WELLOG ENGINEERING COMPANY, INC.
Box 339
Elk City, Oklahoma

HUMBLE OIL & REFINING COMPANY

February 11, 196

Re: Formation Analysis
No. 1 Navajo H
San Juan County, New Mexico
Sec 4-31N-18W
W I L D C A T

Gentlemen:

Presented on the following log are data compiled from the examination and analysis of well cuttings at the No. 1 Navajo H, San Juan County, New Mexico. Logging of the cuttings began at a depth of 5600' and continued to a total depth of 8230'.

The data compiled and shown on this log are as follows:

1. Mud Characteristics

2. Bit Record

3. Drilling rate curve, plotted so that on fast drilling, the curve approaches theleft margin of the log (same as SP curve on Schlumberger log).

4. Gas readings from the drilling mud, are plotted on the left side of the porosity column. As the readings increase, the curve approaches the left side of thelog. These readings are obtained in the following manner: A high voltage (2.2) volts applied to the detector filament creates enough heat to cause catalytic combustion of all hydrocarbon gases. The low voltage (1.2) volts applied creates enough heat to burn catalytically all hydrocarbon gases except methane. This data has been plotted in the following pattern: The high voltage data as a "Total Combustion Gas" curve, indicated by a series of dots (...). The low voltage data is plotted as a "Gas Other Than Methane" curve, indicated by a series of dashes (---).

5. Porosity curve, which is plotted as trace, fair, good or excellent.

6. Depth

7. Lithology, this is a percentage log.

8. Leached residual oil units (oil cut). The data for this curve is secured by applying a rapid drying solvent, either carbon tetrachloride or ether to the drill cuttings and evaluating the residual liquid hydrocarbons collected on the color reaction plate.

9. Gas readings from cuttings are plotted on the right side of the oil column. The high gas readings approach the right side of the log. This gas curve is obtained in exactly the same manner as the readings from the drilling mud, (See No. 4).

10. The percentage of sample showing oil fluorescence when examined under a special ultra violet light. This excludes, as far as is possible, all natural mineral fluorescence.

The following is a brief resume of the shows encountered on the No. 1 Navajo H, San Juan County, New Mexico.

The cuttings indicated that from 5600' to 6110' was predominately a red silty shale, with small percentages of a calcareous sandstone and traces of white pure (chalky) limestone. There were slight gas shows in the mud and cuttings intermittently throughout this section which is a characteristic of the shale.

The upper Hermosa was topped at 6110' according to the cuttings but was found at 6060' by electric logs. The top of the Hermosa was a white finely crystalline limestone which graded back into a red sandy slightly calcareous shale. This gradation occured throughout this section which is characteristic of the Hermosa throughout the basin. The gas in the cuttings as well as the mud would increase as these shale bodies were drilled through and decrease as the limestones were exposed.

One zone in this formation was of particular interest. This was at 6330' to 6350'. The cuttings showed 20% white to tan fine crystalline limestone and 80% varicolored shale. 40 units of gas was indicated in the mud and there was a slight oil cut in the limestone. The company geologist was notified but it was decided that the porosity was too poor to credit a drill stem test. The drilling rate averaged 45 minutes a foot in this section.

The Paradox was found at 7080' according to the cuttings and at 7045' on the electric logs. The top of this formation was white granular anhydrite. This anhydrite effected the viscosity and water loss of the mud to some extent. Within a matter of 2 hrs the viscosity ranged from 49 to 144 while the water-loss went from 8 to 19.

At the same time the increase in anhydrite was noticed, a tan fine fcrystalline dense dolomite was topped thus, the top of the Paradox was found as 50% anhydrite 20% dolomite and 30% shale. A gas of 45 units was released in the mud as the dolomite was drilled. When the dolomite reached 100% of the cuttings the nó. 1 and no. 2 core was cut along with DST No. 1.

Core No. 1 was from 7161' to 7192' of which 27' was recovered. The results of the core was: 7111' to 7172', dark gray very shaly dolomite with some odor and no porosity. 7172' to 7176' a black carbonaceous shale. 7176' to 7192' a tan finely crystalline dolomite with traces of porosity.

Core No. 2 was from 7192' to 7220' with full recovery. 7192' to 7195' dark gray very fine crystalline dense limestone, 7195' to 7196' black carbonaceous shale, 7196' to 7202', dark gray very fine crystalline dense limestone, 7202' to 7206' medium to coarse crystalline anhydrite with a trace of porosity. 7203' to 7204', gray anhydrite with some fluorescence interbedded with carbonaceous shale, 7206' to 7209' black carbonaceous shale, 7209' to 7221' large arkosic inclusions in black shale.

The above cored zone was then subjected to DST No. 1 with the following results: 7155' to 7220' tool open with weak blow and continued throughout test. Recovered 180' muddy water, 2620' slight gas cut salt water, 4300' free gas in drill pipe. Chloride in test 170,000 ppm. Chloride in ditch 8200 ppm. IHMP 3828, IFP 245, FFP 1437, ISI 15 min, FSI 30 min, CIP 3255, 2528 FSI, FHMP 3826, tool open 4½ hrs.

DST No. 2 was conducted at 7396' to 7420'. Tool open 17 min with few bubbles to surface and died. Recovered 30' drilling mud. Chloride in test 8600 ppm, in ditch 8100 ppm. IHMP 3950, IFP 15, FFP 15, FHMP 15, SIP 15, FSIP 30.

This zone in which the above test was made showed a trace of porosity. A fair oil cut also was encountered and the zone was predominately dolomite. Gas in the mud averaged 40 units. Drilling continued through alternating beds of white fine crystalline limestone, fine crystalline dolomite and varigated shales.

DST No. 3 was taken at 7538' to 7677' in the lower paradox. Tool open 5½ hr, weak blow throughout test. Recovered 130' sulphur and gas cut mud. IHMP 4178', IFP 62, FFP 122, ISI 30 min, CIP 635, FHMP 4178. After test much gas from the test zone was recorded in the mud. Much of the gas was identified as hydrogen sulfide.

An influx of white chert slowed drilling operations from 7900' to 7980' and traces of chert appeared off and on in the cuttings until total depth.

The Molas was topped at 7970' with a thin bed of dolomite consisting of black carbonaceous shale interbedded with limestone and thin stringers of chert.

The Leadville was topped at 8090' consisting of brown fine to medium crystalline dolomite which displayed fair to good porosity. This dolomite was interbedded with white limestone. The Leadville (Madison) was tested as follows:

DST No. 4 8120' to 8230' Tool open 3 hr 45 min, with a fair blow. Gas cut mud to surface in two hours, five minutes, heavily gas cut salt water to surface in 2 hr 25 min. Gas too small to measure. Flowed 13.36 bbls per hr. Reserve 60 bbls, IHMP 4433, IFP 752, FFP 3733, ISI 15 min, FSI 30 min, FSIP 3955, FHMP 4433. The tested zone was a fine to medium brown crystalline dolomite with fair porosity interbedded with a white to creamy limestone. No gas was recorded in the mud or cuttings.

TD 8230'.

In our opinion, there were no shows of commercial value encountered.

OPERATIONS	HOURS	MINUTES	PERCENTAGE
Drilling	287	16	41.9
Drill Stem Test	61	08	9.0
Fishing	74	57	13.0
Circulating	9	38	1.2
Coring	23	17	4.2
Conditioning Mud	10	19	2.6
Connections	7	12	.7
Trip (Round Trip)	183	11	27.6
Rig Repairs	14	49	1.9
Pump Repairs	17	12	3.2
Straight Hole Test	4	14	.4
TOTAL	692		100.0

We wish to express our thanks for the cooperation and consideration we received while on this well. We hope we have satisfied your needs and hope to be of service to you in the very near future.

Sincerely yours,

J. D. Tilley

WELLOG ENGINEERING COMPANY, INC.
J. D. Tilley, President
John Cantrell, Geologist

JC:bm

Distribution of logs as follows:

(4) Humble Oil & Refining Company, Box 1600, Midland, Texas Att: Mr. B.L. Beckman
(2) Humble Oil & Refining Company, Box 1287, Roswell, New Mexico
Att: Mr. W. G. McCampbell, Jr.
(2) Humble Oil & Refining Company, Box 2347, Hobbs, New Mexico
Att: Mr. Jim Whitten
(2) V.S.G.S., 208 B West Main, Farmington, New Mexico
(1) Oil & Gas Conservation Comm., 1000 Rio Brazos Road, Aztec, New Mexico
(2) Tidewater Oil Co., 1478 Main Street, Durango, Colorado, Att: Bill Slard.