

Pennine Upper Coal Measures Formation

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Pennine Upper Coal Measures Formation ([PUCM](#)), Carboniferous, Northern England Province

Pennine Upper Coal Measures Formation is part of the [Pennine Coal Measures Group](#)

Name

The formation has historically been referred to as the Upper Coal Measures, as defined by Stubblefield and Trotter (1957^[1]). The name was applied across Britain, despite different boundary definitions existing between England and Scotland (Browne et al., 1999^[2]). To distinguish the succession present within the Pennine Basin from that present within the Midland Valley of Scotland and the South Wales Basin, the formation has been renamed the Pennine Upper Coal Measures Formation.

Lithology

Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with coal seams, but no mudstones containing marine fossils are present. Beds with estheriids are common (Waters et al., 2009, figs. 13, 14^[3]). Coal seams are thin. In Yorkshire sandstones are common and mainly medium-grained.

Genetic interpretation

The deposits accumulated in a delta-top environment with large distributary channels, similar to that described for the Pennine Lower Coal Measures Formation (see Section 6.10.1). The sandstones are mainly derived from the south-east (Hallsworth and Chisholm, 2000^[4]; Chisholm and Hallsworth, 2005^[5]). The absence of marine bands indicates that marine incursions did not extend across the delta top.

Stratotype

The type area is the Potteries Coalfield, Stoke-on-Trent, North Staffordshire (SJ 50 90), where there are numerous borehole and shaft sections, but few exposures (Waters et al., 2009, fig.13^[3]).

Reference sections include: the base of the formation, from 5.3 m depth (the start of coring at the top of the borehole) to about 162 m depth at the top of the Cambriense Marine Band in the Parkhouse Colliery No.1 underground borehole (BGS Registration Number SJ85SW/19) (SJ 8396 5029), Stoke-on-Trent (Rees and Wilson, 1998^[6]); the base and lower part of the formation, from 200.25.m depth to the top of borehole (interpreted as the top of the Cambriense Marine Band to above the Great Row Coal) in the Holditch Quarry No.4 underground borehole (BGS Registration Number SJ84NW/30) (SJ 8392 4850), Stoke-on-Trent (Rees and Wilson, 1998^[6]); and the top and upper part of the formation, from about 317 m to faulting beneath the Great Row Coal at about 547 m depth in the Wolstanton Colliery No.3 Shaft (BGS Registration Number SJ84NE/29) (SJ 8606 4800), Stoke-on-Trent (Rees and Wilson, 1998^[6]).

Lower and upper boundaries

The base, as defined by Stubblefield and Trotter (1957^[1]), is taken at the top of the dark grey fissile mudstone with marine fossils of the Cambriense Marine Band (CAMB). In the Scottish Solway area the base of the Upper Coal Measures was formerly taken at the base of the Aegiranum (Skelton) Marine Band (AGMB) but is now proposed to be taken at the top of the Cambriense Marine Band to conform with the position elsewhere in the Pennine Basin.

The top of the formation is taken at the point in the conformable sequence where red or brown mudstones of primary origin, typically assigned to the Warwickshire Group, become predominant over the grey beds, or at the base of the sub-Permian unconformity.

Thickness

The formation is up to 350 m thick in the North Staffordshire (Potteries) Coalfield. Picken (1988, fig. 2^[2]) suggested a general thickness of up to about 650 m in the Canonbie Coalfield.

Distribution and regional correlation

Central and northern England and North Wales. The formation broadly equates with the Scottish Upper Coal Measures and South Wales Upper Coal Measures formations, although in the Midland Valley of Scotland the definition of the base differs from that of the Pennine Basin. This reflects the absence of the Cambriense Marine Band within the Midland Valley of Scotland.

Age and biostratigraphical characterisation

Bolsovian to Asturian (Westphalian D). The formation is characterised by the presence on nonmarine bivalves of the *Anthraconauta phillipsii* and *Anthraconauta tenuis* zones, of late Bolsovian and Asturian (Westphalian D) age, respectively.

Local notes

In the north-west of the Canonbie Coalfield (Figure.8, Column.10) the Upper Coal Measures, of *alluvial* ('*Barren Measures*') *facies*, were considered to rest unconformably on the Middle Coal Measures by Picken (1988^[2]), but on the evidence of seismic reflection and wireline logging

correlation this was not supported by Jones and Holliday (2006^[8]). The strata are late Bolsavian to Asturian (Westphalian D) in age and include a Tenuis Chronozone fauna with *Anthraconaia pruvosti*, and *Leaia bristolensis* (see Eastwood et al., 1968^[9]; Lumsden et al., 1967^[10]; Ramsbottom et al., 1978^[11]; Jones and Holliday, 2006^[8]). Over much of the west Cumbria Coalfield, strata from the Upper Similis–Pulchra Chronozone appear to be cut out below the base of the Whitehaven Sandstone Formation (Warwickshire Group) (Figure 14, Column 1).

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