

Permit #: 20024 Date Issued: 2-11-86
 Country: Atkinson Date Cancelled: _____
 CONFIDENTIAL, UNTIL: _____ Date Plugged: 3-10-86

COMMENTS:

OGC FORMS	Date Received
1	
2	
3	
3i	2-11-86
4	2-11-86
4i	
5	7-16-86
6	
7	7-16-86
8	
11	
12	
Misc. Form 2	

	TYPE	ID #	Date Received
Logs	MCS	* 28643	
Samples	chip core		
	water		
Analyses	core		

Additional Submitted Data:
geo chemical evaluation

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

APPLICATION TO DRILL DEEPEN PLUG BACK
for an oil well or gas well

NAME OF COMPANY OR OPERATOR The Stone Petroleum Corp. DATE 2-11-86
P.O. Box 52807 OCS, Lafayette LA 70505
Address City State

DESCRIPTION OF WELL AND LEASE

Name of lease Eugene & Anna McCartney Well number 1 Elevation (ground) 1038.7

WELL LOCATION (give footage from section lines)
570 ft. from (X) (S) sec. line 253 ft. from (E) (W) sec. line

WELL LOCATION Section 5 Township 64N Range 39 County Atchison

Nearest distance from proposed location to property or lease line: 253 feet
Distance from proposed location to nearest drilling, completed or applied for well on the same lease: N.A. feet

Proposed depth 4000' Drilling contractor, name & address EDCO, Eureka, KS Rotary or Cable Tools Rotary Approx. date work will start 2-12-86

Number of acres in lease: 45 A. Number of wells on lease, including this well, completed in or drilling to this reservoir: 0
Number of abandoned wells on lease: 0

If lease, purchased with one or more wells drilled, from whom purchased: Name N.A. No. of Wells: producing
injection
inactive
abandoned
Address

Status of Bond
Single Well Amt. Blanket Bond Amt. \$30,000 ON FILE ATTACHED

Remarks: (If this is an application to deepen or plug back, briefly describe work to be done, giving present producing zone and expected new producing zone) use back of form if needed.

Proposed casing program:				Approved casing -- To be filled in by State Geologist			
amt.	size	wt./ft.	cem.	amt.	size	wt./ft.	cem.
<u>420</u>	<u>9 5/8"</u>	<u>36.0</u>	<u>yes</u>	<u>✓</u>	<u>✓</u>	<u>✓</u>	<u>✓</u>

I, the undersigned, state that I am the Drilling Representative of the Stone Petroleum Corp. (company), and that I am authorized by said company to make this report, and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.
Signature C.F. Smith

Permit Number: 20026 Drillers log required Drill stem test info. required if run
Approval Date: 2/11/86 E-logs required if run Samples required
Approved By: Jane Boyd Williams Core analysis required if run Samples not required
BWN

Note: This Permit not transferable to any other person or to any other location
Remit two copies to: Missouri Oil and Gas Council P.O. Box 250 Rolla, Mo. 65401
One will be returned for driller's signature
FEB 11 1986
WATER SAMPLES REQUIRED @
MO. OIL & GAS COUNCIL

Approval of this permit by the Oil and Gas Council does not constitute endorsement of the geologic merits of the proposed well nor endorsement of the qualifications of the permittee.

4-27-83

Missouri Oil and Gas Council
WELL LOCATION PLAT

Form OGC-4

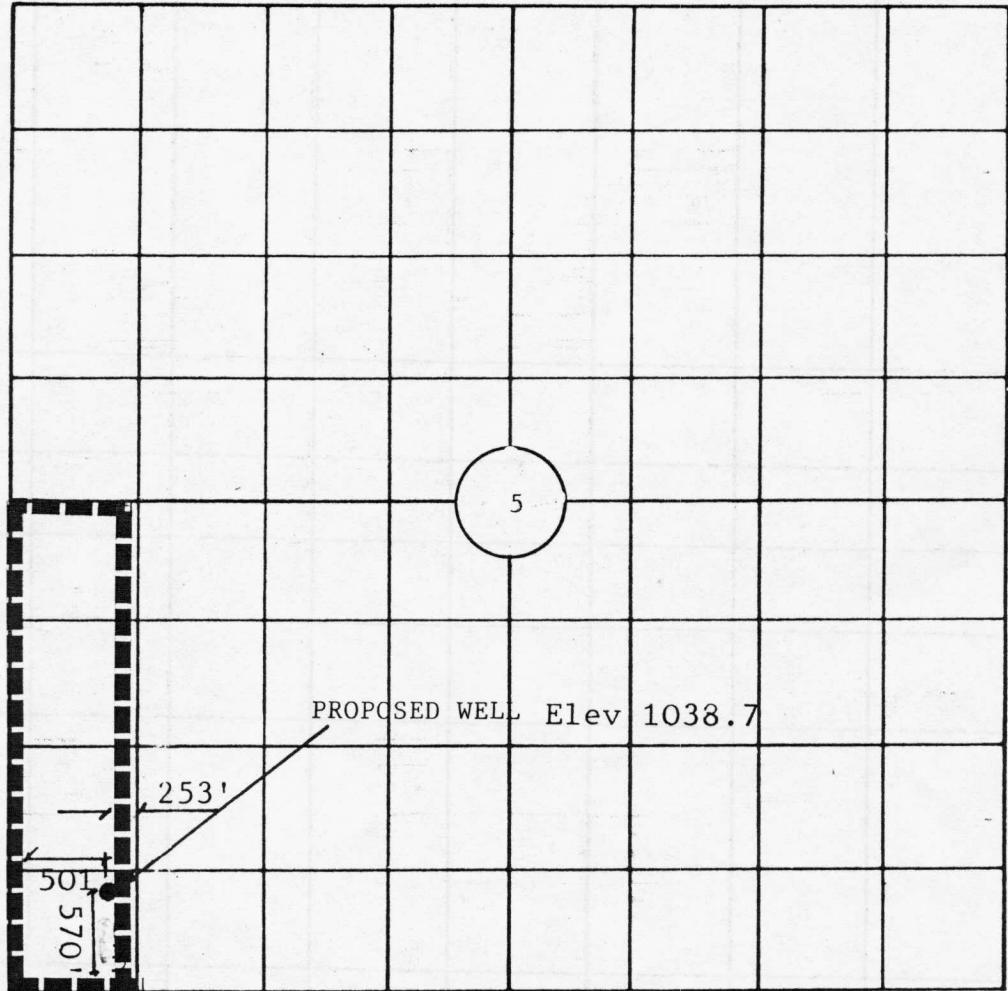
Owner: Stone Petroleum Corp.

Lease Name: Eugene & Anna McCartney County: Atchison

570 feet from S section line and ### feet from E section line of Sec. 5, Twp. 64 N., Range 39
(N)-(S) 253' (E)-(W)



SCALE
1" = 1150'



Lease Line

REMARKS: The Ground elevation at the proposed well site is 1038.7
Elevations are in reference to USGS Vertical Datum.

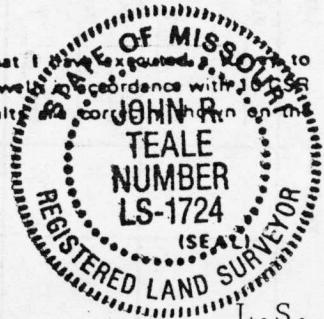
INSTRUCTIONS

On the above plat, show distance of the proposed well from the two nearest section lines, the nearest lease line, and from the nearest well on the same lease completed in or drilling to the same reservoir. Do not confuse survey lines with lease lines. See rule 10 CSR 50:2.030 for survey requirements. Lease lines must be marked.

This is to Certify that I have examined the above plat to accurately locate oil and gas wells in accordance with the provisions of Chapter 50-2.030 and that the results are correctly shown on the above plat.

RECEIVED

FEB 11 1986



Remit two copies to: Missouri Oil and Gas Council
P.O. Box 250, Rolla, MO 65401

One will be returned.

Registered Land Surveyor

Number

L.S. 1724

WELL COMPLETION OR RECOMPLETION REPORT AND WELL LOG

New Well Workover Deepen Plug Back Injection Same Reservoir Different Reservoir Oil Gas Dry

Owner The Stone Petroleum Corporation		Address P. O. Box 52382, Lafayette, LA 70505			
Lease Name Eugene & Anne McCartney		Well Number 1			
Location 570' from the SL & 501' from the WL of Sec. 5			Sec., Twp., and Range or Block and Survey Sec. 5-T64N-R39		
County Atchison	Permit number (OGC 3 or OGC 3I) 20026				
Date spudded 2/21/86	Date total depth reached 3/8/86	Date completed, ready to produce or inject --	Elevation (DF, RKR, RT, or Gr.) feet 1038.7' GR, 1045.2' RKB	Elevation of casing hd. flange feet 1038.7'	
Total depth 3,790'	P. B. T. D. ---				
Producing or injection interval(s) for this completion NA		Rotary tools used (interval) From 0 to 3,790' Drilling Fluid used <u>Chemical</u>		Cable tools used (interval) From -- to --	
Was this well directionally drilled? No	Was directional survey made? No	Was copy of directional survey filed? No		Date filed --	
Type of electrical or other logs run (list logs filed with the State Geologist) DIL-SFL-GR, CNL-LDT-GR, BHC-GR, EPT-GR, ML-GR				Date filed Previously Filed	

CASING RECORD

Casing (report all strings set in well -- conductor, surface, intermediate, producing, etc.)						
Purpose	Size hole drilled	Size casing set	Weight (lb. ft.)	Depth set	Sacks cement	Amt. pulled
Surface	12 1/4"	9 5/8"	36	465'	275	9.5'

TUBING RECORD

LINER RECORD

Size	Depth set	Packer set at	Size	Top	Bottom	Sacks cement	Screen (ft.)
in.	ft.	ft.	in.	ft.	ft.	ft.	ft.

PERFORATION RECORD

ACID, SHOT, FRACTURE, CEMENT SQUEEZE RECORD

Number per ft	Size & type	Depth interval	Amount and kind of material used	Depth interval

INITIAL PRODUCTION

Date of first production or injection		Producing method (indicate if flowing, gas lift, or pumping -- if pumping, show size and type of pump)				
Date of test	Hrs. tested	Choke size	Oil produced during test bbls.	Gas produced during test MCF	Water produced during test bbls.	Oil gravity API (Corr.)
Tubing pressure	Casing pressure	Cal'd rate of Production per 24 hours	Oil bbls.	Gas MCF	Water bbls.	Gas -- oil ratio

Disposition of gas (state whether vented, used for fuel or sold):

Method of disposal of mud pit contents:

Hauled fluids to disposal, backfilled solids at drillsite.

CERTIFICATE: I, the undersigned, state that I am the Production Engineer of the Stone Petroleum Corporation (company), and that I am authorized by said company to make this report, and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

RECEIVED

JUL 16 1986

Michael E. Hadden
Signature

MO. OIL & GAS COUNCIL

PLUGGING RECORD

Owner The Stone Petroleum Corporation		Address P. O. Box 52382, Lafayette, LA 70505			
Name of Lease Eugene & Anna McCartney		Well No. 1	Permit Number (OGC-3 or OGC-3I number) 20026		
Location of Well 570' from the SL & 501' from the WL of Sec. 5-T64N-R39			Sec-Twp-Rng or Block & Survey County Atchison		
Application to drill this well was filed in name of The Stone Petroleum Corporation		Has this well ever produced oil or gas? No	Character of well at completion (initial production) Oil (bbls/day) Gas (MCF/day) --		Dry? Yes
Date Abandoned 3/10/86	Total depth 3,790'	Amount well producing prior to abandonment Oil (bbls/day) Gas (MCF/day) ---		Water (bbls/day) ---	
Name of each formation containing oil or gas. Indicate which formation open to well bore at time of abandonment.		Fluid content of each formation		Depth interval of each formation	Size, kind, & depth of plugs used. Indicate zones squeeze cemented, giving amount cement.
None					15 sx-3690'-3645'; 2229'
					2184'; 1752'-1701'; 937'
					-892'.
					45 sx - 532'-393'
					25 sx - 90'-20'
Size pipe	Put in well (ft)	Pulled out (ft)	Left in well (ft)	Give depth and method of parting casing (shot, ripped, etc.)	10 sx in rat hole Packers and shoes
9 5/8"	465'	9.5'	455.5'	Cut 3' BGL	Rubber & wood plug at 90'
Was well filled with mud-laden fluid? Yes			Indicate deepest formation containing fresh water.		
NAMES AND ADDRESSES OF ADJACENT LEASE OPERATORS OR OWNERS OF THE SURFACE					
Name		Address		Direction from this well:	
Harold Fields, Et al		505 W Lincoln, Maryville, MO 64468		North	
James R Sly, Et al		Box 42, Fairfax, MO 64446		East	
E M McCartney, Et ux		911 College, Tarkio, MO 64491		N/West	
Bass Energy, Inc.		6859 S Canton, Tulsa, OK 74136		S/West	
Method of disposal of mud pit contents: Hauled fluids to disposal, backfilled solids at drillsite.				RECEIVED	
Use reverse side for additional detail.				JUL 16 1986	
File this form in duplicate with				MO. OIL & GAS COUNCIL	
CERTIFICATE: I, the undersigned, state that I am the <u>Production Engineer</u> of the <u>Stone Petroleum Corporation</u> (Company), and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct, and complete to the best of my knowledge.					
				Signature <u>Michael J. Marble</u>	

Remit two copies to: Missouri Oil and Gas Council
P.O. Box 250, Rolla, MO 65401

One will be returned.

MISSOURI GEOLOGICAL SURVEY AND WATER RESOURCES, ROLLA, MISSOURI

COUNTY Atchison
 COMPANY OR OWNER Stone Petroleum
 FARM _____ WELL NO. McCartney #1
 LOCATION SW SW SW SEC 5 T 64N R 39W
 CONTRACTOR/DRILLER Edco
 COMMENCED _____ COMPLETED _____
 PRODUCTION Dry Oil Test
 CASING RECORD _____
 WATER RECORD _____
 SOURCE OF LOG _____
 REMARKS Permit #20026; 501' FNL & 570' FSL

MGS LOG NO. 28643

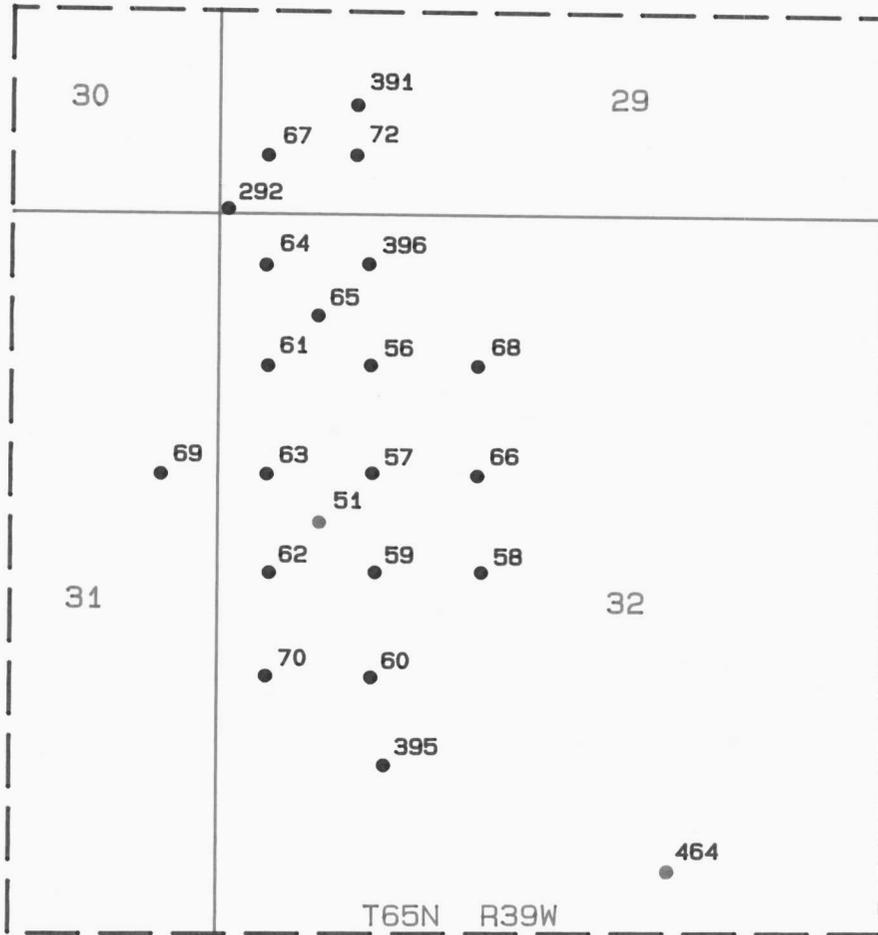
- + -	- + -	- + -	- + -
- + -	5	- + -	- + -
- + -	5	- + -	- + -
- + -	- + -	- + -	- + -

NO. SAMPLES _____ SAMPLES RECEIVED 3-23-87

ELEV. 1038.71
 TOTAL DEPTH 3756
 SWL _____

FORMATION	FROM (ft)	TO (to)	*	FORMATION	FROM (ft)	TO (to)
Loess	0	403	*			
Shawnee Group	403	460	*			
Douglas Group	460	610	*			
Kansas City Group - Lansing Group	610	940	*			
Marmaton	940	1095	*			
Cherokee Group	1095	1740	*			
Mississippian System	1740	1955	*			
Kinderhook Shale	1955	2230	*			
Devonian	2230	2730	*			
Maquoketa	2730	2785	*			
Kimmswick	2785	3600	*			
Lamotte	3600	3730	*			
Precambrian	3730	3736	*			

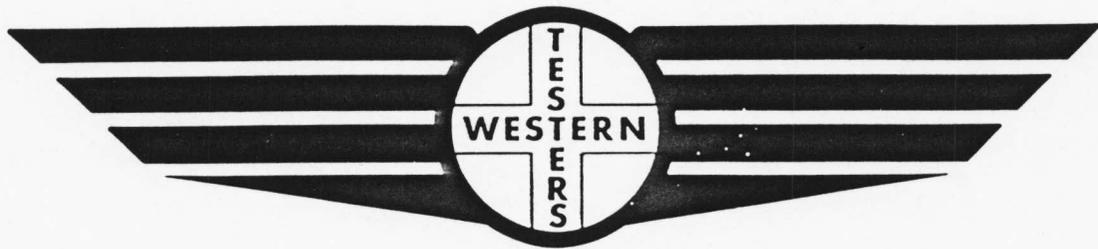
TARKIO OIL FIELD



0 1/4 Mile
Scale



FORMATION TEST REPORT



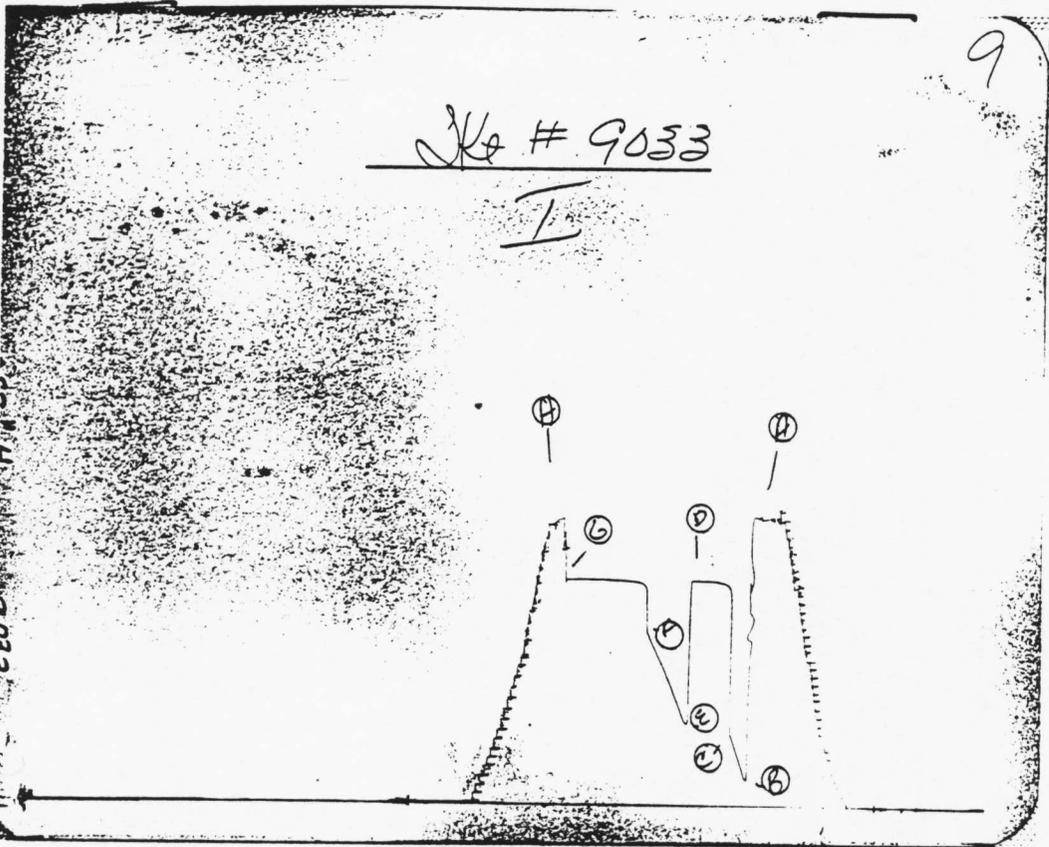
Home Office:

Wichita, Kansas 67201

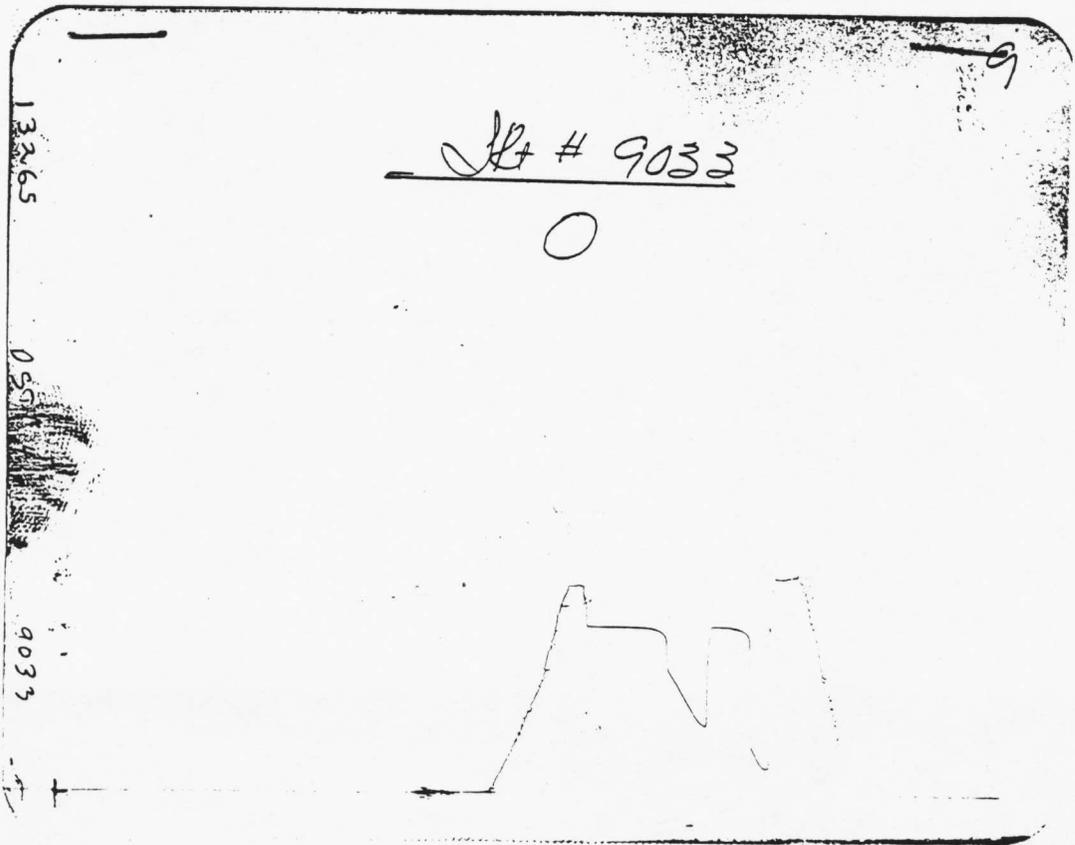
P.O. Box 1599

Phone (316) 262-5861

COMPANY STONE PETROLEUM CORP. LEASE & WELL NO. #1 MCCARTNEY SEC. 5 TWP. 64N RGE. 39W TEST NO. 4 DATE 3/9/86



Inside Recorder



Outside Recorder

SUBSURFACE PRESSURE SURVEY

DATE : 3-9-86 TICKET : 9033
 CUSTOMER : STONE PETROLEUM CORPORATION LEASE : MCCARTNEY
 WELL : 1 TEST: 4 GEOLOGIST : SMITH
 ELEVATION : 1045 FORMATION : HUNTON
 SECTION : 5 TOWNSHIP : 64N
 RANGE : 39W COUNTY : ATCHINSON STATE : MISSOURI
 GAUGE SN# : 3474 RANGE : 3000 CLOCK : 12

INTERVAL FROM : 2240 TO : 2264 TOTAL DEPTH : 3790
 DEPTH OF SELECTIVE ZONE : 2271
 PACKER DEPTH : 2235 SIZE : 7.5
 PACKER DEPTH : 2240 SIZE : 7.5
 PACKER DEPTH : 2264 SIZE : 7.5
 PACKER DEPTH : 2269 SIZE : 7.5

DRILLING CON. : EDCO DRLG
 MUD TYPE : CHEMICAL VISCOSITY : 51
 WEIGHT : 9.2 WATER LOSS (CC) : 8.6
 CHLORIDES (PPM) : 1100
 JARS-MAKE : SERIAL NUMBER :
 DID WELL FLOW ? : NO REVERSED OUT ? : NO

DRILL COLLAR LENGTH : 0 FT I.D. inch : 0.00
 WEIGHT PIPE LENGTH : 0 FT I.D. inch : 0.00
 DRILL PIPE LENGTH : 2220 FT I.D. inch : 3.80
 TEST TOOL LENGTH : 63 FT TOOL SIZE : 5.50
 ANCHOR LENGTH : 24 FT ANCHOR SIZE : 5.50
 SURFACE CHOKE SIZE : .75 IN BOTTOM CHOKE SIZE : .75
 MAIN HOLE SIZE : 8.75 IN TOOL JOINT SIZE : 4.5 XH

BLOW COMMENT #1 : FAIR BLOW DIMINISHING SLIGHTLY AT THE END OF
 BLOW COMMENT #2 : THE TEST.
 BLOW COMMENT #3 :
 BLOW COMMENT #4 :

RECOVERED : 1400 FT OF: SULPHUR CUT WATER. 19.64 Barrels
 RECOVERED : 0 FT OF: CHLORIDES 1100 PPM. 0.00 Barrels
 RECOVERED : 0 FT OF: 0.00 Barrels
 Total Barrels = 19.6 Total Production = 628.4 Bpd

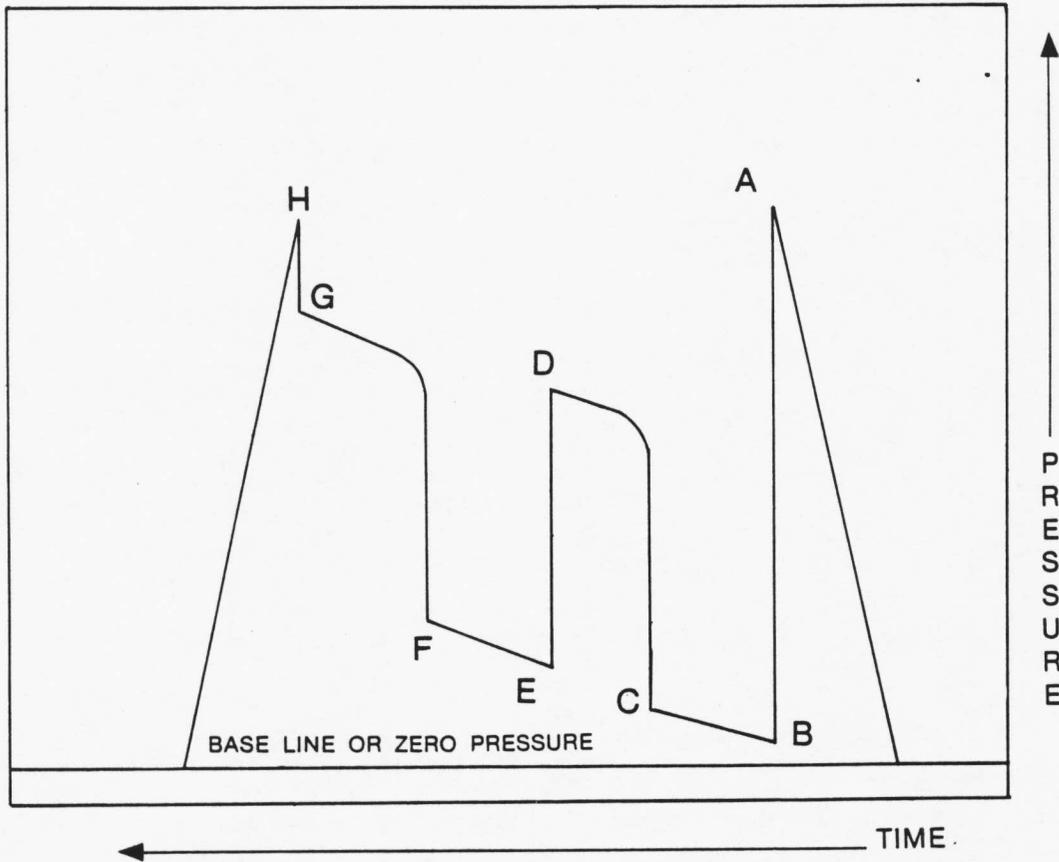
REMARK 1 : TIGHT HOLE. RESISTIVITY 5.0 AT 62 DEGREES.
 REMARK 2 : NITRATES: 6.27 mg-1
 REMARK 3 :
 REMARK 4 :

SET PACKER(S) : 10:00 PM TIME STARTED OFF BOTTOM : 12:15 AM
 WELL TEMPERATURE : 92
 INITIAL HYDROSTATIC PRESSURE (A) 1079
 INITIAL FLOW PERIOD MIN: 15 (B) 98 PSI TO (C) : 267
 INITIAL CLOSED IN PERIOD MIN: 30 (D) 848
 FINAL FLOW PERIOD MIN: 30 (E) 311 PSI TO (F) : 643
 FINAL CLOSED IN PERIOD MIN: 60 (G) 851
 FINAL HYDROSTATIC PRESSURE (H) 1067

COMPANY TERMS

Western Testing Co., Inc. shall not be liable for damages of any kind to the property or personnel of the one for whom a test is made or for any loss suffered or sustained directly or indirectly through the use of its equipment, of its statements or opinion concerning the results of any test. Tools lost or damaged in the hole shall be paid at cost by the party for whom the test is made.

AK-1 Recorders



A - Initial Hydrostatic

B - First Initial Flow

C - First Final Flow

D - Initial Shut-In

E - Second Initial Flow

F - Second Final Flow

G - Final Shut-In

H - Final Hydrostatic

Feb 19, 1989

CONFIDENTIAL

until

2/19/88 Bmw

GEOCHEMICAL EVALUATION

OF THE

MC CARTNEY NO. 1 WELL

FOR

THE STONE PETROLEUM CORPORATION

Geological Sciences



TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
Discussion of Results	3
Conclusions	8
Analytical Data	
Figure 1	9
Table 1	10
Table 2	15
Table 3	16
Table 4	17
Figures 2-6	18
Appendix	23
References	28

INTERPRETATION

Geological Sciences



INTRODUCTION

A geochemical evaluation of a section of the McCartney No. 1 well was undertaken at the request of Mr. Ed Eble of the Stone Petroleum Corporation. The samples provided for analysis were collected in the interval 2790 - 3176 feet. Samples included 17 sidewall cores from 2790-3176 feet, five drill cuttings samples from 3090-3160 feet and a drill stem test sample identified as DST No. 3. In addition, a one foot section of full diameter core was provided from the interval 3208 - 3209 feet in the Longbranch No. 1 well. These samples were received in three different shipments, with the full diameter core arriving first, followed by the sidewall core samples and drill stem test sample. The cuttings samples were submitted upon the request of Core Laboratories, after preliminary analyses indicated the need for additional sample to fully characterize a suspected source interval.

This geochemical evaluation was performed to answer the following questions.

1. Determine the similarity of the oil recovered from the drill stem test to oils previously analyzed for Stone Petroleum.
2. Determine the similarity of the same oil to hydrocarbons extracted from sidewall core samples in the Viola, Simpson and St. Peter Sand formations.
3. Identify any hydrocarbon source intervals present. Quantify

potential yield from an identified source.

4. Isolate and identify material referred to as "black specks" in the St. Peter Sand.

To answer these questions a geochemical program was designed using screening analyses to identify the samples within the section that would provide the most information. The determination of organic carbon content of each sample plus Rock-Eval pyrolysis of samples with relatively high levels of organic carbon was performed to identify these samples. Additional analyses, including solvent extraction, gas chromatography and kerogen evaluation, were then performed on selected samples, to more clearly answer these questions.

DISCUSSION

The following discussion and interpretation of the analytical data has been organized into three sections based on the formation data provided by Stone Petroleum.

Viola

Four sidewall core samples and a drill stem test sample were collected in the Viola formation. Organic carbon determination and Rock-Eval pyrolysis (Tables 1 & 2) were performed on the sidewall core samples to select the best sample for comparative analysis with the drill stem test. The sample at 2790 feet was selected based on the high total organic carbon content (TOC) and the Rock-Eval pyrolysis S1 response (11.62 mgHC/grock, Table 2).

The oil sample was separated from the water, prepared for gas chromatography by isolating the saturated hydrocarbon fraction, and analyzed by injection into a Varian 3400 capillary gas chromatograph. The scan or fingerprint developed by the gas chromatograph is presented in Figure 2. The sidewall core at 2790 feet was extracted with a high purity solvent to recover any free hydrocarbons, then prepared and analyzed by gas chromatography in a similar manner as the oil. This fingerprint is presented in Figure 3.

The fingerprints of the two samples are considered to be similar enough to assure the oil from the drill stem test and the free hydrocarbons recovered

from the sidewall core have a common source. The distribution of the components between nC_{15} and nC_{23} are the prime evidence for correlation. In addition, the predominance of the odd numbered hydrocarbon components over the even numbered components and the lack of biomarker components called isoprenoids indicate a source sequence consisting of primarily marine algae.

Both GC scans are very similar in appearance to GC scans of oil samples previously analyzed by Core Laboratories, Inc. for Stone Petroleum, under our job number 85011. These samples, Davis Ranch Field, John Creek Field and Strahm Field, were all identified as oils collected from Viola Reservoirs. The correlation between these samples would indicate a source consisting of very similar organic facies.

There were no indications that any of the four sidewall cores from the Viola Formation contained organic facies capable of sourcing either the oil collected during Drill Stem Test 3 or the extract recovered from the sidewall core at 2790 feet.

Simpson

A total of 10 sidewall core samples were received from the Simpson Formation. These samples extended from 3092 to 3156 feet. Preliminary analyses on this section prompted Core Laboratories to request additional sample to better define a source sequence. Six drill cuttings samples were received that had been collected at 10 foot intervals and covered the depth interval 3090 to 3160 feet.

The sidewall core samples were initially screened using organic carbon determinations and pyrolysis in the same manner as the sample from the Viola. The sidewall core at 3142 feet was selected for extraction, gas chromatography and kerogen evaluation.

Figure 4 presents the GC scan of the recovered hydrocarbons. This scan contained the same distribution of hydrocarbon components as the GC scans from the sidewall core at 2790 and the recovered oil from the drill stem test, indicating a common source. However, the quantity of soluble hydrocarbons recovered from the sample at 2790 feet and at 3142 feet are markedly different (Table 3, EOM). The value reported for 2790 feet (10260 ppm) is indicative of a reservoir interval whereas the quantity at 3142 feet (2283ppm), relative to the TOC value, is indicative of a possible source. In addition, the Tmax values (Table 2) reported for the Viola samples and the Simpson Samples are quite different, again a phenomenon indicative of a reservoir interval as compared to a potential source interval.

Kerogen evaluation was attempted on the sidewall core from 3142 feet to determine the organic material (kerogen) type and to provide additional information on the thermal maturity of the sample. The kerogen recovery was extremely low and was determined to be 100% woody in character. The poor results of the kerogen evaluation may have been due to the small quantity of sample available and the possibility that the sidewall core sample processed for kerogen contained drilling fluid contaminants. These results prompted the request for additional sample material from this section.

The five cuttings samples were washed and a lithologic description was performed. A dark brown shale was noted to be a minor constituent of the cuttings interval, with the largest concentration in the 3130 - 3140 foot sample. This lithology was hand-picked for organic carbon determination and pyrolysis. The results indicated excellent source potential with a TOC value in excess of 14 weight percent, maturity, as measured by Tmax, at 444°C and a hydrogen Index over 1100 (Table 2).

Solvent Extraction and subsequent gas chromatography yielded the GC scan in Figure 5. The distribution pattern of the hydrocarbons C₁₅ through C₂₃ was very similar to those of the drill stem test oil sample and the two sidewall cores from 2790 and 3142 feet respectively. The kerogen type was classified as 100% amorphous debris (Table 4) with a Thermal Alteration Index of 2. The chemical structure of amorphous algal debris is such that it is prone to liquid hydrocarbon generation. Available evidence indicates that this hand-picked shale is representative of an organic facies that could source the oil sample recovered on the drill

ANALYTICAL DATA

Table 1

Lithology and Total Organic Carbon (TOC)

Depth (ft)	Sample Type	Lithology	TOC (wt %)
		VIOLA	
2790	SWC	100% SANDSTONE- lt brn, tan, v soft, sdy, slty mtrx, f gr, ang to sbang, lse consol, sli calctc, qtz, fspr, oil presence Cut Fluor- wh-bu, streaming, v fluor	0.85
2792	SWC	100% LIMESTONE- wh, lt gry, sparry calcite, v soft, pdry tex Fluor- wh-bu, v fluor	0.32
2796	SWC	100% LIMESTONE- wh, lt gry, sparry calcite, v soft, pdry tex Fluor- wh-bu, v fluor, yellow stream ing	0.34
2798	SWC	100% LIMESTONE- wh, lt gry, sparry calcite, v soft, pdry tex Fluor- wh-bu, v fluor, yellow stream ing	0.34

Table 1

Lithology and Total Organic Carbon (TOC)

Depth (ft)	Sample Type	Lithology	TOC (wt %)
		SIMPSON	
3090-3100	ctgs	95% LIMESTONE- brn, gry, mod hd, brit, f-crs xln, suc tex, oil stn 5% SHALE- dk gry, brn, mod hd, slty to sm tex, sli calctc, carb	
3092	SWC	100% LIMESTONE- wh, lt gry, sparry calcite, v soft, pwdry tex Fluor- wh-bu, v fluor, yellow stream ing	0.26
3120-3130	ctgs	85% LIMESTONE- brn, gry, mod hd, brit, f-crs xln, suc tex, oil stn 15% SHALE- dk gry, brn, mod hd, slty to sm tex, sli calctc, carb	
3126	SWC	100% CLAYSTONE- lt brn, wh, mod soft, slty to pwdry tex, v calctc Cut Fluor- bu-wh, v fluor	1.47
3127	SWC	100% LIMESTONE- wh, lt gry, v soft, sparry calcite, sme xln calcite Cut Fluor- bu-wh, sli fluor	0.31
3128	SWC	100% LIMESTONE- wh, lt gry, v soft, sparry calcite, sme xln calcite Cut Fluor- bu-wh, v fluor	0.33
3130A	C 6	100% LIMESTONE- wh, lt gry, v soft, sparry calcite, sme xln calcite Cut Fluor- bu-wh, sli fluor	0.62
3130B	C 23	100% LIMESTONE- wh, lt gry, v soft, sparry calcite, sme xln calcite Cut Fluor- bu-wh, sli fluor	0.29

Table 1

Lithology and Total Organic Carbon (TOC)

Depth (ft)	Sample Type	Lithology	TOC (wt %)
SIMPSON			
3130-3140	ctgs	75% LIMESTONE- brn, gry, mod hd, brit, f-crs xln, suc tex, oil stn 25% SHALE- total amount ----- 15% SHALE- (dk gry to blk,) mod hd, slty, carb 10% SHALE- (brn,) mod soft, slty, v carb	
3130-3140A	ctgs	100% SHALE- (HANDPICKED SAMPLE) dk brn, mod soft, slty, v carb	14.50
3136	SWC	100% LIMESTONE- wh, lt gry, v soft, sparry calcite, sme xln calcite Cut Fluor- bu-wh, v fluor	0.47
3140-3150	ctgs	80% LIMESTONE- brn, gry, mod hd, brit, f-crs xln, suc tex, oil stn 20% SHALE- dk gry, brn, mod hd, slty to sm tex, sli calctc, carb	
3142	SWC	100% CLAYSTONE- dk gry, blk, wh, soft, slty, calctc, carb Fluor- bu-wh, v fluor	1.98
3144	SWC	100% CLAYSTONE- dk gry, blk, wh, soft, slty, calctc, carb Fluor- bu-wh, sli fluor	0.46
3150-3160	ctgs	80% LIMESTONE- brn, gry, mod hd, brit, f-crs xln, suc tex, oil stn 20% SHALE- dk gry, brn, mod hd, slty to sm tex, sli calctc, carb	
3156	SWC	100% CLAYSTONE- dk gry, blk, wh, soft, slty, calctc, carb Fluor- bu-wh, sli fluor	1.10

Table 1

Lithology and Total Organic Carbon (TOC)

Depth (ft)	Sample Type	Lithology	TOC (wt %)
		ST. PETER SAND	
3173	SWC	100% CLAYSTONE- wh, lt gry, v soft, pwdry tex, sdy, intrd carb mat, Cut Fluor- bu-wh, sli fluor	0.52
3175	SWC	100% CLAYSTONE- wh, lt gry, mod soft, slty, intrd carb mat, sdy, sli calctc Cut Fluor- bu, sli fluor	0.20
3176	SWC	100% CLAYSTONE- wh, lt gry, mod soft, slty, intrd carb mat, sdy, sli calctc Cut Fluor- bu, sli fluor	0.06

Table 1

Lithology and Total Organic Carbon (TOC)

Depth (ft)	Sample Type	Lithology	TOC (wt %)
STONE PETROLEUM LONGBRANCH NO.1 FULL DIAMETER CORE SAMPLE			
3208-3209	core	100% LIMESTONE- lt-m gry, brn, v hd, brit, suc tex, crs xln, dolomitic i.p.	0.04

Table 2
Rock-Eval Pyrolysis

Stone Petroleum McCartney No.1

Depth (ft)	TOC	S1	mg/g rock S2	S3	Hydrogen Index	Oxygen Index	Oil Shows	Oil or Gas Potential	Trans Ratio	Tmax (Deg C)
2790	0.85	11.62	3.49	1.32	410.6	155.3	11.62	15.11	0.77	418
2796	0.34	2.12	0.78	1.16	229.4	341.2	2.12	2.90	0.73	417
3126	1.47	0.91	10.16	1.03	691.2	70.1	0.91	11.07	0.08	442
3130-3140A	14.50	7.92	168.12	1.04	1159.4	7.2	7.92	176.04	0.04	444
3142	1.98	1.11	12.24	0.80	618.2	40.4	1.11	13.35	0.08	436
3156	1.10	0.37	4.11	1.30	373.6	118.2	0.37	4.48	0.08	439
3173	0.52	0.13	1.82	1.23	350.0	236.5	0.13	1.95	0.07	437

TOC = Total Organic Carbon
 Hydrogen Index = $(S2/TOC) \times 100$
 Oxygen Index = $(S3/TOC) \times 100$
 Oil or Gas Shows = S1
 Oil or Gas Potential = S1+S2
 Transformation Ratio = S1/(S1+S2)

2790: High Hydrogen Index due to presence of high molecular weight hydrocarbon compounds in S2 peak.

Table 3
Results of C15 Extractable Organic Matter (EOM) Analysis

Stone Petroleum McCartney No.1

Depth (ft)	TOC (wt%)	EOM (ppm)	HC (ppm)	Composition of C15+ Extractable Organic Matter (Normalized Percent)			Percent				
				Sat	Aro	NSO	Asph	EOM/TOC	HC/TOC	HC/EOM	Sat/Aro
2790	0.85	10260						120.7			
3130-3140A	14.50	1568						1.1			
3142	1.98	2283						11.5			
3175	0.20	400						20.0			

TOC = Total Organic Carbon; EOM = Extractable Organic Matter (C15+); HC = C15+ Hydrocarbons
(saturates + aromatics); Sat = Saturates; Aro = Aromatics; NSO = Resins; Asph = Asphaltene

Table 4
Kerogen Data Summary

Stone Petroleum McCartney No.1

Depth (ft)	%Amorphous	%Exinite	%Woody	%Inertinite	<u>Hydrogen</u> Carbon	Thermal Alteration Index	Vitrinite Reflectance
3130-3140A	100	T	100	T		2	
3142						2	

Amorphous = algal debris + amorphous sapropels; Exinite = waxy and resinous materials generally having a characteristic form; i.e., plant cuticle, pollen, spores, resins, etc.

3130-3140A: TAI based on amorph. debris. Inert. of indeterminate age.

Pyrite presence suggests reducing environment. Strong orange fluor.

3142: Recent or drilling fluid contaminants. No Simpson age palynomorphs.

FIGURE 2

C10+ SATURATED HYDROCARBON FRACTION
STONE PETROLEUM MCCARTNEY NO.1 DST NO.3

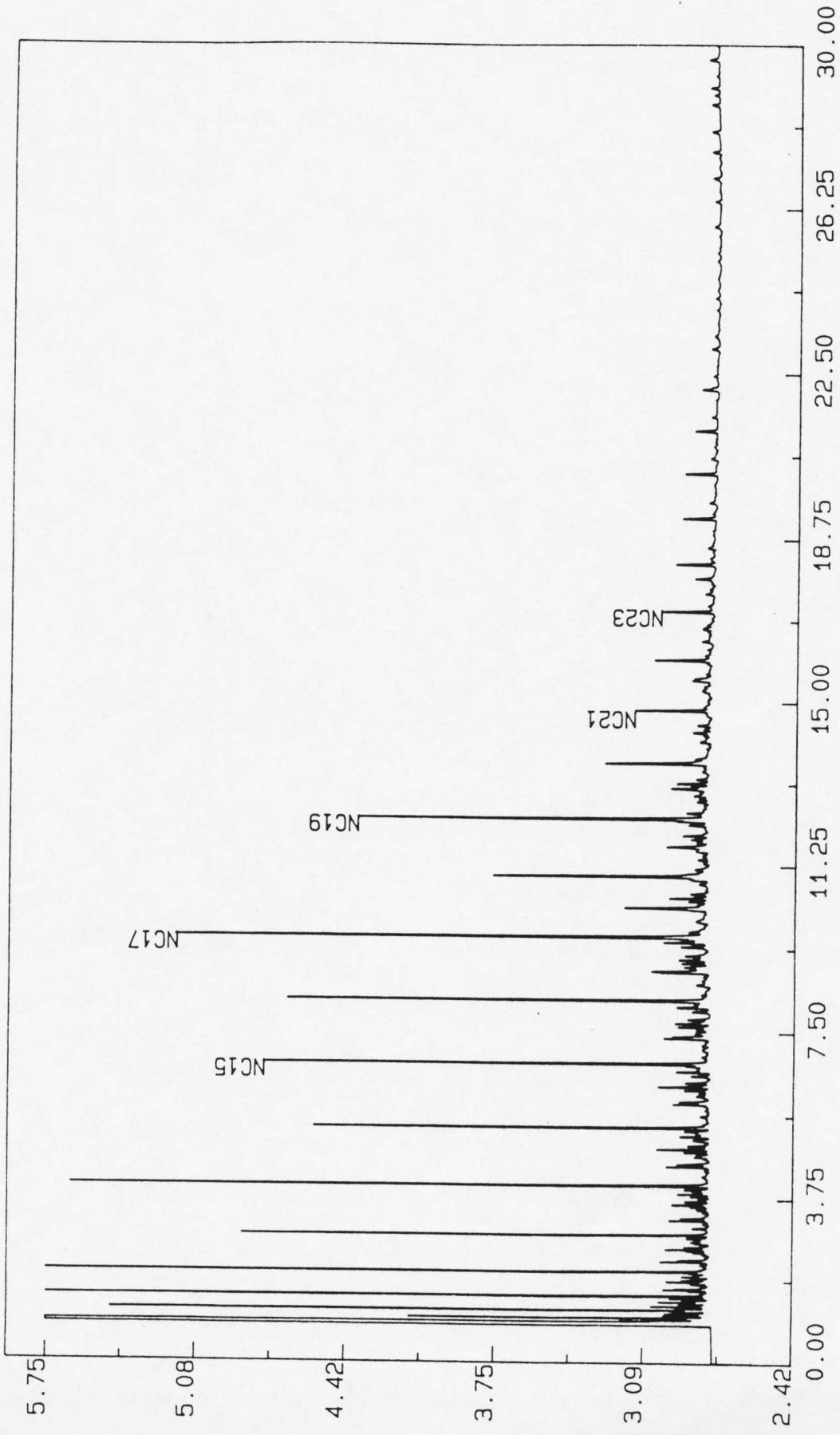


FIGURE 3

C10+ SATURATED HYDROCARBON FRACTION
STONE PETROLEUM MCCARTNEY NO.1 2790 ft.

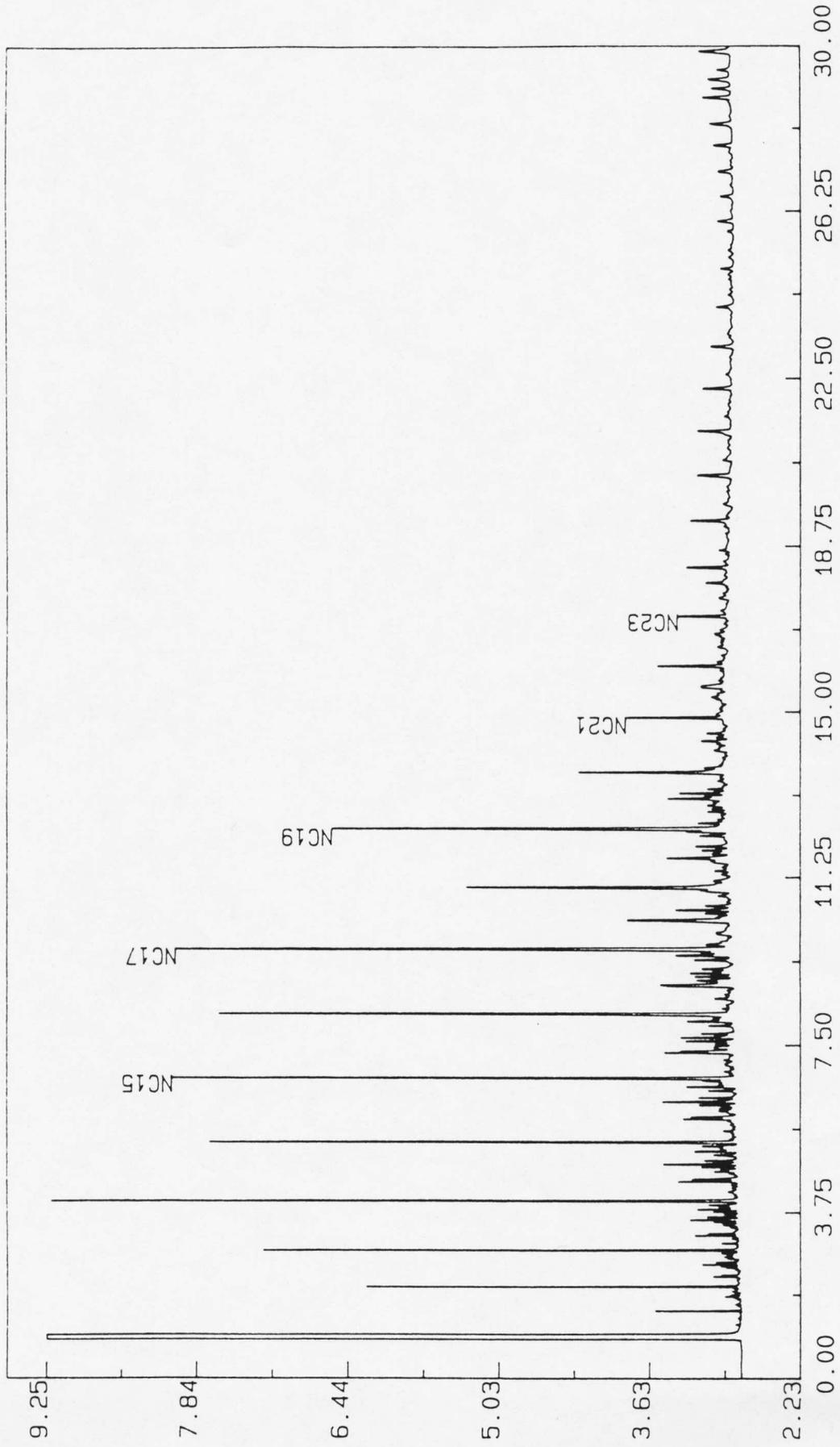


FIGURE 4

C10+ SATURATED HYDROCARBON FRACTION
STONE PETROLEUM MCCARTNEY NO.1 3142 ft.

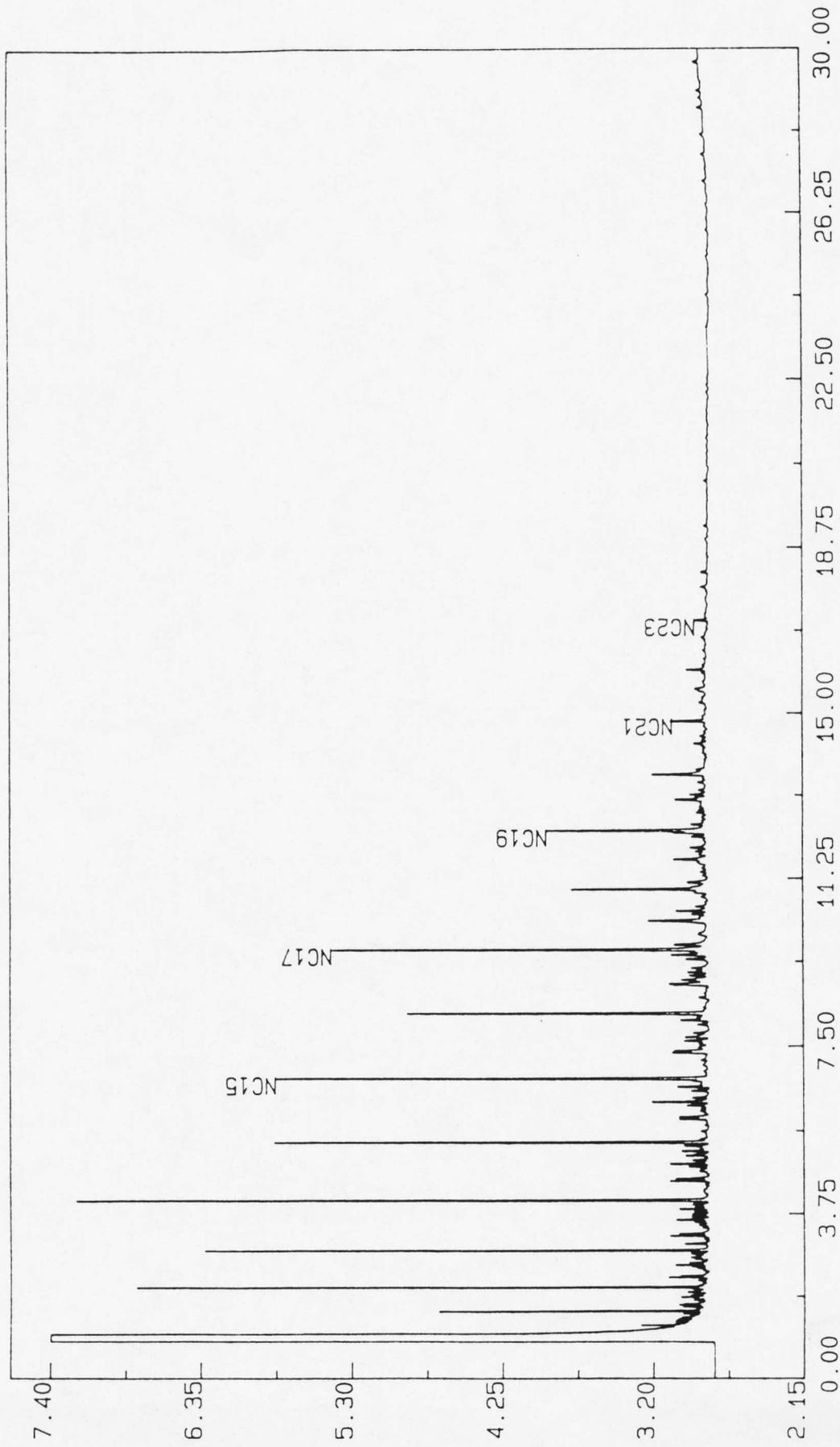


FIGURE 5

C10+ SATURATED HYDROCARBON FRACTION
HAND-PICKED SHALE 3130-3140 ft.

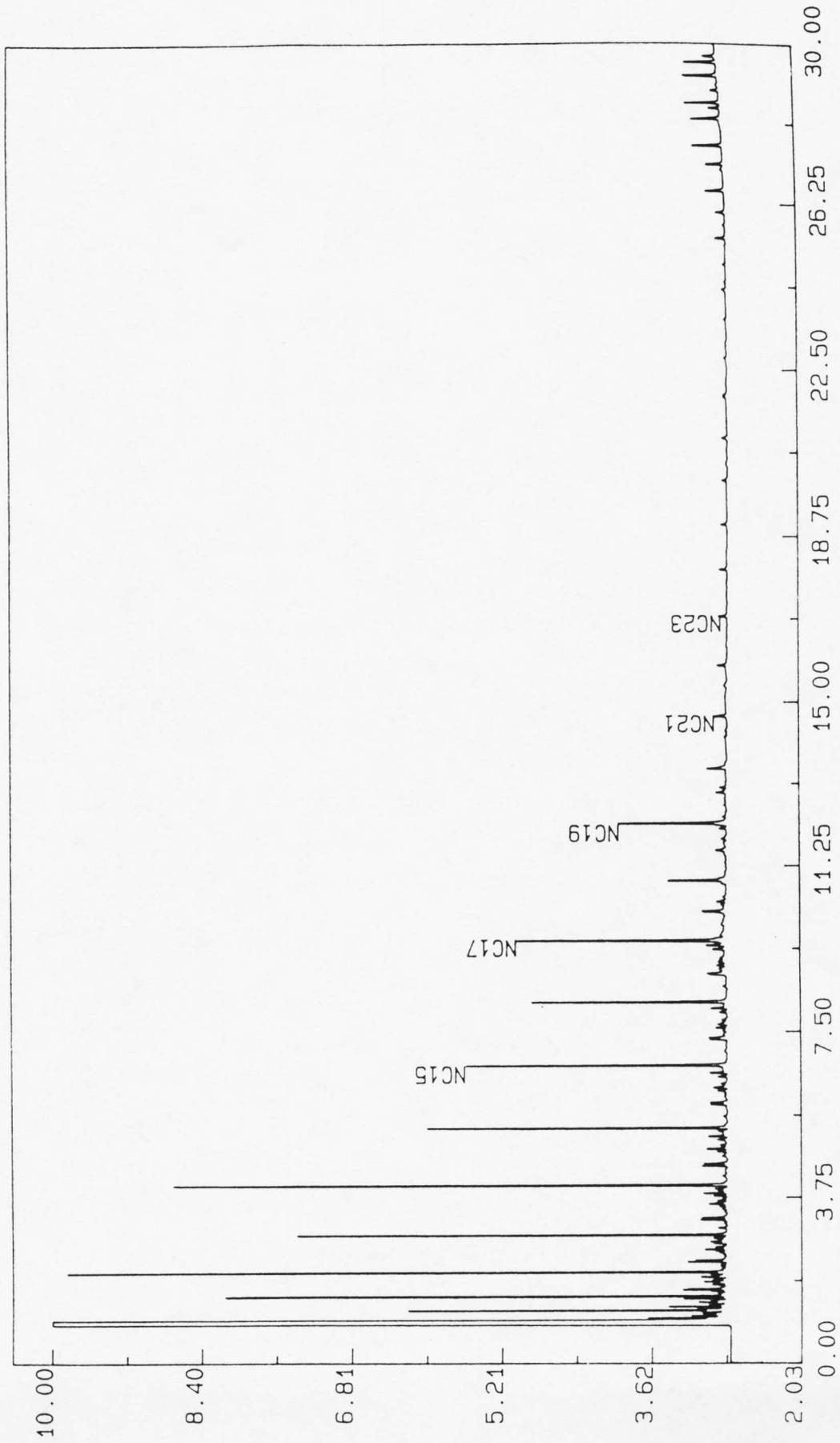
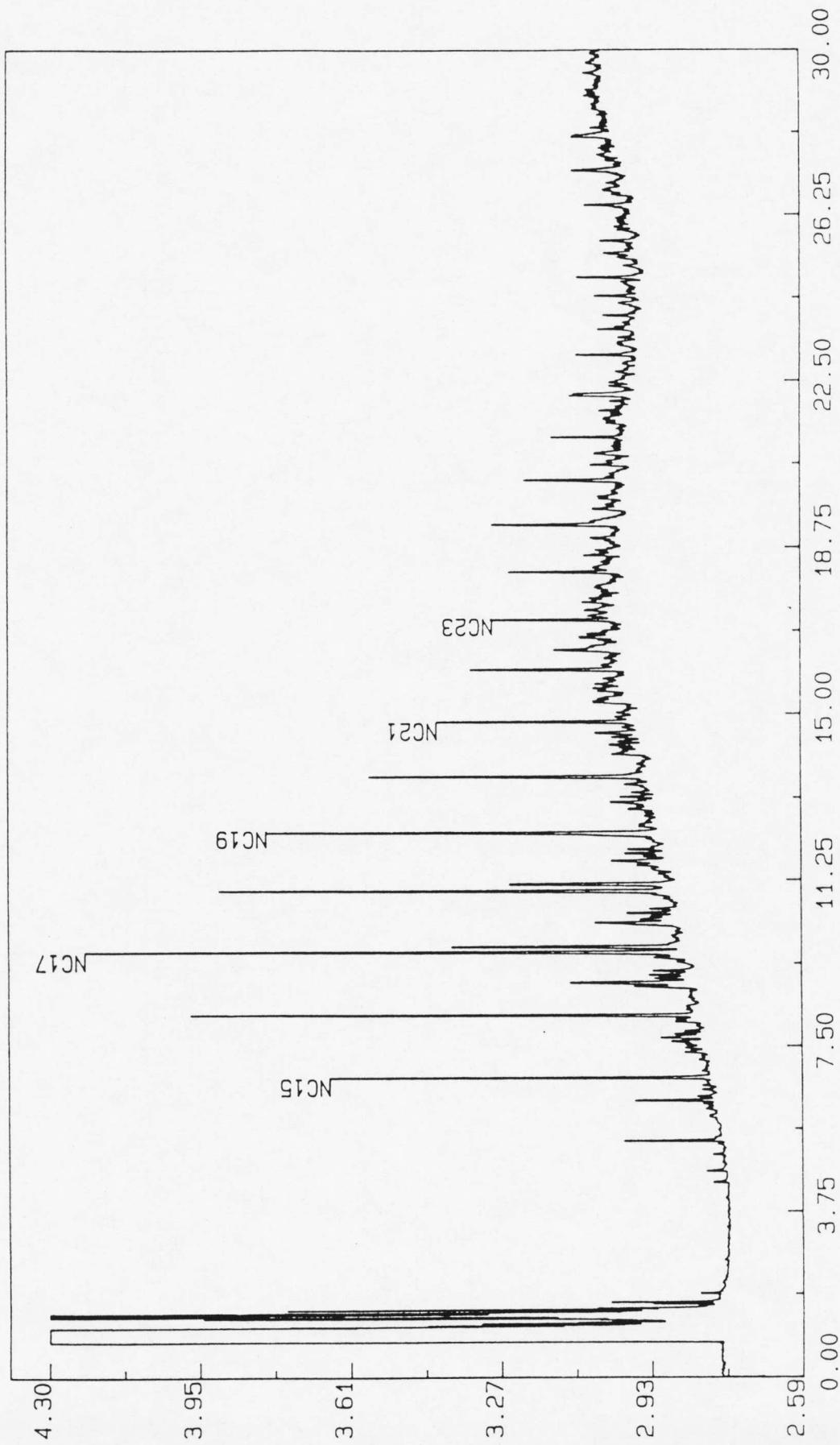


FIGURE 6

C10+ SATURATED HYDROCARBON FRACTION
STONE PETROLEUM MCCARTNEY NO.1 3175 ft.



APPENDIX

APPENDIX A

I Total Oil Generation Capacity:

- Assumptions
1. Generated oil density = 0.9 g/cc
 2. Rock Density = 2.3 g/cc
 3. Conversion of kerogen to oil and gas occurs completely and the oil/gas ratio is defined by the kerogen classification which is assigned by kerogen description or Rock-Eval parameters.
Type I (algal); Type II (mixed); Type III (Humic)

Equation

$$\text{Total Oil Generation Capacity} = k \times S_2 \times f_o$$

where $k = 0.7 \times 10^8$ (conversion factor from g/cc to millions of barrels per cubic mile)

$S_2 = S_2$ mg HC/g rock from Rock-Eval Pyrolysis

$f_o =$ Estimation of oil generation efficiency based on kerogen type: Type I = 0.8, Type II = 0.4, Type III = 0.1

Example

Average shale with TOC = 1.00 wt%, $S_2 = 3.0$ mgHC/g rock and kerogen type II.

$$\begin{aligned} \text{Total Oil Generation Capacity} &= 0.7 \times 10^8 \times 3.0 \times 0.40 \\ &= 8.4 \times 10^7 \text{ bbls/cubic mile} \end{aligned}$$

II. Oil Generated:

Assumptions are the same as for total oil generation capacity with additional assumption that the fraction of oil generated is dependent on the level of maturity and on the kerogen type.

Equation

$$\text{Oil Generated} = k \times \text{TOC} \times \text{HI} \times f_o \times f_1$$

where $k = 0.7 \times 10^8$

TOC = Total organic carbon (gC/100g Rock)

HI = Hydrogen Index (Rock-Eval Pyrolysis)

f_o = Generation efficiency

f_1 = Fractional conversion based on maturity and kerogen type

Example

Average shale with TOC = 1.00 wt% (1 gC/100g Rock),

HI = 300 mgHC/gC, Kerogen type II and maturity,

defined by T_{max} , at 442°C (approximate $R_o = 0.70\%$)

$$\begin{aligned}
\text{Oil Generated} &= k \times \text{TOC} \times \text{HI} \times f_o \times f_1 \\
&= 0.7 \times 10^8 \times 0 \times 300 \times 0.4 \times 0.1 \\
&= 8.4 \times 10^6 \text{ bbls/cubic mile}
\end{aligned}$$

FOR SAMPLE AT 3130-3140 FEET

III. Total Oil Generation Capacity:

$$\begin{aligned}
&= k \times S_2 \times f_o & k &= 0.7 \times 10^8 \\
& & S_2 &= 168 \text{ (Table 2)} \\
& & f_o &= 0.8 \text{ for Amorphous Algal} \\
& & & \text{debris (Table 3)} \\
&= 0.7 \times 10^8 \times 0.8 \\
&= 9.4 \times 10^9 \text{ bbls/cubic mile}
\end{aligned}$$

This value assumes one cubic mile of homogeneous source rock in place and at full maturity. Actual capacity may be somewhat less depending on the homogeneity and thickness of the section.

IV. Oil Generated

$$= k \times \text{TOC} \times \text{HI} \times f_o \times f_1$$

$$k = 0.7 \times 10^8$$

$$\text{TOC} = 14.5 \text{ (Table 1)}$$

$$\text{HI} = 1159 \text{ (Table 2)}$$

$$f_o = 0.8 \text{ (Table 3)}$$

$$f_1 = 0.1 \text{ (Tmax} = 444^\circ\text{C)}$$

$$= 0.7 \times 10^8 \times 0.145 \times 1159 \times 0.8 \times 0.1$$

$$= 9.4 \times 10^8 \text{ bbls/cubic mile}$$

Assuming the section is 10 feet thick and contains approximately 10% by volume of the hand-picked shale identified in sample 3130-3140, the resulting oil generated per square mile would be:

$$9.4 \times 10^8 \times (10/5280) \times 0.10$$

$$= 1.78 \times 10^5 \text{ bbls/square mile}$$

178,000 bbls/square mile generated at current level of maturity from the interval at 3130-3140 feet.

Theoretical Total Oil Generation Capacity & Oil Generated*

<u>Sample Depth</u>	TOC	S2	HI	Fo	F1	TOGC**	TOG***
Average Shale	1.00	3	300	0.4	0.10	8.4×10^7	8.4×10^6
2790	0.85					Reservoir	Rock
2796	0.34					Reservoir	Rock
3126	1.47	10	691	0.6	0.10	4.3×10^8	4.3×10^7
3130-3140	14.50	168	1159	0.8	0.10	9.4×10^9	9.4×10^8
3142	1.98	12	618	0.6	0.10	5.1×10^8	5.1×10^7
3156	1.10	4	374	0.3	0.10	8.6×10^7	8.6×10^6
3173	0.52	1.8	350	0.3	0.10	3.8×10^7	3.8×10^6

* At maturity level equivalent to $\%Ro = 0.70$ or early maturity.

** TOGC = Total Oil Generation Capacity (bbls oil/cubic mile)

*** TOG = Total Oil Generated (bbls/cubic mile) at current maturity

REFERENCES

Hunt, J., 1979, Petroleum Geochemistry and Geology
W. H. Freeman and Company

Tissat, B., Welte, D., 1978 Petroleum Formation and Occurrence
Springer - Verlag

Waples, D., 1981, Organic Geochemistry for Exploration
Geologists, Burgess Publishing Company

Waples, D., 1985, Geochemistry in Petroleum Exploration,
Human Resources Development Corporation