Lodgepole Mounds And Turtle Structures In Montana And Western North Dakota

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ABSTRACT

Paleo-depositional maps indicate that broad areas of Montana and western North Dakota were favorable for the development of Waulsortian-type carbonate mounds during Early Mississippian (Lodgepole) Time. In addition to the oil-filled Lodgepole mounds near Dickinson, North Dakota, similar mounds have been found in a number of locations across Montana. Lodgepole mounds crop out in the Big Snowy Mountains of central Montana and in the Bridger Range near Bozeman. Lodgepole mounds have been imaged by seismic data in northern Montana's Blaine County and in northeastern Montana's Valley County, buried 4,000 and 7,000 ft deep, respectively. There are no commercially productive Lodgepole mounds in Montana but, the fact is, very few mounds have been drilled. In Blaine County, drilling has focused on commercial oil production from Jurassic Sawtooth strata in drape closures overlying Lodgepole mounds. One example is Weygand Field (CUM. 500,000 BO). Drape closures developed above the mounds because the mound-core facies were more resistant to compaction by overburden than the off-mound carbonaceous mud areas. A review of the Dickinson mounds indicates that total off-reef compaction can be up to one-half the mound height. The Sawtooth drape features can be up to 50 ft high and appear to reflect less than half the total compaction that occurred within the Lodgepole Formation. The mound-drape closures are clearly imaged by both 2D and 3Dseismic data. Even where the mounds themselves are not evident, their presence is unmistakable because of definitive drape features in the overlying strata. Some Lodgepole mounds are associated with underlying turtle structures (salt dissolution structures) suggesting that Lodgepole mounds could have developed anywhere throughout the Devonian Prairie Salt depositional basin in western North Dakota and northeastern Montana. The turtle structures created sea floor topographic highs that were the nuclei for the growth of Lodgepole mounds. Julie LeFever and others (1995) postulated that the Lodgepole Mounds at Dickinson were initiated by turtle structures that developed in the upper Bakken Formation. In northeastern Montana, Lodgepole mounds also appear to be coincident with turtle structures.