

17. TAYLOR COLE, geologist, University Lands, Midland: The Black Shale Basin of West Texas; A Preliminary Report.

The Black Shale basin of West Texas covers an area in excess of 21,000 square miles and includes the region from Terrell and Pecos counties eastward to Menard and Kimble counties. It extends from Real, Edwards, and Val Verde northward beyond Glasscock and Upton counties. This basin includes such local basins as the Midland basin, the Val Verde basin of Frank E. Lewis, the Sheffield channel, and the Kerr basin.

Reasons are given for the belief that the black shale sediments in this basin were derived from rocks south of this area.

The shale ranges in age from Bend (Lower Pennsylvanian) through Clear Fork (Middle Permian). The shale of the Midland basin has been divided into three distinct zones.

Pre-Cretaceous erosion has removed the overlapping Permian shale in the extreme southern portion of the area, leaving Pennsylvanian directly beneath the Trinity (basal Cretaceous).

The problem of stratigraphy is complicated by gradation and lack of diagnostic fossils with a short vertical range. There is a great divergence of opinion, derived from the study of well cuttings, as to correlative formational units.

18. FRANK E. LEWIS, consulting geologist, Midland: Stratigraphy of the Upper and Middle Permian of West Texas and Southeast New Mexico.

The stratigraphic phenomena of the Permian basin are related directly to gradation which may be classified as follows: (1) gradual gradation of clastics into marine beds basinward and (2) abrupt gradation of clastics and evaporites into reef limestone. Surface studies and subsurface work with stereograms and paleogeographic maps reveal that, as a result of this gradation, many of the various facies are time equivalents. A significant example of type (2) gradation is found in the Glass Mountains approximately five miles north of Iron Mountain. The clastics of the Word formation may be traced on the surface into the Vidrio limestone. Over a considerable area northeast of the Glass Mountains variable thicknesses of Vidrio limestone and underlying thick sandstones both grade into San Andres limestone over structurally high areas.

The appearance, subsequent movements and disappearance of a number of the structural features are placed in the Permian time scale. Recognized as major structures are the Val Verde basin, the Cerf basin and the Blackstone arch. The latter extends northward from southeastern Pecos County across the Sheffield channel and the Fort Stockton arch into the Sand Hills arch. The Central Basin platform was built over this feature. A perspective of the Permian basin in its entirety indicates that the Anadarko basin is an integral part of the larger basin on the south.

During San Andres time sands moved into the Midland basin by way of the Sheffield channel which connected with the Delaware and Cerf basins. It appears that the sands moving into the Delaware basin came from the west through Salt Flat, which is just west of the Delaware Mountains. Throughout all Permian time red clastics, which were derived from the northwest, northeast, and east, were deposited in the northern part of the basin, the dark sediments of southern origin forming in the south portion.

The presence of facies in the South Plains syncline and the Midland basin similar to those of Oklahoma led to the adoption of Oklahoma nomenclature in West Texas. It is used in part in this paper. The El Reno group with its basal sandstone, the San Angelo, is the red clastic time equivalent of the San Andres and its basal sandstone, the Glorieta. By subsurface correlations the Whitehorse group is traced to its surface outcrop, west of Carlsbad, and is tied into Lang's Chalk Bluff formation. To the south it is traced to the Glass Mountains, where it appears to be equivalent to the Gilliam formation. Sediments of volcanic origin are present in the Leonard, San Andres and their time equivalents, gradually disappearing to the north. They are also present in the Whitehorse in its southern development.

Unconformities are recognized as the best time markers because of the changing facies. By this means the base of the Permian is found near the middle of the Cisco, as described by Plummer and Moore, and at the base of the Wolfcamp and Abo. The unconformity at the base of the Leonard of the Glass Mountains is represented on the east rim of the basin by a change in sedimentation. A conglomerate, 300 feet below the base of the Word, appears to be equivalent to the base of the El Reno group, the San Andres and the Delaware Mountain formation. An unconformity exists at the base of the Whitehorse along the entire length of the east rim of the basin. In the Glass Mountains it appears to be represented by a hiatus at the base of the Gilliam. Eleven hundred feet below the top of the Delaware Mountain formation a break in deposition has been reported which may represent this unconformity. While the lower Castile was being deposited in the southwestern portion of the basin, a hiatus occurred in the remaining areas. An unconformity at the base of the upper Castile and the Quartermaster is indicated in several areas on the east rim of the basin by a conglomerate at the base of the latter.

19. W. D. ANDERSON and JAMES R. DAY, geologists, Amerada Petroleum Corporation, Midland: Monument Field, Lea County, New Mexico.

The Monument field is in east-central Lea County, southeastern New Mexico, and at the present time represents the northernmost producing area of the Hendrick-Jal-Cooper-Eunice trend of Winkler County, Texas, and Lea County, New Mexico. Regionally, the structure is closely related to this same trend, but is locally developed as a broad anticlinal fold in contrast to the rather narrow anticlinal ridges to the south. Production is from porous dolomitic limestone of Middle Permian age and is found at an average depth of 3,950 feet. A horizontal oil zone common to the field and approximately 150 feet in thickness is found between the subsea depths of minus 200 and a common water table of minus 350. Since the oil zone is horizontal and there is considerable structural relief, production is found through a stratigraphic range of several hundred feet. A definite relationship exists between structural position and productivity. Productive limits are defined off structure by the absence of porosity above the water table. Folding occurred at intervals during Middle and Upper Permian time, but the major movement was post-Rustler in age. Prior to July 1, 1938, a total of 473 wells, each on a 40-acre unit, had been drilled, and since the field was discovered early in 1935 it had produced under proration approximately 19,750,000 barrels of oil.