

ABSTRACT

A Preliminary Geochemical Stream- Sediment Survey of the Wagwater Drainage Basin, Jamaica, W. I.

This thesis describes a preliminary examination of the geochemical behaviour and distribution of major, minor, and trace elements in the Wagwater Drainage Basin. The Wagwater Drainage Basin is about 268 km² in area and occupies the northern part of the Tertiary Wagwater Belt in eastern Jamaica. The Basin is comprised of approximately 90% Tertiary sedimentary sandstones, shales, conglomerates, volcanic rocks and approximately 10% Cretaceous volcanics and volcanoclastics.

The Tertiary Wagwater Belt is in a region of base metal mineralization, in which Tertiary silicic volcanics of the Newcastle Volcanic Facies overlie, in places, Lower Eocene sandstones, shales, and conglomerates of the Wagwater Facies.

A total of 77 active stream sediment samples were collected at a sample density of approximately one sample per 3.5 km². The samples were dried in sunshine, sieved and the -80 mesh size prepared for analyses using Instrumental Neutron Activation Analysis and Atomic Absorption Spectrophotometry analytical techniques.

The major, minor, and trace element data for 27 elements were analysed and interpreted using univariate and multivariate statistics and the results plotted as distribution maps.

The distribution maps show two definite trends in the distribution of the elements. These trends are linked closely with felsic and iron-rich minerals in the stream sediment samples. The elements Na, K, Ca, and Al are associated with the felsic minerals and are largely concentrated in the southern section of the Wagwater Drainage Basin, along streams draining the Newcastle Volcanic and Wagwater Conglomerate Facies. The elements Fe, Ti, V, Mn, and Ni, are associated with iron-rich minerals (mainly magnetite) and are concentrated in the northwestern section of the Drainage Basin, along streams draining the Cretaceous Border Volcanic Formation and the Above Rocks Granodiorite.

A weak Cu - Pb - Zn association is located in the southern section of the Wagwater Drainage Basin and this corroborates with previous investigations.

the inter-element associations mostly reflect the erosion of rock types in the area and display normal geochemical variations. High metal values are not high enough to justify further work.