Published by
NEW MEXICO BUREAU OF MINES & MINERAL RESOURCES
A DIVISION OF NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY
1975

Prepared by
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
In cooperation with
NEW MEXICO STATE ENGINEER

RESOURCE MAP 4

EXHIBIT 6 B
Case 14478
MEDUITE SWD, INC

TEXT

This map was prepared to assist potential users of industrial and agricultural water in the general area of the Capitan reef located in southeastern New Mexico. It depicts the varying quality that may be available from aquifers in the Guadalupian Series of Permian age. Water containing relatively high concentrations of chloride ions (10,000 to more than 150,000 milligrams per litre) is found in rocks of the Guadalupian Series on the Northwest Shelf northwest of Hobbs, New Mexico, on the Central Basin platform, and in the Delaware basin. Conversely, water containing relatively low chloride-ion concentrations (less than 10,000 milligrams per litre) is associated with the Capitan aquifer, the San Andres Limestone, and the Artesia Group along the margins of the Delaware basin and at the north and south ends of the Central Basin platform. Fingers of the best quality of water extend into the Capitan aquifer to the north and east from the Guadalupe Mountains, New Mexico, and to the north away from the Glass Mountains, Texas.

The quality of ground water found in rocks of the Guadalupian Series in the western part of the Permian basin is controlled primarily by hydraulic conductivity of the aquifer and the proximity to the outcrop which is present in the western and southern part of the basin. Leaching of soluble minerals from the Guadalupian Series at the surface has enhanced the hydraulic conductivity where these rocks are exposed west of the Pecos River on the Northwestern shelf and in the Guadalupe Mountains. Fresh water enters the Guadalupian Series at outcrops in the Guadalupe, Delaware, Apache, and Glass Mountains, and at other exposures along the western and southern edges of the Permian basin. The fresh water has replaced saline water in the aquifer in amounts proportional to the hydraulic conductivity of the aquifers that have been developed by leaching of the strata. Relatively fresh water may be found resting upon saline water, as in the general case west of the Pecos River between Artesia and Carlsbad, or it may be encountered in situations where it is overlain and (or) surrounded by more saline water as, for example, in the vicinity of Carlsbad and in the San Andres Limestone and Grayburg Formation south of Hobbs, New Mexico. Throughout the area, water with a relatively low salinity can be found inter-fingering with water that is relatively high in salinity. This relationship has been shown to be a dependable qualitative indicator of the relative differences in hydraulic conductivity of the rocks.

The data were obtained from many sources including various exploration, production, and service companies within the petroleum industry and State and Federal agencies. The analyses represent samples of water collected over a period of approximately 45 years from 1926 to 1971 but are believed to accurately depict, on a regional basis, the water now present in the Permian (Guadalupian) age sedimentary rocks.

The two examples below illustrate use of the map. Water containing less than 5,000 milligrams per litre chloride is available near Carlsbad, in an arcuate strip parallel to the Capitan aquifer, and in narrow bands at either end of the Central Basin platform. By closer examination of the data points, the individual aquifers that would contain water of this quality can be identified from the plotted data points. On the other hand, an exploration for concentrated brines would be restricted to areas where the Guadalupian rocks are known to contain nearly saturated brines, as in the Delaware Mountain Group in eastern Loving County, Texas.

EXPLANATION

Position of Capitan aquifer — Approximate position of extreme shelfward edge; Approximate position of basinal edge

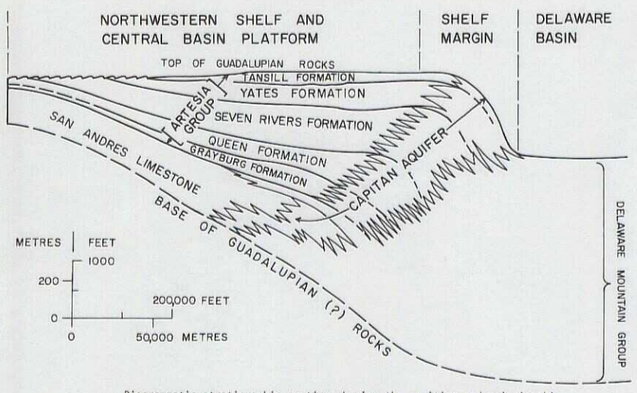
50 — Line of equal chloride-ion concentration, in thousands of milligrams per litre. Dashed where inferred. Based on lowest concentration shown or interpreted to be present. Within any area delineated by two lines, ground water having a chloride-ion concentration indicated by the line values is probably present in at least one water-bearing zone; ground water having a higher chloride-ion concentration than that indicated by the contour values is generally present also.

Stratigraphic code representing name of the formation from which water sample has been collected. The stratigraphic codes are listed in order of stratigraphic position, youngest first — Well penetrating rocks of Permian (Guadalupian) age

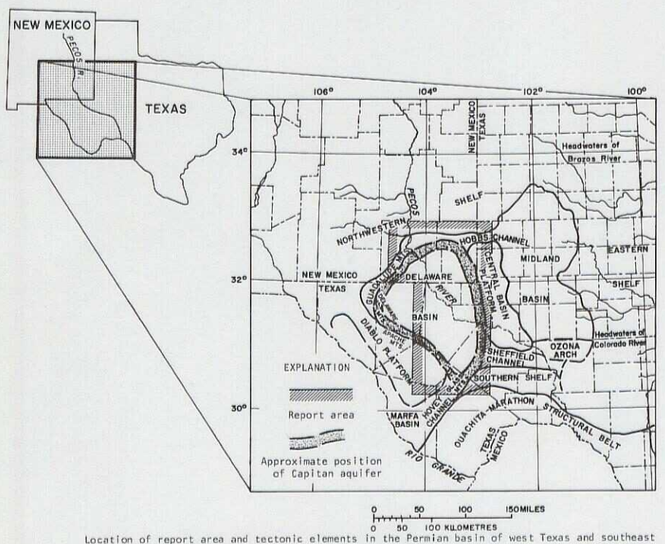
Example: CPAQ 7600 + 12,000 & DLWR 170,000 — Chloride-ion concentration in mg/l

Multiple sample taken from same formation

Code	Stratigraphic Codes: Name (all units are of Permian age)
CPAQ	Capitan aquifer
DLWR	Delaware Mountain Group
GBSA	Grayburg Formation-San Andres Limestone undivided
GRBG	Grayburg Formation
QUEN	Queen Formation
SADR	San Andres Limestone
SVRV	Seven Rivers Formation
TNSL	Tansill Formation
YTES	Yates Formation



Diagrammatic stratigraphic section showing the position and relationship of rocks of Guadalupian age in southeast New Mexico and west Texas



Location of report area and tectonic elements in the Permian basin of west Texas and southeast New Mexico (modified after fig. 7, Oriel, Meyers, and Crosby, 1967, West Texas Permian basin region, In McKee, E. D., and Oriel, S. S., eds., Paleotectonic investigations of the Permian System in the United States: U.S. Geological Survey Professional Paper 515, p. 17-60).

New Mexico base from U.S. Geological Survey, Branch of Oil and Gas Operations, Roswell 9 South 1 inch = 2 miles (1963). Texas base from Midland Map Co. BM-2 (1969), BM-3 (1966), BM-4 (1961), BM-11 (1956), BM-12 (1956), BM-13 (1961), BM-17 (1955), and BM-18 (1955) 1 inch = 5,000 feet, used with permission of Midland Map Co.

CHLORIDE-ION CONCENTRATION IN GROUND WATER IN PERMIAN GUADALUPIAN ROCKS, SOUTHEAST NEW MEXICO AND WEST TEXAS

by W. L. HISS