ABSTRACT

MINERALOGY, GEOCHEMISTRY AND PROVENANCE OF THE SILICA SAND DEPOSITS, BLACK RIVER, ST. ELIZABETH, JAMAICA, W.I.

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The rich silica sand deposits of Jamaica only occur two miles inland along an 80 km. stretch of undulating plains in Black River, St. Elizabeth. The deposits occur as irregular pockets within karstic depressions of Tertiary Limestone of the Newport Formation. The silica sand immediately overlies and is interbedded with kaolinitic clay deposits. The clay rests unconformably on the Tertiary Limestone bedrock. The silica sand deposits are scattered throughout the Black River basin, and are of varying areal extent. There are ten major areas where the deposits occur, two of these located in the Great Morass to the east of the Black River basin.

The silica sands are mature sand deposits rich in quartz. Minerals found in the deposits as determined from XRD and optical microscopy are quartz, ilmenite, magnetite, calcite, rutile, anatase, tourmaline, zircon,

epidote and disordered kaolinite. Modal analyses show that quartz ranges from 83 to 94 percent of all samples. Partial chemical analyses of the silica sand indicate high levels of SiO_2, while the other elements include Al_2O_3, Fe_2O_3 and TiO_2. Traces of sodium and potassium oxide are present. The variation in the chemistry is controlled to a large extent by modal mineralogy. For example high SiO_2 contain a high percentage of quartz, Al_2O_3 is highest when there is abundant kaolinite and Fe_2O_3 higher in those sands that contain abundant hematite.

The source of these sands appears to be from the Central Inlier. This was deduced from provenance studies and reviewing sea level changes during the Quaternary. The age of the silica sand appears to postdate the last interglacial (c. 120,000y.b.p) as the sands overly an elevated reef of this age in the study area. The absence of siliciclastic rocks in the Montpelier - Newmarket belt, coupled with SEM studies suggest an offshore provenance for the silica sands. Surface textures, from the SEM, include evidence of both marine and eolian influence, the latter commonly overprinting the former. This study has revealed that the sands were blown inland from a marine environment.

The Central Inlier consists of outcrops of granodiorite bodies, drained by a southward flowing river, the Rio Minho. During sea level lowering in the late Pleistocene period this river transported siliciclastic sediments onto the shelf. Movement of these sediments occurred westward along the shelf, which could have been facilitated by the dominant westerly current and littoral drift directions when sea level rose.

During the Wisconsinan, sea level lowering exposed the shelf for approximately 70,000 years, at which time characteristic south-east winds transported the sands to their present location. Emplacement of the silica sands, therefore, appear to have occurred during the late Pleistocene (after 120ka.).