

Map of the area from the Service

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Geologic structure of Bueyeros carbon dioxide area,
Harding County, New Mexico

A preliminary map showing by contour lines the geologic structure of an area of about 225 square miles in Harding County, New Mexico, in the vicinity of Bueyeros post office, has been prepared by the Geological Survey, United States Department of the Interior. This map, on a scale of one inch to the mile, is the result of field investigations made during September and October 1938, by J. Charles Miller of the Geological Survey staff, assisted by Merle Q. Dannettell, for use in the administration of the mineral leasing laws. A copy may be obtained on application to the Director of the Geological Survey, Washington, D. C., or to the Supervisor, Oil and Gas Leasing Operations, P. O. Box 997, Roswell, New Mexico.

The map is of special economic interest at the present time because relatively pure carbon dioxide gas has been discovered by drilling the area and is being converted commercially to the liquid or solid form. The use of the solid form of carbon dioxide, commonly known as "dry ice," as a refrigerant is experiencing a gradual growth, and in regions where an abundant supply of by-product gas is not available the natural carbon dioxide affords a convenient and comparatively cheap source.

The exposed rocks of the area mapped are folded sedimentary beds ranging in age from Triassic to Upper Cretaceous. The Dakota sandstone forms the rim of the Canadian escarpment, which is 500 feet more or less in height and extends along the north and west margins of the area. The average altitude of the area is about 4,500 feet. The Dakota sandstone is overlain locally by Tertiary gravels or by lava flows. In the escarpment the Purgatoire formation of Lower Cretaceous age is exposed beneath the Dakota sandstone, and these strata are underlain successively by the Morrison formation of Upper Jurassic age and the Wingate sandstone of Jurassic(?) age. The Wingate is generally the lowest formation exposed in the escarpment. In the valleys south and east of the Canadian escarpment, which constitute the greater part of the area, beds of the Dockum group of Upper(?) Triassic age are at the surface, except in a few outliers

where these beds are overlain by the Wingate sandstone. The Dockum formation is 1,100 feet thick, as determined from the log of a well drilled in the SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 20 N., R. 31 E., although the formation boundaries are not sharply defined. From the log of this well it was concluded that the underlying Manzano group (Permian), which includes the Chupadera formation and Abo sandstone, is about 1,400 feet thick. Whether the well penetrated the pre-Cambrian granite or drilled into a bed of arkose is not definitely known.

All the wells now drilled start in beds of the Dockum group, and the carbon dioxide gas occurs within the lower part of this unit in the Santa Rosa(?) sandstone at depths of approximately 600 feet and 800 feet.

The rocks of the area are warped and locally folded into anticlines and synclines that interrupt the regional southeastward dip. A number of normal faults of small throw were mapped, and there are indications of other faults that were not mapped because their direction and displacement could not be determined definitely.

On the map the structure is shown by contour lines drawn at intervals of 25 feet on top of the massive Wingate sandstone. Solid lines are used where that formation is exposed, dashed lines where it is eroded and the structure is inferred.

One of the folds, the Kerlin anticline, and two of the plunging anticlines or anticlinal noses, the Gallagher and Mitchell anticlines, have been drilled. The resulting carbon dioxide wells were completed with initial productions ranging from 500,000 to 1,000,000 cubic feet a day. Gas from one of these wells analyzed 98.2 percent carbon dioxide. Three wells of smaller yield have been completed in the synclinal areas.

Three plants have been constructed, each having an estimated daily capacity of 5 tons of solid carbon dioxide. Liquid and solid carbon dioxide are transported by truck to points of consumption.