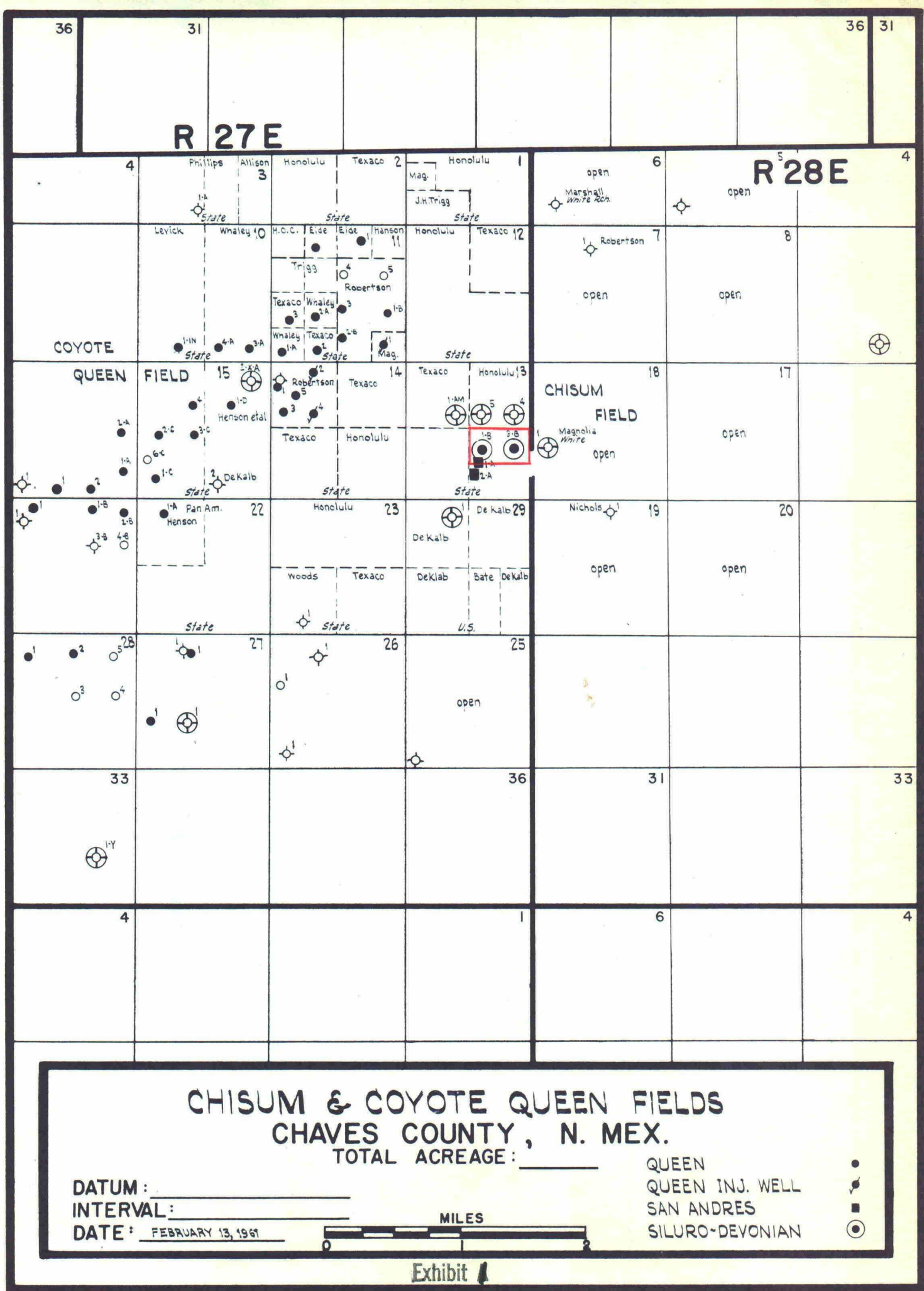


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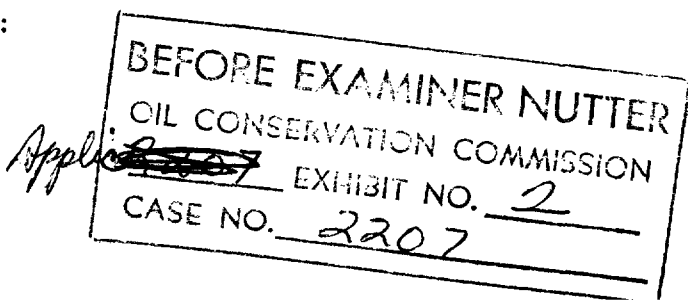
CHISUM TESTIMONY

This is an application by Honolulu Oil Corporation for authorization to conduct a pressure maintenance project by the injection of water into the Devonian producing formation underlying the Honolulu - State "B" Lease in the Chisum Oil Pool, Section 13, T-11-S, R-27-E, Chaves County, New Mexico. This Honolulu - State "B" Lease covers all of Chisum Oil Pool. The producing wells in this Pool are the Honolulu - State "B" Nos. 1 and 3.

Following is a brief history of this field. The discovery well was the Honolulu - State "B" No. 1 located 1980' from the South and East lines of Section 13, T-11-S, R-27-E, Chaves County, New Mexico. This well was completed February 20, 1950, for a flowing potential of 170 barrels of clean 40.5° gravity oil in twenty-four hours. The well was originally drilled to a total depth of 6,933 feet in granite. The surface string of 13-3/8" casing had been set at 440' and cemented to surface with 500 sax cement. The intermediate string of 9-5/8" casing had been set at 1,866' and cemented with 500 sax cement. Top of cement behind the pipe is at 860'. At total depth of 6,933', the well was plugged back to 6,563'. The 7" production casing was set at 6,490' and cemented in three stages. First stage was 500 sax cement from 6,490' back to 4,514'. The second stage was 400 sax cement from 4,235' to 2,760'. The third stage was from 390 sax of cement from 2,590' to surface. The producing interval is in the open hole between 6,490' and 6,563'. The well was reacidized with 8,000 gallons on June 22, 1950 and repotentialied for 498 barrels clean oil in 24 hours, flowing.

The only other producing well in the field is the Honolulu - State "B" No. 3 located 1980' from South line and 660' from the East line of Section 13, This well has 13-3/8" surface casing set at 448' and cemented to surface with 785 sax cement. An intermediate string of 8-5/8" casing was set at 2,190' and cemented with 200 sax cement. The well was drilled and cored to a depth of 6,556'. The producing string of 5-1/2" casing was set at 6,499' and cemented with 500 sax cement. After 10,500 gallons acid treatment of the open hole between 6,499' and 6,556', the well potentialied for 882 barrels of clean oil in 12 hours, flowing, Gas-oil ratio was 79 cubic feet per barrel.

There have been 6 dry holes drilled to the Devonian formation in the area of the Chisum Oil Pool. These are:



Honolulu - State "B" No. 4 - located 1980' from the North line and 660' from the East line of Section 13;

Honolulu - State "B" No. 5 - located 1980' from North line and 1880' from East line of Section 13;

Magnolia - White No. 1 - located 1980' from South and 660' from West lines of Section 18, T-11-S, R-28-E;

Texas Co. - State No. 1-AM - located 1980' from the North and West lines of Section 13;

DeKalb - State No. 2-X-A - located 660' from the North and East lines of Section 15, T-11-S, R-27-E;

Honolulu - Federal-Hinkle No. 1 - located 660' from North and 1980' from West lines of Section 24.

As Honolulu's Exhibit No. 1, we offer a plat showing the area surrounding the proposed project area for a distance of two or more miles. This plat shows the lease ownership, lease name, and well locations. As shown on the legend, the solid circles are Queen sand producing wells in the Coyote Queen Oil Pool. The formation produces from a depth of about 1,200'. The solid squares are producing wells in the Chisum (San Andres) Oil Pool. The two concentric circles designate wells to the Devonian. The solid circles with a diagonal line through them indicate water injection wells in the Queen sand formation in the Coyote Queen Pool. The proposed project area is outlined in red, being the N/2 of the SE/4 of Section 13.

Honolulu's Exhibit No. 2 is a copy of the electric log and gamma ray log of Well No. 3, the proposed injection well. As shown on the log, the top of the Devonian formation is at 6,496'. The Microlog indicates porosity between 6,500' and the total depth of 6,556'. It is proposed to inject water into this interval between the bottom of the 5-1/2" casing at 6,499' and the total depth of 6,556'. There was one core taken in this well from 6,512' and 6,553'. This recovery was 100% crystalline dolomite with some vuggy porosity and an extensive fracture system. The core analysis gave 22.2% porosity, average permeability of 14 millidarcys with a range of from less than 0.1 md. to 59 md. The analysis also gives a residual oil saturation of 32.7% and a connate water content of 27%.

Honolulu's Exhibit No. 3 is a contour map of the Chisum Pool and the area around it. The contours are based on the top of the Devonian of all wells in the area. The subsea datum of the Devonian is shown for all wells. Contour interval is twenty feet. Except for Honolulu Wells Nos. 1 and 3, the other wells shown tested only water in the Devonian. This contour map shows an asymmetrical anticline with the apex of the structure to be the small area around Honolulu Well No. 1 with a rapid drop to the North, East, and South and a more gentle dip to the West. The contour map also shows Honolulu Well No. 3 to be on the extreme Eastern edge of the probable producing area of the Chisum Pool. This map indicates that the project area as proposed will include all of the oil productive area of the Chisum Pool. The two dotted lines on the Map A-A' and B-B' are the lines of two cross-sections which will be Honolulu's Exhibits Nos. 4 and 5.

Honolulu's Exhibit No. 4 is a cross-section A-A' roughly NW-SE along the apex of the Chisum Pool structure. From NW to SE the wells are as follows: Texaco - State No. 1-AM, Honolulu - State "B" No. 1, Honolulu - State "B" No. 3, and Magnolia - White No. 1. The cross-section is made from portions of electric logs and radioactive logs of the above named wells. The dotted line is the top of the Devonian formation as shown on the logs. The drill stem test intervals on each well are shown on the logs. Below each well log are shown the drill stem test intervals, length of time of each test, and fluid recovery on each test. As the tests show, only the Honolulu wells recovered any oil or gas without sulfur water. The Texaco - State well recovered 1,270' of mud cut oil and 840' of oil and gas cut sulfur water approximately 70' below the top of the Devonian. However, samples did not indicate any porosity for the accumulation of oil above the depth where this test was taken. The test shown was taken in the first porosity encountered in the Devonian. This cross-section also shows the relatively steep Easterly dip of the structure from the Honolulu Well No. 3 to the Magnolia - White No. 1. This cross-section also indicates that the area drained ^{by the} two Honolulu wells includes all of the Chisum Pool. It also indicates that Well No. 3 is 8' lower structurally than Well No. 1.

Honolulu's Exhibit No. 5 is a North-South cross-section of the Chisum Pool through the line B-B' shown on Exhibit No. 3. The crosssection goes through the following wells: Honolulu - State "B" No. 5, Honolulu - State

"B" No. 1 and Honolulu - Federal-Hinkle No. 1.

The dotted line shown on the cross-section is the top of the Devonian formation as determined from the electric and radioactive logs. As on the previous Exhibit, the drill stem tests on each well are shown. As indicated by the tests, the only well showing commercial production is the Honolulu - State "B" No. 1. This Exhibit also shows the rapid dip in the structure both to the North and to the South from the State "B" No. 1.

Honolulu's Exhibit No. 6 is graph of the reservoir performance data for the two wells in the Chisum Pool. This graph is a plot of the reservoir pressure against time. The original pressure was 2650 psi taken in March, 1950 after completion of the discovery well. There are three other pressure points on the curve. These show the bottom hole pressure of 2600 psi in June, 1950; 2578 psi in August, 1950; 2552 psi in February, 1951; and 2425 psi in January, 1961. This curve represents our interpretation of the pressure performance in this pool. The first four pressure determinations were made during the flowing life of the field, which lasted less than one year. After installation of pumping equipment, no pressure determinations were made until January, 1961. As the graph shows, there has been a relatively small pressure decline during the last ten years compared to the first year of production.

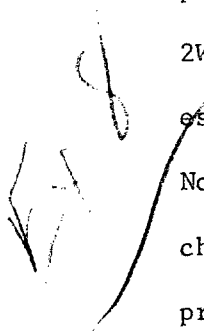
This reservoir pressure curve indicates an active water drive reservoir. Since there has been a decline in pressure under present withdrawal rates, this decline indicates that the water drive is not sufficient to completely replace reservoir fluid withdrawals. We anticipate a more rapid decline in pressure under planned increased withdrawal rates if there is no program of pressure maintenance. We believe the natural water drive to be sufficiently active to maintain the present reservoir pressure if it is aided by returning the produced water to the reservoir.

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Honolulu's Exhibit No. 7 is a graph of oil production rate versus time. There are three curves on this Exhibit. Curve No. 1 shows the actual oil production rate of the Chisum Pool up to the year 1960. Early in 1960, the lease was electrified and larger pumps were installed. The dashed line portion of Curve No. 1 is the anticipated decline rate of production if the electricity and larger pumps had not been installed. The electrification and installation resulted in the increased production rate shown by the point on Curve No. 2. Curve No. 2 shows the anticipated decline rate resulting from the equipment change. Curve No. 2 parallels the decline rate established by

Curve No. 1 to the economic limit of 20 barrels per day or 600 barrels per month.

The point at the beginning of Curve No. 3 is the anticipated production rate for 1961 provided the Commission approves this pressure maintenance project. The dashed line is parallel to Curve No. 1 and represents the anticipated oil production rate under this proposed program to the economic limit. This curve indicates an approximate extension of seven years to the producing life of the field. The anticipated oil producing rate at the economic limit of this pool is 20 barrels per day, at which rate we expect to be producing 98% water.

Honolulu's Exhibit No. 8 is a plot of the oil production rate versus cumulative oil production. The three curves correspond to the same numbered curves on Exhibit No. 7. Projection of these curves to the economic limit show that the equipment change in 1960 increased the ultimate recovery approximately 40,000 barrels over the previous anticipated recovery. Curve No. 3 shows that an anticipated additional 205,000 barrels of oil will be recovered under the proposed pressure maintenance program.

The curves in the upper portion of the Exhibit numbered 1W, 2W, and 3W are water production curves corresponding to the numbered oil production curves. This water production is expressed in per cent of total fluid production as shown on the right hand margin of the Exhibit. Curves Nos. 2W and 3W are estimates only as the water production trend has not been established at the anticipated production rates for the two wells. Curve No. 1W is the composite overall trend established for both wells. The change in slope of Curve No. 2W is estimated on the basis of the higher producing rate from Well No. 1 during 1960. The current water per cent of Well No. 1 is 75% and of Well No. 3 95%. An increase in production ^{from Well No. 1} would lower the overall produced water percentage.

Curve No. 3W is the anticipated water cut trend under the proposed pressure maintenance program. Under this program, all fluid withdrawals would be from Well No. 1, and the initial water cut would be that of the current water per cent production from Well No. 1. The slope of this curve can only be estimated at this time, but due to the higher structural position of Well No. 1 compared to Well No. 3, the water production should not increase as fast as the combined water production from the two wells. The water production at the economic limit of production under this proposed program is estimated to be 98% of total production.

Honolulu's Exhibit No. 9 is a water analysis of water produced from the State "B" No. 1 Well during normal pumping operations. This sample was analysed by the Western Company.

Read Analysis.

From this analysis it can be seen that the formation water being produced by Well No. 1 is only mildly corrosive as evidenced by the neutral PH of 7, the relatively low sodium chloride content, and the very low hydrogen sulphide content. Because of the extremely mild corrosiveness, no equipment corrosion problems are anticipated in the proposed injection of this water into Well No. 3.

Honolulu's Exhibit No. 10 is an outline of proposed rules for the operation of this project if this application is granted by the Commission.

Read rules.

As shown by these rules, Honolulu is not requesting any unusual orders or special treatment for the operation of this project. The reason for requesting that Well No. 3 be converted into an injection well is that all other wells drilled to the Devonian in this reservoir have been plugged and abandoned at least ten years ago. It would be prohibitively expensive to clean out one of these old holes, run the necessary casing and tubing, lay the necessary water lines, and do all things necessary to prepare the well for water injection. The Well No. 3 has reached the point where it will no longer be possible to produce this well economically. During the month of December, 1960, production from Well No. 3 averaged 8 barrels of oil per day or 5% oil and 150 barrels of water per day, or 95% water. Honolulu is requesting that only the normal unit allowable be assigned each well and that permission be granted to transfer the normal unit allowable from Well No. 3 to Well No. 1. Also, if Well No. 1 cannot make this project allowable at any time, the allowable shall be assigned on the basis of production tests.

The solution gas-oil ratio of this reservoir under original conditions was only 88 cubic feet of gas per barrel of stock tank oil. The bubble point pressure is 244 psig at the reservoir temperature of 131° F. These figures indicate that the producing gas-oil is too small to accurately measure by normal procedures. Therefore, we request that the project be exempt from gas-oil ratio tests. The above reservoir data were obtained from two bottom hole samples taken on April 27, 1950 at a depth of 6,435' in Well No. 1.

Conclusions

Based on the previous testimony the following conclusion have been made by Honolulu Oil Corporation.

1. Due to the nature of the reservoir and reservoir rock, it is felt that injection of produced water to be the best method of maintaining reservoir pressure.

2. Although there is an active water drive present in this reservoir, it is not active enough to fully maintain the present reservoir pressure. However, it is thought that by the injection of the produced water that this pressure can be maintained at about its present level.

3. As shown above by the Exhibits, an anticipated increase in ultimate recovery is expected if this project is approved. This increased recovery will amount to approximately 205,000 barrels of oil over and above the anticipated recovery under present producing methods. This will result in recovery of oil that would otherwise be left in the ground and will result in increased revenue to the State of New Mexico since this is a State lease.

4. The approval of this project by the Commission will not adversely affect any other operator or royalty owner in the Chisum Pool, since there are only two wells in this Pool, both operated by Honolulu, and only one royalty owner, the State of New Mexico.

SCHLUMBERGER

WELL SURVEYING CORPORATION

Location of Well

Sec. 15, T-11-S,
R-27E, 1980' fr B/L,
660' fr B/L

Elevation: D.F. 3757
K.S.
or G.L.

COMPANY: HONOLULU OIL CORP.

WELL: STATE #3

FIELD: WILDCAT

LOCATION: S-13, T-11-S

R - 27E

COUNTY: CHAVES

STATE: NEW MEXICO

FILING No.

COUNTY: CHAVES
FIELD OR
LOCATION: S-13, T-11-S, R - 27E
WELL: State #3
COMPANY: HONOLULU OIL CORP. 1980

RUN NO.	1				
Date	6-2-50				
First Reading	6557-6557				
Last Reading	2192-0				
Footage Measured	4365-6557				
Csg Shoe Schlum.	2192				
Csg Shoe Driller	2190				
Max. Depth Reached	6560				
Bottom Driller	6553				
Depth Datum	11' above G.L.				
Mud Nature	200gal				
" Density	10.5				
" Viscosity	45				
" Resistivity	.06 @ 65°F	@ 65°F	@ 65°F	@ 65°F	@ 65°F
" Resistivity BMT	.03 @ 133°F	@ 133°F	@ 133°F	@ 133°F	@ 133°F
" pH	@ °F	@ °F	@ °F	@ °F	@ °F
" Water Loss	10 CC 30 Min.	CC/30 Min.	CC/30 Min.	CC/30 Min.	CC/30 Min.
Maximum Temp. °F	133				
Bit Size	7 7/8 to 6 1/2, 4 3/4 - 6560				
Spacings - AM	10'				
AO	32" IS				
AO	19'				
E.S. Rig Time	6 hrs.				
Truck No.	303				
Recorded By	Hamilton				
Witnessed By					

Exhibit 2

LARGE FORMAT
EXHIBIT HAS
BEEN REMOVED
AND IS LOCATED
IN THE NEXT FILE

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