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Characterization and significance of intrusive rocks in geothermal reservoirs - Olkaria East and Southeast fields.

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The Olkaria Geothermal Complex is a high temperature field in the East African Rift system. The lithostratigraphy of the Olkaria geothermal area as revealed by data from geothermal wells is characterised by pyroclastics, rhyolites, basalts, trachytes and intrusive rocks. Recent drilling activities within the Olkaria East and South East fields encountered intrusives in various geothermal wells from as shallow as 2200m below ground level. The need to characterise the nature and distribution of the intrusives is significant in understanding their influence to the geothermal system.

Microscopic examination of drill cuttings in thin section indicates the intrusions are mainly microgranites with a granophyric texture; composed of coarse grains of quartz interlocking with feldspars and pyroxenes (augite). Syenitic intrusions are also encountered in some wells but occur intermittently with trachytes as thin dykes. Hydrothermal alteration mineralogy in some of the intrusions is indicative of the presence of micro-fractures.

Gravity data indicate localised dense bodies that extend at depth as evident from Bouguer anomaly map, Owens et al. [2]. This has also been corroborated with the magnetic anomaly of the area which illustrates the rocks have been demagnetised due to the high temperatures associated with the intrusions.

This paper seeks to highlight the type, extent and significance of intrusions in Olkaria geothermal field and their influence to the geothermal system.

References:

[1] Omenda P.A. (1998) The geology and structural controls of the Olkaria geothermal system, Kenya.

Geothermics, 27-1, 55-74

[2] Owens L., Porras E., Spielman P. and Walsh P. (2015) Updated Geologic and Geochemical Assessment of the Olkaria III Field Following Recent Expansion to 110MW.

