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Barberton Drilling Project – Barite Valley Core BARB5

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Diamond drilling has recently been completed in the Barberton Greenstone Belt, South Africa in order to obtain fresh, unweathered samples and continuous stratigraphic sections of Palaeoarchean volcanic and sedimentary rocks. The Barberton drilling project, sponsored by ICDP, has multiple aims including investigating the composition and temperature of the early atmosphere and oceans, the presence and activity of early microbial biosphere, the nature of melting in the mantle, and early tectonic processes. Three sections of sedimentary rocks have been obtained including the site BARB5 that is described here. The cores represent diverse chemical and clastic sediments and primary as well as diagenetic sedimentary structures. BARB5 cuts through stratigraphy in the 3.26-3.23 Ga lower Mapepe Formation of the Fig Tree Group in the Barite Valley Syncline. We provide core logs, details of the main lithologies sampled and present preliminary chemostratigraphic data. The core has a total length of 763 m and samples three major units with depth: siltstone, silicified volcaniclasics and laminated carbonaceous shales. The uppermost part of the stratigraphy consists of poorly preserved siltstone with some interbedded heavily weathered and variably silicified shale up to a core depth of 110 m. Heavily silicified volcaniclastic sediments, with interbedded cherts and sandstones underlie the siltstone for 150 m. The remaining 500m of core consists of interbedded shale, conglomerate, sandstone, breccias and minor chert bands at the base. An impact spherule layer occurs at the uppermost part of this zone accompanied by localized brecciation. Pyrite is common throughout the section as both discreet layers and disseminated grains. Forthcoming geological, geochemical and isotopic investigations with this core are expected to reveal key information about the nature of Archean sedimentary, biological and hydrothermal processes.