Pennsylvanian and Permian Systems of Southwestern Utah

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INTRODUCTION

Marine and non-marine Permian rocks crop out along the Hurricane Cliffs, and together with Pennsylvanian marine strata are exposed in the Beaver Dam Mountains; elsewhere in southwestern Utah the record of these systems is largely in subcrop. Rocks of these and other systems have been penetrated during drilling operations of various oil companies during the past tens of years in the area under consideration, but to date tests have been anything but promising for the Permo-Pennsylvanian sediments relating to oil and gas potential in a large part of southwestern Utah.

This discussion relates briefly to extent, correlation, and suggested environments of sedimentation for various formations of the Pennsylvania and Permian rocks in southwestern Utah, extending from the Beaver Dam Mountains on the west almost to the Kaiparowits Plateau on the east. Information concerning outcrops of the Pennsylvanian and Permian rocks in the Beaver Dam Mountains, and of some of the Permian of the Hurricane Cliffs can be obtained in the field. Data of subsurfaces is from available drilling records, and some of this is of questionable reliability. Furthermore, distance from one well to another, or from outcrop to a well, is great in some examples, such as 63 miles from the Hurricane Cliffs near Anderson Junction to the Lion Oil (Monsoant) Bryce No. 1. Obviously, it would be desirable to have more and better subsurface control in much of the area under consideration.

Relative geologic dating by means of paleontology is provided in some instances, such as outcrop sections; lithology and stratigraphic position must largely be relied upon for well-log data. Geologists obviously differ in the "tops" which they call in examination of cuttings and other subsurface information which relates to these Late Paleozoic rocks. I have attempted to be objective in the present evaluation of the well-log data, but am also realistic in anticipating differences of opinion where subjectivity is not without question.

STRATIGRAPHY

Pennsylvanian System

Callville Limestone — This name was proposed by Longwell (1921, p. 47) for approximately 1,100 feet of gray to black, dense, coarse granular limestone of Pennsylvanian age in the Muddy Mountains of Clark County, Nevada. Dobbin (1939, p. 124) noted that the Callville is 1,590 feet thick in the Beaver Dam Mountains of southwestern Utah, with the lower 150 feet consisting of calcareous sandstone, variegated shale, and thin limestone; seemingly this sequence is disconformable upon Upper Mississippian limestones. Reber (1932, p. 104) stated that the Callville in the Beaver Dam Mountains consists of as much as 1,560 feet of interbedded limestone, sandstone, and dolomite in thin to thick-bedded units. He assigned about 1,100 feet of limestone beneath the Callville to the Redwall, and considered the contact with the Mississippian to be gradational and conformable. McNair (1951, p. 520-523) called attention to Longwell's (1949, p. 930) notation that the Callville in the Muddy Mountains is at least 2,000 feet thick and probably contains some Permian strata; thus, McNair restricted the Callville Limestone to the Pennsylvanian below Permian dolomitic beds. His measured sections at Pakoon Ridge, North Grand Wash Cliffs, and Hurricane Cliffs (all in Mohave County, Arizona) contain an upper member of Virgilian age, and except for the Hurricane Cliffs section contain a lower member which he did not date. Later, McNair (1952, p. 46) indicated the Callville to be more than 1,500 feet thick in the Beaver Dam Mountains, and placed about 400 to 500 feet of uppermost dolomitic limestone in the Permian, likely the Pakoon. Brill (1963, p. 313-317) shows a measured section of the Callville limestone for the Beaver Dam Mountains that aggregates at least 1,000 feet. He indicates presence of these fusulinids: Millerella sp., Fusulinella lamarckii, Fusulina sp., and questionable Triticites sp. Presence of these forms indicates equivalency to at least the Morrowan, Derryan, Desmoinesian, possibly Missourian, and Virgilian. Brill also notes that at least 650 feet of Pakoon is present in these mountains. I have shown (Fig. 1) the Pakoon to aggregate about 300 feet in thickness, above 900 feet of Callville Limestone.

Callville Limestone is, therefore, a shelf or platform facies and can be recognized at Frenchman Mountain east of Las Vegas, in Shell Oil Company's "Bowl of Fire" well farther east, in the Muddy Mountains, at Azure Ridge and Pakoon Ridge, in the Virgin Mountains, and in the Beaver Dam Mountains (Bisell, 1962a, p. 206-207). Dobbin (1939, p. 142) indicates that the upper beds of the Callville were penetrated in the Esalanete No. 2 test (sec. 19, T. 43 S., R. 15 W.) of the Bloomington Dome, Washington County, Utah. Campbell (1952, p. 86-89) pointed out that on this same structure California Company drilled theGuidebook to the Geology of Southwestern Utah: Transition between Basin-Range and Colorado Plateau Provinces, 1963

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