

Although some early wells in the southern North Sea penetrated Late Carboniferous redbeds, these were usually assumed to represent reddening beneath the base Permian unconformity. The existence of a distinctive primary redbed succession became apparent only in the early 1980s, when improved seismic resolution allowed recognition of a characteristic acoustically transparent zone overlying the Coal Measures. Drilling of closures containing this seismic package led to the discovery of the first generation of gasfields reservoired in the so-called “Barren Red Measures” (Boulton, Ketch, Schooner).

Stratigraphical understanding of the Late Carboniferous red-beds has developed slowly and has been constrained by several interdependent factors. Extreme end-Carboniferous inversion and pre-Rotliegend denudation in most areas resulted in preservation of the younger Carboniferous succession in a few synclinal outliers. These are widely separated and they contain successions that were initially difficult to correlate. Most of the early well penetrations were lithostratigraphically ambiguous, gave poor or no palynological recovery, and did not penetrate enough of the underlying Coal Measures succession to identify any clear basal markers. As a result, early stratigraphical interpretations relied excessively on the succession in the UK onshore area, which itself was poorly understood, and proved in some ways to be an inappropriate reference section. Since 1990 the availability of more extensive offshore well data, coupled with improved understanding of the onshore succession, has allowed construction of a consistent regional lithostratigraphy. This was initially based on clay mineral assemblages and palaeoclimatic indicators, but has since been reinforced by heavy mineral provenance studies, better palynological results obtained by use of improved techniques, and the development of a robust regional chemostratigraphical correlation scheme.

Recent stratigraphical studies demonstrate that the current lithostratigraphical nomenclature is misleading at formation and member level ([Table 1](#)). A proposed revision that honours the tectono-stratigraphical units and is consistent with identified unconformities is shown in [Table 2](#), which also summarizes the principal features of the stratigraphical units.

The Ketch and Boulton formations are the deposits of fluvial and lacustrine systems that formed in the contemporaneously evolving Variscan foreland basin. The facies architecture resulted from the interaction of river systems derived from source areas both within and peripheral to the Variscan mountain belt, on which was superimposed a progressive change in climate and early diagenetic environment – from humid tropical in Late Westphalian C to a more arid in Westphalian D. A significant deformation and denudation event occurred during Westphalian C time, resulting in a marked angular unconformity and onlap at the base of the Ketch Formation. The possible presence of other local unconformities is consistent with the pattern in the UK on shore, where diachronous and localized deformation is linked to the evolution of individual structures.

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