positions of uncertainty, then many successes should settle the argument as a practical matter.

The author quotes from previous reports, some of them unpublished, to emphasize the "before and after" (case history) approach.

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April 4, 1966
WILLIAM W. MALLORY
U.S.G.S., Denver
"Pennsylvanian System in Wyoming"

Despite the fact that the stratigraphy of the Pennsylvanian System in Wyoming is essentially simple, the literature contains abundant differences of opinion which are puzzling to the geologist seeking an integrated, coherent concept. By returning to Darton's original definitions of the Tensleep and Amsden Formations and applying his criteria to surface and subsurface sections in central and western Wyoming, it is possible to defend, by sections and by thickness and facies maps of each significant unit, the following statements. The Amsden Formation is a tripartite lithologic unit. Its basal member, the Darwin Sandstone, has irregular limits and thickness but is widespread in the Wind River and Bighorn basins where it lies on a karst topographic surface developed on the Madison Limestone. A middle red shale has nearly constant thickness and lithology. An upper carbonate member is widespread in northwestern Wyoming but is lacking on the Pathfinder uplift (the most northerly of the Ancestral Rocky Mountain uplifts) and grades southward into the Fountain and Casper Formations. The Tensleep Sandstone everywhere overlies the Amsden.

Sources for the sand in the Darwin and Tensleep, either from the northwest as suggested by some, or from the Ancestral Rocky Mountains as alternately suggested, are discarded in favor of a widespread older Paleozoic sandstone in the Hudson Bay region which had been exposed to erosion in Pennsylvanian time.

The Darwin Sandstone, an ideal reservoir rock, is composed of exceptionally pure, well-sorted quartz sandstone. Production is currently obtained from the Tensleep in numerous anticlinal reservoirs; but may also yield from other types of traps. Facies-change belts, as in the gradation of the Tensleep into the Minnelusa, and that between the Casper, Fountain, and Morgan Formations, may have unsuspected possibilities.

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April 21, 1966
JOHN F. HARRIS, Consultant, Tulsa
"Dolomites: Their Stratigraphic and Structural Significance"

Previous work on fractures has shown that a relationship exists between their development and concentration and the local and regional structure upon which they occur. These areas of concentration can be illustrated through preparation of an isofracture map which shows maximum concentration to be in areas of highest rate of dip and/or strike change.

Field and subsurface work shows that tectonic dolomites have the same fabric relationship to local and regional structure and are related to fracture concentration areas on structure. These tectonic (secondary) dolomites constitute important oil reservoirs in the subsurface and include the Deep River field (26 million barrels) and the Scipio-Albion field (100 million barrels) of Michigan. Often, the crest of a structure may be barren (tight) while a major tectonic dolomite reservoir may be present on the shoulder or flanks of the structure.

Petrographic criteria are available to distinguish tectonic (secondary) dolomites from depositional dolomites. Once porosity due to the former tectonic cause is differentiated from the depositional fabric, considerable progress can be made in constructing the depositional fabric of an area in the search for stratigraphic traps. Depositional dolomites appear to be related to the crystal instability of aragonite and may in part be of facies significance (quiet water lagoonal facies). The increment concept of primary carbonate deposition illustrates lateral as well as vertical facies relationships. Oil traps related to these primary depositional changes include the Putnam fifeld of Oklahoma, the Hermosa (Aneth, etc.) production of the Paradox basin in Utah, the Mississippian production in North Dakota (Rival pool), Canada (Midale pool), and the Cottonwood (Permian) field of Wyoming.

Many other oil reservoirs related to both tectonic and depositional dolomitization and carbonate facies can be cited. Recognition of these two entirely different origins and occurrences of dolomite and related porosity is necessary for exploration purposes.