

TO: DIRECTOR, UNITED STATES GEOLOGICAL SURVEY,
WASHINGTON, D. C.

FROM: HUMBLE OIL & REFINING COMPANY, EXPLORATION DEPARTMENT,
ROSWELL, NEW MEXICO

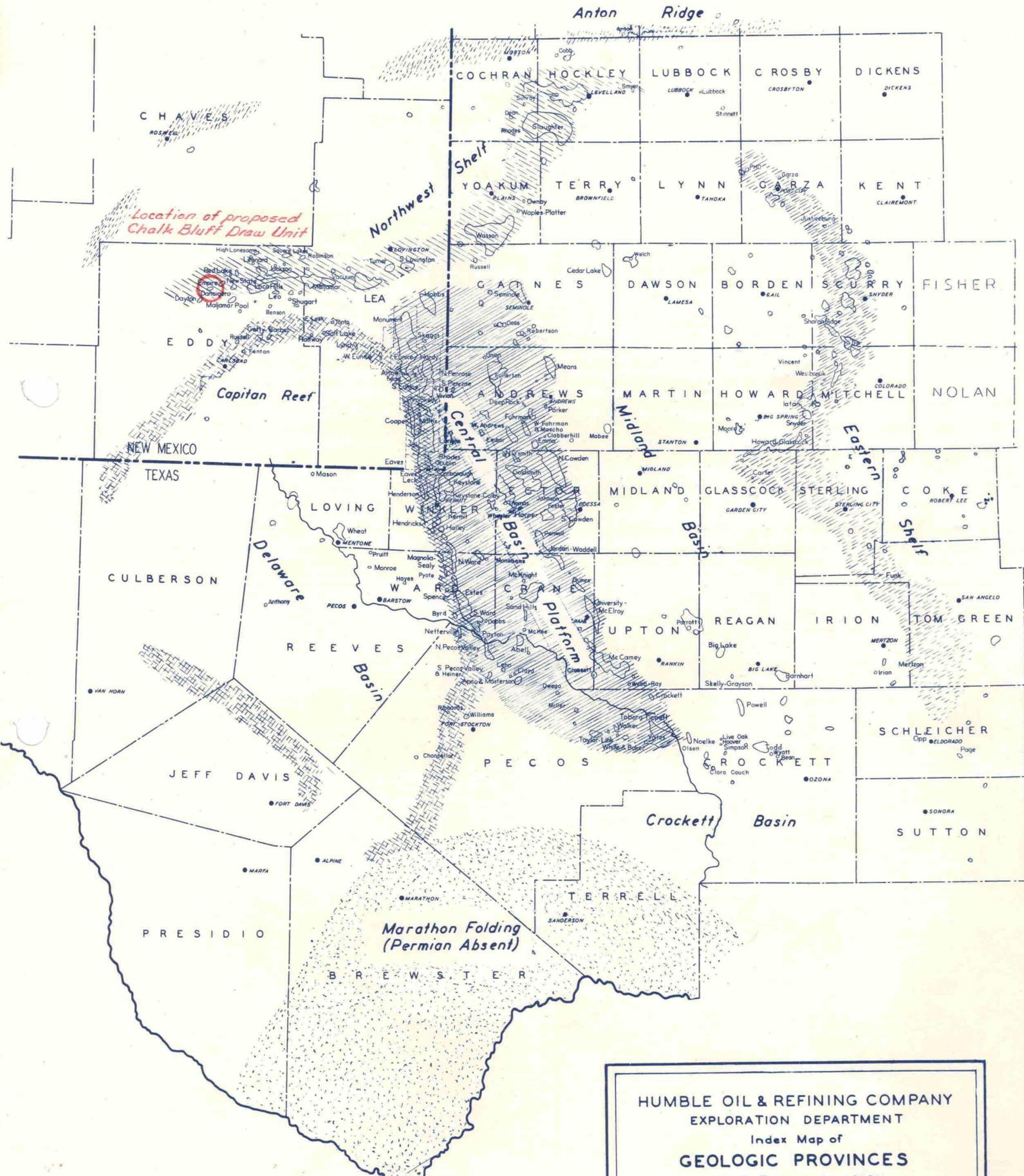
SUBJECT: REPORT ON THE GEOLOGY OF THE CHALK BLUFF DRAW AREA,
EDDY COUNTY, NEW MEXICO

PURPOSE: THIS REPORT IS SUBMITTED TO SHOW THE SUBSURFACE GEOLOGY
OF THE CHALK BLUFF DRAW AREA AND TO DEMONSTRATE THE
NEED OF FORMING A FEDERAL EXPLORATION UNIT TO TEST THE
AREA. IT IS BELIEVED THAT THE GEOLOGIC CONDITIONS ARE
SUCH THAT THE ONLY REASONABLE METHOD OF EXPLORATION AND
DEVELOPMENT IS BY MEANS OF AN APPROVED FEDERAL UNIT.

DATE: December, 1954

REPORT ON THE CHALK BLUFF DRAW AREA

EDDY COUNTY, NEW MEXICO



HUMBLE OIL & REFINING COMPANY
 EXPLORATION DEPARTMENT
 Index Map of
GEOLOGIC PROVINCES
 WEST TEXAS DIVISION

REPORT ON THE CHALK BLUFF DRAW AREA

EDDY COUNTY, NEW MEXICO

INTRODUCTION

The Chalk Bluff Draw area is located on the west end of the Maljamar-Grayburg-Jackson trend of shallow Permian fields in north-central Eddy County, southeastern New Mexico. The geologic site of the Unit outline is the west-central part of the Northwestern Shelf, about 12 to 15 miles north of the northwestern edge of the Delaware Basin. Most of the shallow Permian Empire field lies within the boundary of the Unit. The stratigraphy and oil possibilities of this area are particularly attractive, with petroleum source and reservoir rocks occurring from a depth of 300 feet in the Permian to 11,500 feet in the Lower Ordovician. These reservoirs occur in structural and stratigraphic traps. The stratigraphic traps are in the form of facies changes on the updip side of the flanks of the Permian Basin, on flanks of local structures, in traps created by porosity changes, and in reefs. The Chalk Bluff Draw Unit area has possibilities of many reservoirs, both structural and stratigraphic, and has an excellent possibility of producing oil below the depth of the present Empire:San Andres production. As the oil occurrence and geologic conditions above 3000 feet are well known and outside the proposed Unit, this report will deal primarily with the geology and oil possibilities below this depth.

SUBSURFACE STRATIGRAPHY

The general stratigraphy in the Chalk Bluff Draw area can best be described from the section encountered by the Stanolind No. 1 State Gas Unit "B", located in Section 29, T-17-S, R-28-E, about six miles east of the proposed unit area.

The Stanolind well from a total depth of 12,417 feet to the surface at an elevation of 3714 feet encountered the following section:

ORDOVICIAN:

ELLENBURGER: Approximately 400 feet thick (base not penetrated). Cream, tan, and brown dolomite with thin chert stringers. Is coarsely crystalline in texture, often with fracture porosity. Is likely to produce only on structure.

SIMPSON: 130 feet thick. Sandstone and shale with some thin beds of tan, brown, and grey, dense limestone. These beds not likely to produce in this area, although the sandstones of the Simpson make reservoirs on the Central Basin Platform 60 miles to the east.

MONTOYA: 260 feet thick. White, cream, and tan dolomite with fracture and intercrystalline porosity. Coarsely crystalline in upper part, medium to finely crystalline in lower 200 feet. Potential reservoir in upper 60 feet. Permeability with overlying Siluro-Devonian may permit vertical migration.

SILURO-DEVONIAN: 615 feet thick. Coarsely crystalline, white, cream, and tan, porous dolomite. Upper 150 feet contain massive chert beds. This rock usually fractured and forms excellent reservoirs when related to closed structures.

MISSISSIPPIAN:

MISSISSIPPIAN LIME: 530 feet thick. Dense, tan, and brown limestone with shale beds at the base. The limestone frequently siliceous.

PENNSYLVANIAN:

BEND: (Morrow and Atoka) 890 feet thick. Interbedded sandstones, shales, and tan and brown limestones. The sandstones are potential reservoirs with a 100-foot thick, clean quartz sandstone bed forming the main reservoir in the Stanolind No. 1 State Gas Unit "B".

STRAWN: (Des Moines) 450 feet thick. Cream, tan, and brown, finely crystalline limestone with several thin beds of shale. The Strawn can produce from the limestone where porosity occurs. This production may be localized stratigraphically or structurally.

CANYON: (Missouri) 725 feet thick. Tan and brown finely crystalline limestone with some shale partings in lower 500 feet. White and tan, coarsely crystalline dolomite in upper portion.

CISCO: (Virgil) 660 feet thick. White, coarsely crystalline very porous dolomite, and tan to brown, dense limestone. This would make an excellent petroleum reservoir for a closed structure or a stratigraphic trap if the dolomite facies changed updip from dolomite to finely crystalline, less porous limestone.

PERMIAN:

HUECO: 1045 feet thick. Finely crystalline, cream, tan, and brown limestone. Some thin shale beds 400 to 700 feet below the top, and some thin beds of chert and dolomite in the upper part of the section.

ABO: 1155 feet thick. Consists primarily of cream and dark, finely crystalline dolomite. The upper 700 feet of the Abo contains thin beds of red and green shale. The lower 50 feet of the Abo sometimes shows porosity and staining and is a likely reservoir.

CLEAR FORK: 1305 feet thick. The lower 700 feet predominantly tan and brown finely crystalline dolomite. The upper 200 feet of this lower zone is frequently very sandy or contains thin beds of sandstone and is referred to as the Drinkard sandy member or Tubb sand.

The upper 600 feet of the Clear Fork is predominantly finely crystalline, cream, tan, and brown dolomite with a 20-foot sandstone bed about 110 feet below the top. Although the Clear Fork is a prolific producer on the Central Basin Platform, it is not believed that it will be productive in this area.

YESO: 950 feet thick. Predominantly finely crystalline, cream, tan, and brown dolomite with a 120-foot thick sand zone at the top of the section. This sand zone often quite dolomitic. There are frequently lenses of sandstone and sandy dolomite in the lower part of the section.

SAN ANDRES: 1400 feet thick. Mostly cream, tan, and brown, very finely crystalline to medium crystalline dolomite. Thin anhydrite beds or zones can be expected near the top of the San Andres and the lower part of the section frequently contains many chert beds. The San Andres has produced considerable amounts of oil in this area, but is not herein considered in detail because formations of this age and younger are already productive in the Chalk Bluff Draw area and will not have their substances unitized.

WHITEHORSE: Approximately 1930 feet thick, constituted of sandstones, dolomites, and evaporites. This section like the San Andres will not be detailed as it is already productive and within the part of the geologic section which will not be unitized.

The following are the expected stratigraphic markers and their estimated depths in the proposed Humble No. 1 Chalk Bluff Draw Unit:

The well will be spudded near the top of the Whitehorse.
Top of the San Andres - 1250 feet
Top of the Yeso - 2650 feet
Top of the Tubb sand zone - 4200 feet
Top of the Abo - 4905 feet
Top of the Hueco - 6060 feet
Top of the Cisco - 7070 feet
Top of the Canyon - 7600 feet
Top of the Strawn - 8160 feet
Top of the Bend - 8510 feet
Top of the Bend gas zone - 8870 feet
Top of the Mississippian - 9290 feet

Present plans call for a test of the Pennsylvanian gas zone at 8870 feet, with the well to continue drilling to the top of the Mississippian at 9290

feet. Should the well encounter the top of the Mississippian at an advantageously high structural position, then at the Unit Operator's judgement it may be deepened to the top of the Siluro-Devonian. The presently recommended location for the well is 1980 feet from the south and west lines of Section 5, Township 18 South, Range 27 East.

STRUCTURE

The Chalk Bluff Draw Unit is located on an excellent subsurface Permian San Andres structural nose. This feature is probably the shallow reflection of an important closed deeper structure, but it is possible that it may indicate draping over a carbonate reef "buildup" at depth. However, Permian and Pennsylvanian stratigraphic traps could be anticipated in either case since reservoir porosity and permeability conditions frequently exist on the flanks and crest of such features.

The area of interest is near the Pecos River. The terrain is rough due to deep erosion of the bluff on the eastern side of the Pecos River. This rough topography along with rapid facies changes in the Permian make accurate seismic work in this area difficult to impossible. Therefore, it is believed that a unit with a well drilled on the basis of the San Andres structural nose would be the best method for isolating deeper petroleum producing reservoirs in this area. Deep subsurface control in this area is very sparse at present.

Accompanying this report are a top of the San Andres structure map (Figure A), a top of the Pennsylvanian Bend gas sand structure map (Figure B), and an isopachous map of the Pennsylvanian Bend gas sand (Figure C). These three exhibits illustrate Humble Oil and Refining Company's present subsurface interpretation of the Chalk Bluff Draw area. The other two exhibits are copies of the Schlumberger electric logs of the Stanolind No. 1 State Gas Unit "B" (Figure D) and the Continental No. 1 Duffield (Figure E) with all pertinent formation markers indicated.

ECONOMIC POSSIBILITIES

The Chalk Bluff Draw Unit will not unitize those substances above the base of the San Andres formation or the top of the Yeso. This geological horizon was encountered at 3340 feet in the Stanolind No. 1 State Gas Unit "B" in Section 29 of Township 17 South, Range 27 East. The top of the Yeso or base of the San Andres will be encountered at a shallower depth, approximately 2650 feet, in the Chalk Bluff Draw area. In this connection it is considered that the Glorietta sand is the basal member of the San Andres formation.

Those zones in the Chalk Bluff area that will have the best possibilities of commercial production from the top of the Yeso to total depth are as follows:

- (1) The interval from approximately 3300 to 3700 feet in the Yesso dolomite has shown some staining and porosity in this area and might produce as a stratigraphic trap, possibly of reef type.
- (2) The dolomites of the basal Abo have shown considerable porosity and some staining in this area.
- (3) The zone from 7100 to 7450 feet in the Wolfcamp had many shows of oil and gas in the Stanolind No. 1 State Gas Unit "B", and oil and gas has been recovered on drill stem tests of this part of the section.
- (4) The coarsely crystalline Cisco-Canyon dolomite encountered in the Stanolind No. 1 State Gas Unit "B" would make an excellent reservoir. It would be encountered in the interval of approximately 7070 to 7600 feet.
- (5) Sandstone lenses throughout the Pennsylvanian should be tested and the Bend sand zones expected between 8500 and 9000 feet are the primary objective in the Chalk Bluff Draw area. The producing reservoir in the Stanolind No. 1 State Gas Unit "B", about six miles to the east, is a widespread Bend sand with lenticular zones of porosity.
- (6) In the event the well is anomalously high structurally on the top of the Mississippian, the porous Siluro-Devonian dolomites of this area will be an attractive objective. These dolomites should be encountered between the depths of about 9900 and 10,500 feet. Unless the proposed wildcat is running structurally high on the Pennsylvanian sands and/or on the top of the Mississippian, it is not believed that it would be economically feasible to drill the well to the Siluro-Devonian.

RECOMMENDATIONS

It is recommended that Humble form a federal unit of the acreage within the limits of the proposed Chalk Bluff Draw Unit. This unitization should be accomplished before any well is drilled, for the following reasons: (1) The acreage tracts within the limits of this unit are greatly cut-up, having been divided and subdivided many times. (2) The ownership is complicated and a reasonable spacing and development program would be nearly impossible unless it occurred under a unit plan. (3) It is believed that the nature of the products (gas and condensate) received from the Pennsylvanian are best adapted to a unit program. It is believed that this type of production is best developed either on a 320 or 640 acre spacing plan with a very careful development program. Such an exact and accurate program can only be accomplished

under a signed unit. (4) Secondary recovery programs, such as water-flood or gas injection in structural or stratigraphic traps, are very difficult to develop on a fair and equitable basis without unitization.

After unitization is successfully completed, it is recommended that Humble drill a well to 9300 feet to test all unitized formations to the top of the Mississippian formation to be located 1980 feet from the south and west lines of Section 5, Township 18 South, Range 27 East. The location of this well would be on the crest of an east-plunging subsurface San Andres structural nose on which the Stanolind No. 1 State "AB" was drilled. It is believed that this geological location would be most likely to encounter structural and stratigraphic conditions favorable to commercial oil production. It is further recommended that if the stratigraphic markers in the Pennsylvanian and Mississippian are encountered structurally high that the well be carried to the Siluro-Devonian. If the initial well is dry but indicates conditions that would favor the drilling of a second well, it is recommended that a second Mississippian test be located on this unit, subject to the information gained from the drilling of the first well.

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 DALLAS 1, TEXAS

REFERENCE N^o W2859 -D

FIGURE E

 Electrical Log																																																																																																																																																														
COUNTY - EDDY FIELD or LOCATION - WILLOCAT WELL - DUFFIELD # 1 COMPANY - CONTINENTAL OIL CO.	COMPANY - CONTINENTAL OIL COMPANY WELL - DUFFIELD # 1 FIELD - WILLOCAT LOCATION - SEC. 21-16S-27E COUNTY - EDDY STATE - NEW MEXICO	Location of Well 1980' f 58 ^m /L Sec. 21-16S-27E ES-GRL-ML Elevation: D.F. 3572 K.B.: or G.L.: FILING No.																																																																																																																																																												
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W 2959D + W 2859E

Well	CONTINENTAL OIL CO. - 11 Gertrude Duffield	Product	Gas
Locn	1980' f 58 ^m /L Sec 21-16S-27E, 4 mi W Empire Fla		
DISCIPLINE DISCOVERY			
Elev	3573' sp	PRODUCTION	
T. Can. Andrea 1375'		IPF 3,800 MCFGD plus 30 bbls dist thru 1-1/2" on on	
T. Marietta 2853'		2-1/2" at 8600', City 66.5, SIP 2943, CH ph at 8513'	
T. Tulsa 4160'			
T. Leo 4875'		RECORD: SPUD 12-22-51 ***** CORP. 5-13-52	
T. Buco 6095'			
T. Penn 6200'			
T. Ass 11 89-5'		13" 274'/300 ex, 9 5-8" 1361'/825 ex, 7" 8750'/070 ex	
T. Hoodier 6300'			
T. Revocian 9347'		DST 6090-6134', op 30 min, rec 120' mud; DST 7192-7276'	
T. Montoya 9700'		op 2 hrs, rec 260' sul/wtr, FP 600., 15 min SIP 2400 (502	
T. Simpson 10,025'		7515-7665', op 1 hr, gas 40 min, rec 420' sil 200, no show	
T. Schlumberger 10,075'		DST 85-0-8650', op 1 hr 18 min, gas 4 min, mud 18 min,	
T. Pay 8616'		Flwd 4,500 MCFGD, FP 1523, 15 min SIP 2875, DST 8600-	
T. D 8765'		8750', used 1000' UB, op 2 hrs, sil blow gas 20 min, rec 90' sil	
T. D 10,158' dolo		046CH, 1000' UB & 15,300 MCFGD, FP 625, SIP 1075, DST 9347-9400'	
		op 2-1/2 hrs, rec 1300' UB, 2600' silty sul/wtr; DST 9400-9502'	

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 1305 COMMERCE STREET
 DALLAS 1, TEXAS

REFERENCE N° W 4026 -D

FIGURE D

SCHLUMBERGER WELL SURVEYING CORPORATION
 HOUSTON, TEXAS



Electrical Log

COUNTY <u>Eddy</u> FIELD or LOCATION <u>Wildcat</u> WELL <u>State AB # 1</u> COMPANY <u>Stanclind Oil & Gas Co.</u>	COMPANY <u>STANCLIND OIL AND GAS COMPANY</u>	Location of Well <u>1980' f SSE/L</u> <u>Sec. 29-17S-28E</u>
	WELL <u>STATE AB # 1</u>	(ML-DM) Elevation: <u>D.F. 3715</u> K.B. _____ or G.L. _____
	FIELD <u>WILDCAT</u>	
	LOCATION <u>SEC. 29-17S-28E</u>	
	COUNTY <u>EDDY</u>	
	STATE <u>NEW MEXICO</u>	FILING No. _____

RUN No.	1	2	3		
Date	3-13-53	6-17-53	8-3-53		
First Reading	2000	10659	12414		
Last Reading	539	2004	10659		
Feet Measured	1461	8655	1755		
Cg. Schlum.	539	2004	2004		
Cg. Driller	539	2003	2003		
Depth Reached	2003	10662	12417		
Bottom Driller	1995	10668	12431		
Depth Datum	1' Abv. RT				
Mud Mat.	Natural-Chemicals-Gel-Caustic-Obr				
Density	9.3	8.9	9.2		
Viscosity	32	75	75		
Resist.	0.6 @ 68°F	6.6 @ 78°F	1.2 @ 72°F	@ °F	@ °F
Res. BHT	0.4 @ 98°F	1.6 @ 127°F	5.9 @ 171°F	@ °F	@ °F
pH	@ °F	@ °F	@ °F	@ °F	@ °F
Wir. Loss	CC 30 min.	10 CC 30 min.	11 CC 30 min.	CC 30 min.	CC 30 min.
Max. Temp. °F	98	127	171		
Bit Size	12"	8 3/4"	8 3/4"		
Specs.-AM	10"	10"	10"		
A	32" LS	32" LS	32" LS		
AO	19'	19'	19'		
Opr. Rig Time	1 Hr.	2 Hrs.	4 Hrs.		
Truck No.	1739-Ros.	1724-Ros.	1759-Hobbs		
Recorded By	Hayle	Wilson	Rodgers		
Witness By			Anthony		

REMARKS

THIS IS NOT A COMPLETE REPRODUCTION OF
 THE ORIGINAL THREE-TRACK SCHLUMBERGER LOG.

SPONTANEOUS-POTENTIAL millivolts	DEPTH feet	RESISTIVITY -ohms. m ² /m
$-\frac{20}{100} +$	2" / 100	Run 1:
		0 10" Normal 10
		0 100
		0 32" LS Lateral 1
		Run 2:
		0 10" Normal 225
		0 2250
		0 32" LS Lateral 175
		Run 3:
		0 10" Normal 150