

The Ticknall Borehole was drilled in 1995 to a depth of 209 m in order to investigate the succession on the Hathern Shelf, a fault-bounded structural province that lies on the southern margin of the Widmerpool Half-graben, part of a major early Carboniferous rift system. The borehole demonstrated a 'basement' of Upper Cambrian cleaved mudrocks, correlated with the Stockingford Shale Group. Unconformably overlying this is a basal Carboniferous unit, the Calke Abbey Sandstone Formation, of probable Visean (?Holkerian) age, comprising 82.34 m of fluvial sandstones and conglomerates, with interbedded red-grey palaeosols exhibiting highly distinctive 'pseudogley' fabrics indicative of emergent episodes. The unit may have been deposited in a localized, possibly fault-controlled basin and was in part sourced from the Precambrian volcanic terrain of Charnwood Forest. As rifting and subsidence proceeded, the encroachment of nearshore/peritidal environments is indicated at the top of the formation by interbedded calcilutites that have yielded marine faunas. Fully marine conditions were established during deposition of the overlying Peak Limestone Group, comprising the early Asbian Cloud Hill Dolostone Formation succeeded by the Ticknall Limestone Formation, of Brigantian age. Comparisons between the Ticknall Borehole and Peak Limestone strata exposed in quarries farther east, around Breedon, show major changes in water depths over a distance of only 4.5 km. Such variations can be reconciled with seismostratigraphical studies in the adjacent Widmerpool Half-graben, which show that sedimentation on the Hathern Shelf was in part controlled by movements along nearby rift-bounding faults.