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Use of Magnetic Anomalies to Estimate Subsurface Extent of the Eppawala Phosphate Deposit

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A magnetic survey was carried out to find out the possibilities of demarcating the phosphate deposit from the surrounding country rocks in Eppawala. It is a well-established fact that the magnetic mapping can be utilised to investigate the subsurface objects, materials or different rock types based on their magnetic properties. Most of the rock-forming minerals are non-magnetic, while some minerals have magnetic properties. Those rocks with ferro-magnetic minerals such as magnetite generate magnetic anomalies which in turn help to investigate the subsurface occurrence of mineral deposits. Magnetite and its derivatives are intimately bound with the Eppawala phosphate, which is a secondary product of the apatite-rich carbonatite weathering. Therefore, the magnetic signature of the phosphate body is different to that of the surrounding country rocks. Despite having a large number of studies on the geological, geochemical, petrological, and agricultural aspects of the Eppawala phosphate deposit, very little research has been conducted on geophysical aspects. Further, the subsurface extents of the ore body are not adequately studied to date. Therefore, this study was conducted to identify the boundaries of the phosphate body. The study was carried out over 12 km^2 area, 5 km north from the current mining site. GSM-19 Overhouser system magnetometer with integrated GPS was used to collect field data. The magnetic anomalies were plotted using a pre-defined grid. The maximum positive and negative anomalies encountered in the survey area are 690 nT and 829 nT respectively. This study showed that magnetite is not distributed evenly in the area and the deposit extended along the north-south direction in the survey area. Further, processing of analytical signal using the anomalies showed that the carbonatite occurs as a continuous body trending in north-south direction.