KARST BRECCIAS IN THE MADISON LIMESTONE (MISSISSIPPIAN), GARLAND FIELD, WYOMING

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Abstract

Garland field is an asymmetric anticlinal trap located in the north-central Big Horn basin, Wyoming. The field produces hydrocarbons from interlayered, fractured limestones and dolomites of the Madison Limestone (Mississippian). Significant karstification occurs in the form of field-wide intraformational breccias and locally developed cavernous porosity. Most breccias and caverns apparently formed during prolonged post-Madison exposure, prior to deposition of the overlying Darwin Sandstone.

Three types of karst breccia occur: (1) red, siltstone-matrix breccias, (2) clay-matrix breccias, and (3) dolomicrite-matrix breccias. Red, siltstone-matrix breccias occur in the upper 30 ft (9 m) of the Madison, and are related to the exposure event at the top-of-Madison unconformity. Clay-matrix breccias form a regionally correlatable layer which is about 50 ft (15 m) thick in the Garland field area. These breccias, which occur roughly 200 ft (60 m) below the top of the Madison, probably formed by evaporite dissolution and subsequent collapse. Dolomicrite-matrix breccias occur at the tops of shallowing-upward sequences at several levels within the Madison, and they apparently pre-date clay-matrix breccias. Dolomicrite-matrix breccias may have formed during periodic intraformational exposure events.

Introduction

Garland field is one of a number of anticlinal traps that produce hydrocarbons from the Madison Limestone (Mississippian) in the Big Horn basin, northwestern Wyoming (Figure 1). According to Peterson (1990), Garland is the fifth largest reservoir in the basin, with 160 MMBO (million barrels of oil) in place.