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CHA CHA GALLUP

Producing sandstone of the Cha Cha Gallup Oil Pool are the result of the transition of the regressive Carlile Seas, leaving the Gallup sandstones and the transgressive Niobrara Seas. The advancing seas caused truncation of the Gallup and deposition of new sands, silts and muds. The lower sands are cleaner and generally thought to be offshore bars deposited by currents parallel to the shore line. These basal Niobrara sandstones are oil bearing as are some of the cleaner Gallup sandstones.

The entire complex of upper Carlile-lower Niobrara sandstones has been known as "the Gallup" since the late nineteen fifties when production began along the Bisti-Hourseshoe Canyon trend.

Several of the basal Niobrara sandstones are present in the Cha Cha Gallup Pool.

These sandstones have been described as follows:

> Light-gray to gray-brown, fine to coarse grained quartz sandstone with minor chert, feldspar and rock fragments. Traces of glauconite and mica are present. Cement is primarily calcite with some secondary quartz. There is porosity present and oil staining is evident.

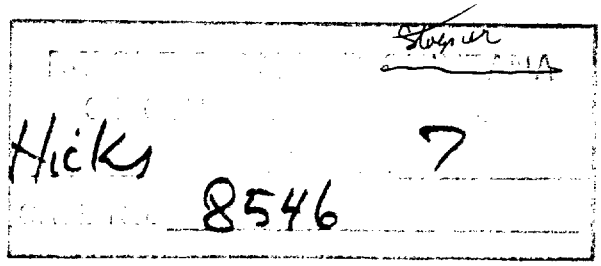
DRINKING WATER SOURCES

Considerable effort was made to obtain chemical analyses of the water bearing rocks in Township 28 North, Range 13 West, San Juan County, N.M. These efforts failed but analyses were observed of waters taken from sources outside the township which had similar ages and depositional histories.

The analyses showed the following:

1. There is no known source of potable* water immediately below the Cha Cha Gallup producing zones.

2. The only potable water aquifers found above the injection zones (Cha Cha Gallup) are:
   a. the Cretaceous Kirtland (Farmington Sandstone) at depths of 630-815' in section 21. (This information obtained from Ed Welder, U.S.G.S., Albuquerque.



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DRINKING WATER SOURCES cont.

b. the Ojo Alamo (Tertiary Period) has water with very low solids (350-850 mg/l). This is found to a depth of 350-450' in the area of interest.

*All references herein to potable or drinking water are based on dissolved solids of 10,000 mg/l or less as found in item VIII of Application for Authorization to Inject.