Memo. on geologic reconnaissance in vicinity of water well 5 miles south of Gallup, McKinley County, N. Mex.

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United States

Department of the Interior

Geological Survey

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In January, 1950, at the request of the Navajo Service, Bureau of Indian Affairs, the Geological Survey made a geologic reconnaissance of an area about 5 miles south of Gallup, McKinley County, New Mexico. The study was made for the purpose of determining whether the failing supply of a well in sec. 15, T. 14 N., R. 18 W., might be supplemented by deeper drilling. The well was dug to a depth of 35 feet, and later deepened by drilling to 60 feet. The well was begun in Recent alluvium, and finished in the Bartlett barren member of the Mesaverde formation of Upper Cretaceous age.

The rocks exposed at the surface near the well belong to the upper part of the Bartlett barren member of the Mesaverde formation, and consist of gray shale with gray sandstone locally interbedded. Most of the sandstone beds are not persistent, but wedge out or grade laterally into shale. A few thin beds of coal occur at various horizons. The Bartlett barren member is about 400 feet thick in the area. Where observed, the beds strike N.15°W. and dip 5°SW.

The Dilco coal member of the Mesaverde formation underlies the Bartlett barren member, and is lithologically similar except for the presence of much thicker coal seams. The thickness of the Dilco coal member is about 300 feet.

The basal member of the Mesaverde formation is the Gallup sandstone. In the area here described, the Gallup sandstone member consists of interbedded sandstone and shale, and is between 250 and 300 feet thick.

The thickness of alluvial fill exposed ranges from 25 to 30 feet in the walls of a wash about ½ mile north of the well site. The alluvium is predominantly clay and silt but contains a few lenses of fine-grained sand. The arroyo is eroded below the base of the fill and into the upper part of the Bartlett barren member. The erosion of the stream channel has lowered the water table in the area and contributed substantially to the failure of the water supply in the well.

The fine-grained texture of the alluvial fill and the fact that the wash has cut below the base of unconsolidated material, make it unlikely that any other wells attempting to obtain water from the alluvium in the area, would be successful.

The lenticularity and irregular distribution of the sandstone beds within both the Bartlett barren and the Dilco coal members of the Mesaverde formation, make it difficult to predict the success of a well drilled into those members, or to anticipate the subsurface rock sequence at any locality. A stratigraphic section 335 feet thick was studied in the area. Projection of the section down dip toward the well site indicates a subsurface sequence as follows:

Material	Thickness (feet)	Depth (feet)
Quaternary		
Recent		
Alluvial fill	15	15
Cretaceous		
Bartlett barren member of Mesaverde formation		
Sandstone	10	25
Shale	30	55
Sandstone	15	70
Shale	150	220
Sandstone	10	230
Shale	75	305
Sandstone	30	335

It is thought that the Gallup sandstone member of the Mesaverde is the only dependable aquifer in the area. It is estimated that the top of the member lies between 550 and 700 feet below the land surface at the well.

Water in the sandstone beds of the Bartlett barren and Dilco coal members of the Mesaverde formation in this region is usually fairly highly mineralized, although soft. Water in the Gallup sandstone member is expected to be of better quality than in the overlying beds, although analyses of water from wells near Gallup show it to be somewhat hard.

It is concluded that if the well were drilled through the Gallup sandstone member an adequate supply of water suitable in quality for domestic and stock use could be developed. It is possible that sufficient water to supply the demand could be obtained at shallower depths.