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Depositional Environments of the Lower Cretaceous Cloverly Formation, Bighorn Basin, Wyoming

The Lower Cretaceous nonmarine Cloverly Formation in the Bighorn Basin of Northern Wyoming was deposited in a foreland basin east of a developing Sevier fold-thrust belt in eastern Idaho. It consists of a thick variegated siliceous and bentonitic mudstone sequence of possible playa origin (Little Sheep Mudstone Member of Moberly, 1960). This is interbedded with thin, laterally continuous quartz arenites and wackes deposited by eastward-flowing flashy ephemeral streams. At least four major fluvial channel complexes are present within the Cloverly Formation in the eastern and northern margins of the Bighorn Basin. The lowest is a basal Cloverly sequence of lenticular, dark chert-rich conglomerates or conglomeratic quartz arenites (Pryer Conglomerate Member of Moberly, 1960) which were derived from uplifted Paleozoic strata to the west and deposited as channel lag within low sinuosity channel systems. At a medial position within the Cloverly Formation is a series of lenticular channel sandstones. The sandstones are dark chert-bearing quartz arenites and were deposited by both high and low sinuosity, generally westward flowing, systems. A third channel sequence overlies the bentonitic (playa?) mudstone sequence and consists of bentonitic feldspathic and lithic wackes deposited by eastward-flowing low sinuosity fluvial complexes. This channel system is overlain by a fourth fluvial complex which together comprise Moberly's (1960) Himes Member. The fourth fluvial system is characterized by very well sorted quartz arenites and is informally referred to as the Greybull sandstone. It is a complex channel sequence of stratigraphically older, relatively thin meandering channel deposits and younger, thick (15m or more) Platte-type braided channel systems. This channel sequence, like the second fluvial complex, is characterized by westward-directed paleocurrent indicators.

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