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Stratigraphic Relationships Within the Middle Jurassic Gypsum Spring Formation (Bajocian and Bathonian), Bighorn Basin, Wyoming and Montana

The stratigraphic relationship between the Middle Jurassic Gypsum Spring and Piper Formations is examined in the Bighorn Basin of Wyoming and Montana. Previous authors have placed the Gypsum Spring Formation unconformably over the Triassic Chugwater Formation and under the Rierdon Formation. A thin, red shale unit, denoted as the Piper Formation, may occur between the Gypsum Spring and Rierdon Formations. Other authors place the Piper unconformably over the Chugwater Formation and unconformably beneath the Rierdon Formation with or without a section of Gypsum Spring between the Piper and Chugwater.

This study proposes to clarify the stratigraphic occurrence and significance of regional unconformities in the Middle Jurassic by examining the litho-, bio-, and sequence-stratigraphic relationships within the Middle Jurassic in the Bighorn Basin. The Piper and Gypsum Spring Formations are lithologically similar, share a comparable sequence of strata and both contain Middle Jurassic fauna. The initial study focuses on the lithofacies in the Gypsum Spring Formation along the eastern margin of the Bighorn Basin.

Based on outcrop and subsurface data, the Gypsum Spring Formation is divided into a lower anhydrite that is predominantly microcrystalline, and upper shales and carbonates containing red and green dolomitic, calcareous, sandy, or anhydritic shales interbedded with gray-black, and brown limestone and white-cream dolomite which are micritic and occasionally contain anhydrite. Lithofacies within the Gypsum Formation are laterally continuous although in places the gypsum/dolomite facies is completely replaced by a chert and limestone breccia that has been used to mark the regional unconformities in the Jurassic section.