ECONOMIC ASPECTS OF PHOSPHATIC ROCK OF THE SAMCHAMPI ALKALINE-CARBONATITE COMPLEX, ASSAM, NORTH EAST INDIA**

S.Q. Hoda<sup>1</sup> and P. Krishnamurthy<sup>2</sup>

*Formerly Atomic Minerals Directorate for Exploration and Research, Hyderabad, India*

*E-Mail: <sup>1</sup>hoda\_sq@yahoo.com, <sup>2</sup>krisvijji@gmail.com*

### **Abstract**

Four discontinuous lensoid bodies of secondary phosphatic rock (0.433 sqkm) occur along the curvilinear fault zone in the dominantly soil covered Samchampi Alkaline-Carbonatite Complex (SACC) that was emplaced in close proximity to the Kalyani lineament during the upper Cretaceous (109Ma) in the Mikir Hills massif of Assam. Petrographic studies indicate that fine-grained flourapatite is the dominant phosphate mineral set in a ground mass of calcite and francolite. Crandallite, pyrochlore, magnetite, ilmenite, goethite, biotite and zircon occur as accessory minerals. Major and minor oxides show a wide range of P<sub>2</sub>O<sub>5</sub> (31.49-38.0%), CaO (41.70-54.73%), Fe<sub>2</sub>O<sub>3</sub> (1.40-11.16%), and Al<sub>2</sub>O<sub>3</sub> (0.53-4.47%) and SiO<sub>2</sub> (0.64 – 7.24%). Trace element analysis including REE indicate high REE (1518ppm), U<sub>3</sub>O<sub>8</sub> (223ppm), Nb (168ppm), Y (69ppm) and Zr (674ppm). Electron Microprobe studies have revealed the presence of mineral phases such as apatite, crandallite, pyrochlore that account for the chemical constituents like P, REE, U, Nb and Y in the rock. A moderate reserve of 15 million metric tons of phosphatic ore averaging 35% P<sub>2</sub>O<sub>5</sub> has been estimated under the resources category down to a depth of 15m. Thus, the phosphatic rock of Samchampi Complex could become a potential source for production of phosphoric acid together with uranium and rare-earth elements as by-products. They can be extracted economically by using a combination of froth flotation to remove calcite and silica as gangue and hydrometallurgical treatment of the beneficiated ore.

*Keywords:* Geochemistry, Mineralogy, Samchampi, Alkaline-Carbonatite Complex, Mikir Hills, Assam