

**INFLUENCE OF WEATHERING OF CARBONATITE ON RARE EARTH
ELEMENT CHEMISTRY OF EPPAWALA PHOSPHATE DEPOSIT,
SRI LANKA**

**W.M.S.K. Weeranayake^{1*}, Y.L. Yatawara¹, H.M.T.G.A. Pitawala^{1,2}
and N.W.B. Balasooriya^{1,2}**

¹*Department of Geology, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka*

²*Postgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka*
**sachiweeranayake@gmail.com*

Eppawala phosphate deposits have been formed as a result of weathering of basement carbonatites and are made up of primary and secondary phosphate minerals. Similar deposits around the world contain various types of secondary minerals which influence the Rare Earth Elements (REE) chemistry of phosphate deposits. The present study was focused on understanding the mineralogical changes occurring during the weathering processes and explaining their influence on the variation of REE chemistry of the Eppawala deposit. The samples collected from different zones of weathering profiles were investigated using inductively coupled plasma mass spectroscopy, X-ray diffraction and optical microscopy. The phosphate ores consist of fluoro-chloro apatite, magnetite and ilmenite as primary minerals and fluoroapatite, carbonate-fluoroapatite, crandallite, florencite, and monazite as secondary phosphate minerals. The present study revealed the presence of texturally and morphologically different five major types of apatite in the Eppawala deposit. Those include primary apatite derived from the carbonatite and four other types formed by the weathering and recrystallization processes. During the alteration processes of primary apatite, fluoroapatite, hydroxy apatite and carbonate fluoroapatite have been formed. Recrystallization has resulted in the formation of fluoroapatite, crandallite and florencite. Further, the formation of fluoroapatite is favoured for the depletion of REEs during the recrystallization process. The mineralogy, petrology of the phosphate deposit indicates that the recrystallization processes and secondary phosphate mineralogy highly influenced the variation of REEs in the ore bodies.

The financial assistance from the University of Peradeniya (Grant No. AHEAD/ICE/PDN/SCI/Activity 4) is acknowledged.

Keywords: Carbonatites, Rare Earth Elements, Secondary phosphate, Weathering