

DEPOSITIONAL ENVIRONMENTS OF THE MUDROCK AND COAL FACIES OF GWEMBE COAL FORMATION (LOWER PERMIAN), LOWER KAROO GROUP, MID-ZAMBEZI VALLEY, SOUTHERN ZAMBIA

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The Lower Permian Gwembe Coal Formation, is a succession of carbonaceous, silty mudstones and siltstones with interbedded coal seams and sandstones overlying the Siankondobo Sandstone Formation. The formation attains its maximum thickness, in excess of 280 m, in the Siankondobo coalfield area. It is overlain by the Late Permian Madumabisa Mudstone Formation, which is regarded as of lacustrine origin. Fourteen lithofacies recognised in the formation are grouped into four facies associations. The Maamba Sandstone facies association is probably a high-sinuosity meandering stream deposit. Accumulation of organic deposits (coal facies association) in the swamps was interrupted by deposition of channel, crevasse channel and splay, levee (Interseam Sandstone) and overbank fine deposits. One sandstone body (Sandstone A facies association) represents a change in fluvial style from proximal braided system to high-sinuosity meandering stream. The mudrock facies association is mainly overbank fine deposits with abundant concretionary siderite beds that were diagenetically precipitated. Two cycles are present in the Gwembe Coal Formation. The first cycle, which starts with the Maamba Sandstone facies association, began with a probable tectonic pulse that resulted in increased sediment supply through rejuvenated streams or as a result of isostatic rebound following glacial retreat. For the most part, this cycle consists of alternating units of silty mudstone and carbonaceous/coaly mudstone that progressively become silty towards the top, and these are best explained by periodic flooding. The second cycle starts with Sandstone A facies association and is dominated by thick silty mudstone (slightly carbonaceous) with intercalations of carbonaceous/coaly mudstones and upper coal seams alternating with sandstones B to E. These features can be best explained by (a) high sinuosity fluvial migration and avulsion, and (b) floodplain flooding and vertical accretion. The characteristic features of coarse siliciclastics facies in the Gwembe Coal such as the sandstones are well known, however, the characteristics of finer-grained facies are relatively known. This paper describes the sedimentological, petrographical and geochemical characteristics of the mudrock and coal facies in order to interpret their depositional environments.