

New Mexico Bureau of Mines and Mineral Resources
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HYDROCARBON SOURCE-ROCK ANALYSES,
HOUSTON OIL AND MINERALS NO. 14-28 FEDERAL WELL,
TORRANCE COUNTY, NEW MEXICO

by GeoChem Laboratories, Inc.

1987



GEOCHEMICAL ANALYSES
SOURCE ROCK EVALUATION

CRUDE OIL—SOURCE ROCK CORRELATION

CRUDE OIL CHARACTERIZATION
GEOCHEMICAL PROSPECTING

1143-C BRITTMORE ROAD • HOUSTON, TEXAS 77043-8084 • 713/487-7011

November 13, 1984

LEONARD MINERALS COMPANY
Mr. Ben Donegan
3202 Candelaria N.E.
Albuquerque, New Mexico 87107

Dear Mr. Donegan:

Enclosed please find the results of geochemical analyses performed on fifteen (15) composite samples from the HOM 14-28 Federal well in Torrance County, New Mexico. *Houston Oil + Minerals → 28-6N-10E*

Upon arrival at GeoChem these samples were assigned the GeoChem Job Number 2998 and as instructed, were submitted to the following organic geochemical analyses:

Total Organic Carbon and Brief
Lithological Description.....Table I

Rock-Eval Pyrolysis.....Table II

Visual Kerogen assessment.....Table III

DISCUSSION OF THE RESULTS

Lithological Description

Lithologies picked from cuttings from the HOM 14-28 Federal well consist of a reddish brown shale from 5190' to 6880'. A quartzite and reddish gray siltstone make up the sediments from 7200' to 8220'. The remaining sediments from 8300' to 8740' consist mainly of a dark gray shale.

Thermal Maturity

The thermal maturity of the sediments from this well range from a moderately mature Maturation Index Stage 2+ to 3-, at 8740'. At these levels of maturation, the sediments from 5270' to 6340' are considered within the very early oil-generating zone, while those sediments from 6550' to 8740' are considered in the "oil window" or oil-generating zone.

The S2 value detected from this well is insufficient to produce a valid T_{max} , therefore no maturation determinations can be determined using Rock-Eval pyrolysis.

Visual Kerogen Characterization

Woody kerogen dominates the upper sequences (5270' to 6550') of this well, giving these sediments a gas-prone character. Sediments below 6550' to 8740' consist of woody material with secondary herbaceous matter. Generally with these mixtures of kerogen types these sediments have a dominant gas-prone character with a secondary oil-prone character.


Hydrocarbon Source Characterization

Sediments analyzed from 5190' to 6340' contain poor amounts of organic matter (0.20% avg. TOC; Table I), thus giving this section a poor hydrocarbon source character. The remaining clastic sediments, from 6510' to 8220' and 8300' to 8740' contain fair amounts of organic matter (0.61% avg. TOC and 0.79% avg. TOC respectively; Table I) giving these sediments a fair source character.

Generally, pyrolysis results indicate the sediments analyzed from this well have a poor hydrocarbon source rock character. The sediments analyzed from 6510'-6550' contain good amounts of total organic carbon (1.73% TOC; Table I and good amounts of residual hydrocarbon, $S_2=1.07$ mg/g; Table II), thus giving this sequence a good hydrocarbon source character.

Should we be of any further assistance concerning this study or any other matter please do not hesitate to call upon us.

Yours truly,



Douglas A. Muckelroy
GEOCHEM LABORATORIES, INC.

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Enclosures



Table I

SCREEN ANALYSIS SUMMARY

GeoChem Sample Number	Well Interval (feet)	Brief Lithological Description	Total Organic Carbon (% of Rock)
2998-001	5190-5270	100% Shale, reddish brown. Trace anhydrite.	0.12
2998-002	5560-5610	60% Shale, reddish brown. 40% Sandstone, yellowish gray.	0.10
2998-003	5700-5750	60% Shale, medium dark gray. 40% Sandstone, yellowish gray.	0.40
2998-004	5940-6000	50% Shale, reddish brown. 50% Anhydrite, white to light gray.	0.22/0.21
2998-005	6300-6340	50% Shale, reddish brown. 50% Sandstone, yellowish gray.	0.14
2998-006	6510-6550	60% Shale, reddish brown. 30% Sandstone, yellowish gray. 10% Shale, grayish black.	1.73
2998-007	6840-6880	100% Siltstone, reddish brown. Trace shale.	0.12
2998-008	7200-7260	60% Quartzite, white to clear. 40% Siltstone, reddish brown.	0.63
2998-009	7310-7380	70% Quartzite, various colors 30% Siltstone, reddish gray.	0.33
2998-010	7590-7640	70% Siltstone, reddish gray. 30% Quartzite, various colors.	0.58
2998-011	7900-7970	50% Quartzite, various colors 30% Shale, grayish black. 20% Siltstone, reddish gray.	0.38

Table I

SCREEN ANALYSIS SUMMARY

GeoChem Sample Number	Well Interval (feet)	Brief Lithological Description	Total Organic Carbon (% of Rock)
2998-012	8140-8220	100% Siltstone, medium dark gray.	0.47
2998-013	8330-8380	60% Shale, dark gray. 40% Sandstone, brownish gray.	0.85
2998-014	8500-8590	60% Shale, dark gray. 40% Sandstone, yellowish gray to brownish gray.	0.58
2998-015	8700-8740	100% Shale, dark gray.	0.92

TABLE II
RESULTS OF ROCK-EVAL PYROLYSIS

GeoChem Sample No.	Depth Interval (Feet)	Tmax (c)	S ₁ (mg/g)	S ₂ (mg/g)	S ₃ (mg/g)	PI	PC*	T.O.C. (wt.%)	Hydrogen Index	Oxygen Index
2998-001	5190-5270	371*	0.03	0.02	0.29	0.75	0.80	0.12	16	241
2998-002	5560-5630	260*	0.02	0.00	0.18	1.00	0.80	0.10	0	180
2998-003	5760-5750	296*	0.02	0.01	0.19	1.00	0.80	0.40	2	47
2998-004	5940-6000	265*	0.02	0.03	0.51	0.50	0.80	0.22	13	231
2998-005	6300-6340	418*	0.01	0.01	0.26	0.50	0.80	0.14	7	185
2998-006	6510-6550	420	0.03	1.07	1.08	0.03	0.69	1.73	61	62
2998-007	6840-6880	428*	0.02	0.01	0.15	1.00	0.80	0.12	8	125
2998-008	7200-7260	364*	0.03	0.14	0.18	0.19	0.81	0.63	22	28
2998-009	7310-7380	384*	0.02	0.08	0.22	0.20	0.80	0.33	24	66
2998-010	7590-7640	375*	0.01	0.04	0.17	0.25	0.80	0.58	6	29
2998-011	7900-7970	289*	0.02	0.03	0.22	0.50	0.80	0.38	7	57
2998-012	8140-8220	312*	0.01	0.02	0.16	0.50	0.80	0.47	4	34
2998-013	8300-8380	408*	0.03	0.07	0.18	0.30	0.80	0.86	8	20
2998-014	8500-8590	323*	0.02	0.04	0.22	0.33	0.80	0.58	6	37
2998-015	8700-8740	324*	0.03	0.08	0.23	0.30	0.80	0.92	8	25

* The S₂ value, or quantity of kerogen pyrolyzed to bitumen, is insufficient to produce a valid Tmax.


T.O.C. = Total organic carbon, wt. %
S₁ = Free hydrocarbons, mg HC/g of rock
S₂ = Residual hydrocarbon potential
(mg HC/g of rock)

S₃ = CO₂ produced from kerogen pyrolysis
(mg CO₂/g of rock)
PC* = 0.083 (S₁ + S₂)
Hydrogen
Index = mg HC/g organic carbon

Oxygen
Index = mg CO₂/g organic carbon
PI = S₁/S₁ + S₂
Tmax = Temperature Index, degrees C.

TABLE III
VISUAL KEROGEN ASSESSMENT WORKSHEET

GEOCHEM No.	DEPTH	INDIGENOUS POPULATION (INTERPRETED)		GENERAL CHARACTERISTICS			CAVED AND/OR REWORKED POPULATION(S)		SUMMARY ORGANIC MATTER TYPE
		TYPE OF ORGANIC MATTER	MATURATION INDEX	COLOR OF ORGANIC MATTER	STATE OF ORGANIC MATTER	%	TYPE OF ORGANIC MATTER	MATURATION INDEX	
2998-001	5270		W ₂ -; Am-H						W ₂ -; Am-H
2998-002	5610		W ₂ -; B						W ₂ -; B
2998-003	5750		W ₂ ; H ₂ -						W ₂ ; H ₂ -
2998-004	6000		W ₂ -; Am-H						W ₂ -; Am-H
2998-005	6340		W ₂ -; Am-H						W ₂ -; Am-H
2998-006	6550		W ₂ -; H					coal disc	W ₂ -; H
2998-007	6880		W ₂ ; H ₂ -						W ₂ ; H ₂ -
oil stain 2998-008	7260		W ₂ ; H ₂ -						W ₂ ; H ₂ -
2998-009	7380		W ₂ ; H ₂ ; Am						W ₂ ; H ₂ ; Am
2998-010	7640		W ₂ ; H ₂ ; Am						W ₂ ; H ₂ ; Am
2998-011	7970		W ₂ ; H ₂ ; Am						W ₂ ; H ₂ ; Am
2998-012	8220		W ₂ ; H ₂ ; Am						W ₂ ; H ₂ ; Am
2998-013	8380		W ₂ ; H ₂ ; Am						W ₂ ; H ₂ ; Am
2998-014	8590		W ₂ ; H ₂ -						W ₂ ; H ₂ -
2998-015	8740		W ₂ ; H ₂ -						W ₂ ; H ₂ -

 Recent contaminants from drilling mud