

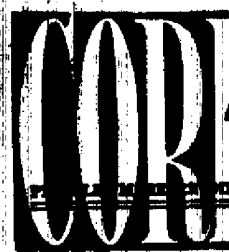
CORE ANALYSIS FOR

TESORO PETROLEUM CORPORATION

NO. 17 SANTA FE RAILROAD

SOUTH HOSPAH FIELD

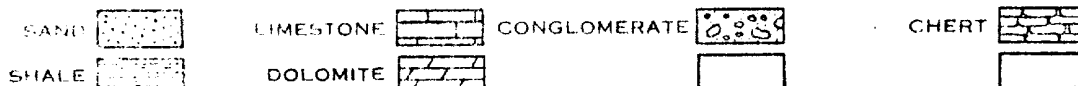
McKINLEY COUNTY, NEW MEXICO



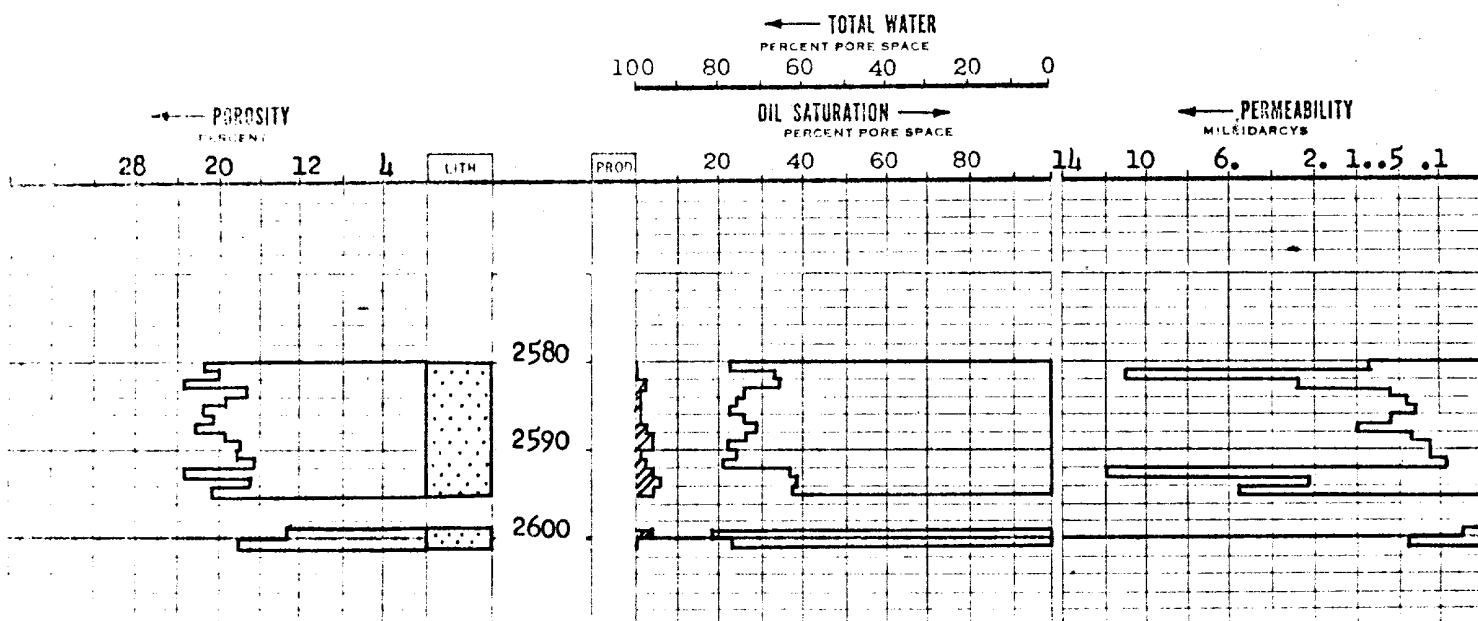
COMPANY Tesoro Petroleum Corporation DATE ON 5-3-69 FILE NO. RP-3-2349  
WELL Santa Fe RR # 17 DATE OFF 5-4-69 ENGRS. Mohl  
FIELD South Hospah FORMATION Dakota 2nd bench ELEV. 6989 KB  
COUNTY McKinley STATE N. Mex. DRG. FLD. Gel 8% Oil CORES Dia. Conv. 4"  
LOCATION SE NW Sec 7 - T 17N - R 8W REMARKS Conventional Core Analysis

## COMPLETION COREGRAPH

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted). But Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper operation, or profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.



VERTICAL SCALE: 5" = 100'



CL-529

## CORE SUMMARY AND CALCULATED RECOVERABLE OIL

FORMATION NAME AND DEPTH INTERVAL: Dakota 2nd Bench - 2580.0 to 2595.0 feet

FEET OF CORE RECOVERED FROM ABOVE INTERVAL	15	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	71.4
FEET OF CORE INCLUDED IN AVERAGES	15	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	
AVERAGE PERMEABILITY: MILLIDARCY	2.5	OIL GRAVITY: °API	
PRODUCTIVE CAPACITY: MILLIDARCY-Feet	37.42	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	
AVERAGE POROSITY: PER CENT	19.9	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE	2.0	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	

Calculated maximum solution gas drive recovery is barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is barrels per acre-foot, assuming full maintenance of original reservoir pressure, 100% areal and vertical coverage, and continuation of production to 100% water cut. (Please refer to footnotes for further discussion of recovery estimates.)

(c) Calculated (e) Estimated (m) Measured (\*) Refer to attached letter.

## INTERPRETATION OF DATA

2580.0 to 2595.0 feet - Believed to be primarily water productive. Characterized by lower than normal permeability and higher than normal water saturation. Initially some very small volumes of oil might be produced with increasing volumes of water.

These recovery estimates represent theoretical maximum values for solution gas and water drive. They assume that production is started at original reservoir pressure; i.e., no account is taken of production to date or of prior drainage to other areas. The effects of factors tending to reduce actual ultimate recovery, such as economic limits on oil production rates, gas-oil ratios, or water-oil ratios, have not been taken into account. Neither have factors been considered which may result in actual recovery intermediate between solution gas and complete water drive recoveries, such as gas cap expansion, gravity drainage, or partial water drive. Detailed predictions of ultimate oil recovery to specific abandonment conditions may be made in an engineering study in which consideration is given to overall reservoir characteristics and economic factors.

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**CORE LABORATORIES, INC.**  
**Petroleum Reservoir Engineering**  
**DALLAS, TEXAS**

Page No. 1**CORE ANALYSIS RESULTS**

Company Tesoro Petroleum Corporation Formation Dakota 2nd bench File RP-3-2349  
 Well Santa Fe RR # 17 Core Type Dia. Conv. 4" Date Report 5-4-69  
 Field South Hospah Drilling Fluid Fresh water gel 8% Oil Analysts Mohl  
 County McKinley State N. Mex. Elev. 6989 KB Location SE NW Sec 7- T 17N- R 8W

**Lithological Abbreviations**

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS $K_A$	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE		Gas Sat	SAMPLE DESCRIPTION AND REMARKS
				OIL	TOTAL WATER		
1	2580-81	0.8	21.5	0.0	77.1	22.9	Ss, gry, fn-med, shly
2	2581-82	11.	20.0	0.0	66.5	33.5	Ss, gry, fn-med, shly, vert frac
3	2582-83	2.6	23.0	2.6	64.8	32.6	Ss, gry, fn-med, shly, vert frac
4	2583-84	0.6	17.1	1.2	74.3	24.5	Ss, gry, fn-med, shly
5	2584-85	0.41	19.1	1.1	75.9	23.0	Ss, gry, fn-med, shly
6	2585-86	0.35	21.2	1.0	76.4	22.6	Ss, gry, fn-med, shly
7	2586-87	0.6	20.7	1.1	74.3	24.6	Ss, gry, fn-med, shly
8	2587-88	1.0	22.4	1.8	71.0	27.2	Ss, gry, fn-med, shly
9	2588-89	0.3	19.1	2.8	73.2	24.0	Ss, gry, fn-med, shly
10	2589-90	0.14	17.8	2.8	77.0	20.2	Ss, gry, fn-med, shly
11	2590-91	0.14	18.0	1.1	76.1	22.8	Ss, gry, vfn-fn, shly
12	2591-92	0.08	16.9	1.3	78.6	20.1	Ss, gry, vfn-fn, shly
13	2592-93	12.	23.5	2.5	63.9	33.6	Ss, wh, vfn-fn, shly, sl calc
14	2593-94	2.1	17.0	6.5	61.1	32.4	Ss, wh, vfn-fn, sl calc
15	2594-95	5.3	20.9	4.3	61.7	34.0	Ss, wh, vfn-fn, sl calc
16	2599-00	0.05	12.9	4.0	80.5	15.5	Ss, gry, vfn-fn, shly
17	2600-01	0.41	18.0	0.0	76.0	24.0	Ss, wh, vfn-fn, shly

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