ABSTRACT

The Wagwater Belt is a fault bounded structural unit in which approximately 3700 m. of strongly folded and faulted (?) Paleocene - Lower Eocene sedimentary and volcanic rocks are contained. This succession of rocks, known as the Wagwater Group is divided into a lower, intermediate and upper zone. The lower zone consists predominantly of non-marine red-beds known as the Wagwater Formation and the upper zone consists of marine turbiditic beds called the Richmond Formation. The intermediate zone is made up of mafic and felsic lava flows and their sedimentary derivatives which interdigitate with the Richmond and Wagwater Formations. These lava flows outcrop in the central and northern sections of the Wagwater Belt, but are absent in the southern part of the Belt.

The mafic rocks, the Halberstadt Volcanics, consist of basaltic and spilitic pillow lavas and volcaniclastics. The felsic rocks, named the Newcastle Volcanics, overlie the Halberstadt Volcanics and are comprised of subaerial dacite and quartz keratophyre lava flows and volcaniclastics.

The basalts in the Wagwater Belt are similar in mineralogy and geochemistry to plateau type tholeiitic basalts of the Deccan and Columbia River areas. The basalts were derived from the partial melting of a garnetiferous mantle followed by fractionation at a shallow depth.

The dacites are comparable with calc-alkaline dacites from volcanic arc regions. The geochemistry of the dacites suggests that the magma was derived from the partial melting of either lower crustal or mantle material under hydrous conditions.

The spilites and quartz keratophyres are the metasomatized equivalents of the basalts and dacites respectively. Metasomatism took place under conditions of high P_{CO_2} and involved the addition of Na and CO_2 and the removal of Ca, Sr and K from the original rocks. Conditions during this period were similar to present day geothermal fields.

The Wagwater Basin was created by the splitting of an Upper Cretaceous volcanic arc into a frontal and third arc. Submarine basaltic volcanism accompanied the opening of the basin. Subsequent dacitic volcanism during the early Eocene, indicated renewed subduction leading to the closure of the Wagwater Basin.