

New Mexico Bureau of Mines and Mineral Resources  
Open File Report No. OF-204

ORGANIC GEOCHEMICAL ANALYSIS, GARTLAND NO. 1 BRISTER  
WELL, SIERRA COUNTY, NEW MEXICO

by Stephen R. Jacobson, James S. Rankin,  
and James D. Saxton  
Chevron, U.S.A. Inc.  
Denver, Colorado

and Stephen W. Brown  
Brown and Ruth Laboratories, Inc.  
Houston, Texas

May 25, 1983



Chevron U.S.A. Inc.

700 South Colorado Blvd., P. O. Box 599, Denver, CO 80201

May 25, 1983

OF 204

Mr. Clayton S. Valder  
Marshall R. Young Oil Co.  
750 West Fifth Street  
Fort Worth, TX 76102

Dear Mr. Valder:

Enclosed please find the geochemical and paleo results from the Gartland #1 Brister. Paleontologic examination of the samples found Cretaceous forms throughout the well. Also the T-Max results show a temperature reversal (lower temperatures with depth). The cuttings were re-sampled but the paleo and T-Max results were unchanged. Upon very close examination of samples in the Paleozoic section, a few Permian forms were identified. There are several possible interpretations to explain these results. The most likely, in my opinion, is that the samples reflect a caving problem. The higher thermal maturity (T.A.I.) values (4180 ft. and deeper) were obtained from some of the few Paleozoic palynomorphs, inferring that these values are probably representative of the section at the indicated depths.

Yours truly,

*M. I. Roberson*

M. I. Roberson  
District Geologist

JSR/bm

Enclosures

cc: G. C. Young, Chevron U.S.A.

*Sam - results on this well  
not very enlightening. If you have or obtain  
any additional info or evidence for tops,  
& stratigraphy cut by this well, I'd  
appreciate hearing from you.*

*Sincerely  
Jim Randers*

Nm Bm Jm R

BIOSTRATIGRAPHIC STUDY NO. 1096  
PALYNOLOGY REPORT  
P3974

**LOCATION:** Gartland #1 Brister (Drew Matthews)  
Sec. 8-12S-4W  
Sierra Co., New Mexico

**PROBLEM:** Cutting and picked cuttings samples submitted by Jim Rankin for determination of maturity (TAI-V<sub>o</sub>) and microscopic organic analysis (MOA).

**RESULTS:** Note: So much Cretaceous material is present in the complete interval that TOC, Tmax, organic yield and MOA indices are valueless, essentially the same material was measured over and over. Laborious examination did yield a very few palynomorphs that should be "in place" according to the stratigraphy given. No vitrinite plugs were made because of insufficient material. They would not have been useful because such a small proportion of the kerogen was in place.

Data

Sample  
P3974-2      Kerogen Types (MOA)  
(2160-2180)    No useful data.

Maturity

T<sub>max</sub> -  
V<sub>o</sub> -  
TAI - 2.7 - 2.8 oil generative zone. (=V<sub>o</sub>, .70 - .80)

Amount (of organics)

No useful data.

FILE INDEXING INFO.	
DISPLAYS	TB
SMPL. TYPE	P
FOSSIL TYPE	P
TYPE OF STUDY	TMV

Sample            Kerogen Types  
P3974-3            No useful data.  
(2370-2400)

Maturity  
T<sub>max</sub>    -  
V<sub>o</sub>      -  
TAI     - 2.6 - 2.7 oil generative zone. (=V<sub>o</sub>, .60 - .70)

Amount  
No useful data.

Top of Permian @ 2,740'

Sample            Kerogen Types  
P3974-13            No useful data.  
(2930-2940)

Maturity  
T<sub>max</sub>    -  
V<sub>o</sub>      -  
TAI     - 2.8 - 2.9 oil generative zone. (=V<sub>o</sub>, .80 - .90)

Amount  
No useful data.

Sample            Kerogen Types  
P3974-4            No useful data.  
(2920-2960)

Maturity  
T<sub>max</sub>    -  
V<sub>o</sub>      -  
TAI     - 2.8 - 2.9 oil generative zone. (=V<sub>o</sub>, .80 - .90)

Amount  
No useful data.

Sample            Kerogen Types  
P3974-33            No useful data.  
(3650-3660)

Maturity  
T<sub>max</sub>    -  
V<sub>o</sub>      -  
TAI     - 2.9 - 3.0 oil generative zone. (=V<sub>o</sub>, .90 - 1.0)

Note: The first occurrence downhole of a single specimen of Vittatina sp. (Permian) is used in this determination, this also is the first corroboration of the stratigraphy.

Amount  
No useful data.

Sample  
P3974-34  
(4180-4190)

Kerogen Types  
No useful data.

Maturity

T<sub>max</sub> -  
V<sub>o</sub> -  
TAI 3.8 - 3.9 dry gas gen. zone. (=V<sub>o</sub>, 2.7 - 3.4)

Note: TAI determination based on presence of a single specimen of Hamiapollenites cf. perisporites, a Permian age palynomorph.

Amount

No useful data.

Top of sill @ 4,360'

Bottom of sill @ 5,110'

Sample  
P3974-38  
(5430-5450)

Kerogen Types  
No useful data.

Maturity

T<sub>max</sub> -  
V<sub>o</sub> -  
TAI - 3.8 - 3.9 dry gas gen. zone. (=V<sub>o</sub>, 2.7 - 3.4)

Note: TAI determination based on the following assemblage:  
One specimen of Hamiapollenites cf. perisporites, Permian  
One specimen of Vittatina sp., Permian  
One specimen of Vittatina costabilis, Permian.

Amount  
No useful data.

Sample  
P3974-30  
(6860-6865)

Kerogen Types  
No useful data.

Maturity

T<sub>max</sub> -  
V<sub>o</sub> -  
TAI - 3.8 - 3.9 dry gas gen. zone. (=V<sub>o</sub>, 2.7 - 3.4)

Amount  
No useful data.

Sample  
P3974-39  
(6860-6865)

Kerogen Types  
No useful data.

Maturity

T<sub>max</sub> -  
V<sub>o</sub> -  
TAI - 3.8 - 3.9 dry gas gen. zone. (=V<sub>o</sub>, 2.7 - 3.4)

Note: TAI determination based on a single specimen of Vittatina sp. a Permian age palynomorph.

Amount

No useful data.

Sample  
P3974-10  
(7200-7220)

Kerogen Types  
No useful data.

Maturity

T<sub>max</sub> -  
V<sub>o</sub> -  
TAI - 3.8 dry gas gen. zone. (=V<sub>o</sub>, 2.7)

Amount

No useful data.



Sample  
P3974-16  
(7200-7230)

Kerogen Types  
No useful data.

Maturity

T<sub>max</sub> -  
V<sub>o</sub> -  
TAI - 3.8 - 3.9 dry gas gen. zone. (=V<sub>o</sub>, 2.7 - 3.4)

Amount

No useful data.

Sample  
P3974-31  
(7395-7400)

Kerogen Types  
No useful data.

Maturity

T<sub>max</sub> -  
V<sub>o</sub> -  
TAI - 3.8 - 3.9 dry gas gen. zone. (=V<sub>o</sub>, 2.7 - 3.4)

Amount

No useful data.

Sample            Kerogen Types  
P3974-11           No useful data.  
(8200-8230)

Maturity  
T<sub>max</sub>    -  
V<sub>o</sub>       -  
TAI      -    3.8 - 3.9 dry gas gen. zone. (=V<sub>o</sub>, 2.7 - 3.4)

Amount  
No useful data.

Sample            Kerogen Types  
P3974-12           No useful data.  
(8500-8510)

Maturity  
T<sub>max</sub>    -  
V<sub>o</sub>       -  
TAI      -    3.8 - 3.9 dry gas gen. zone. (=V<sub>o</sub>, 2.7 - 3.4)

Amount  
No useful data.

Sample  
P3974-18  
(8490-8550)

Kerogen Types  
No useful data.

Maturity

T<sub>max</sub> -

V<sub>o</sub> -

TAI 3.8 - 3.9 dry gas gen. zone. (=V<sub>o</sub>, 2.7 - 3.4)

Amount

No useful data.

ATTACHMENT: Brown - Ruth Report 429  
Brown - Ruth Report 407  
Figure 1

*SK*

May 18, 1983  
J. D. SAXTON

APPROX. TAI	APPROX. % R <sub>o</sub>	APPROX. TAI	APPROX. % R <sub>o</sub>	APPROX. TAI	APPROX. % R <sub>o</sub>
1.0	—	2.0	0.30	3.0	1.0
1.1	0.11	2.1	0.32	3.1	1.1
1.2	0.14	2.2	0.35	3.2	1.2
1.3	0.16	2.3	0.38	3.3	1.3
1.4	0.18	2.4	0.43	3.4	1.4
1.5	0.20	2.5	0.50	3.5	1.5
1.6	0.22	2.6	0.60	3.6	1.7
1.7	0.24	2.7	0.70	3.7	2.0
1.8	0.26	2.8	0.80	3.8	2.7
1.9	0.28	2.9	0.90	3.9	3.4
				4.0	4.0

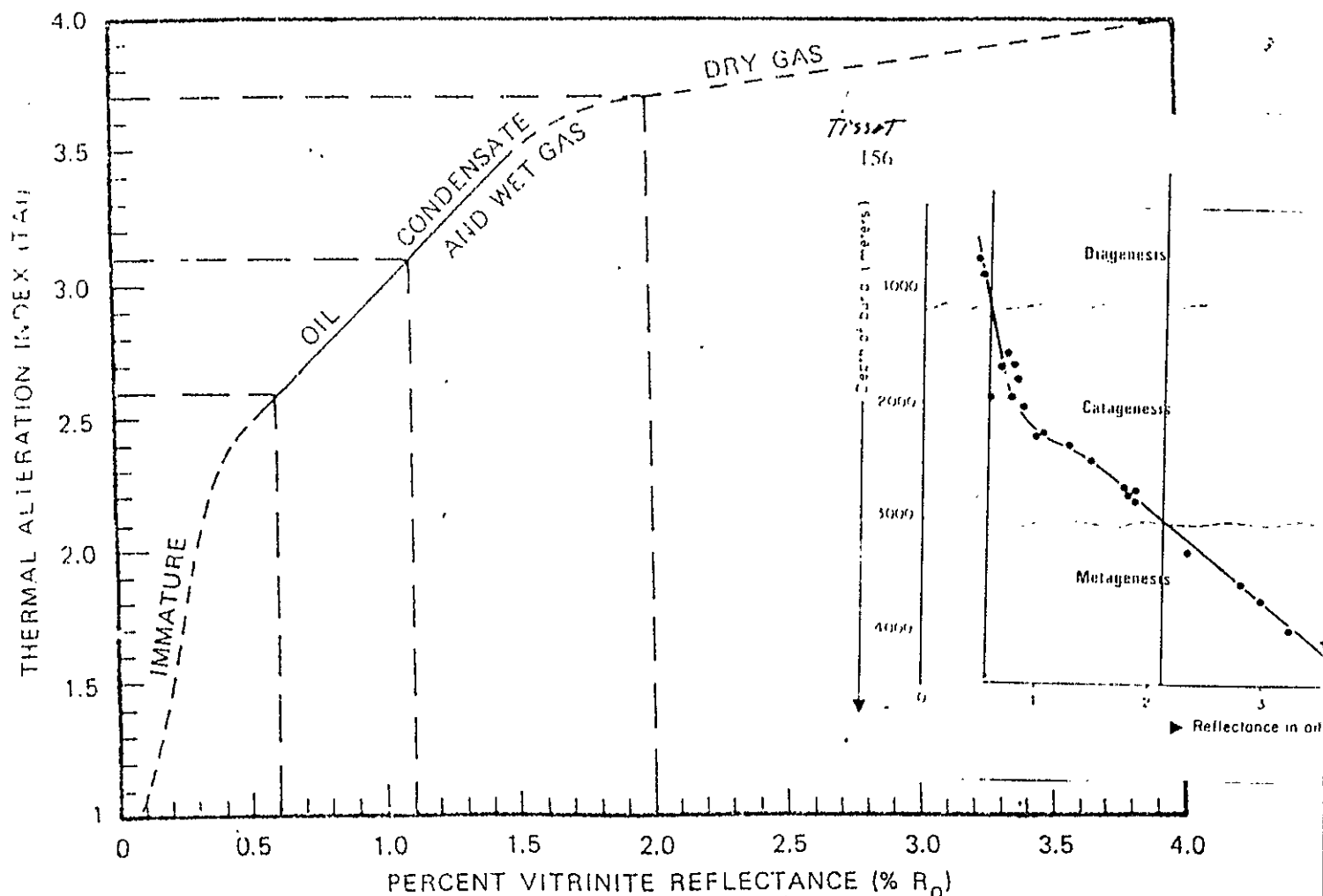


FIGURE 1  
TAI AND PERCENT VITRINITE REFLECTANCE OF  
PRINCIPAL HYDROCARBON GENERATION ZONES

BIOSTRATIGRAPHIC STUDY #1096

ADDENDUM

P3974

Location                      Gartland (Drew Matthew) #1 Brister  
    Section 8, T12S, R4W  
    Sierra County, New Mexico

Problem                        Confirm age of picked cuttings samples to support source  
    rock quality determinations. Requested by J. S. Rankin.

Results

<u>Sample #</u>	<u>Depth</u>	<u>Age</u>
P3974-34	4180-90'	Permian (?)
P3974-38	5430-50'	Permian (?)
P3974-39	6860-65	Permian (?)

Discussion

These results must be used with caution. The dominant proportion of the organic matter is Cretaceous, characterized by dinoflagellates, plant tissue spores and pollen unknown from the Paleozoic. As these samples were picked cuttings, the possibility that Cretaceous cavings were concentrated by the picking process is suggested. Consequently bulk analyses like total organic content (T.O.C.), microscopic organic analyses (M.O.A.) and rock eval pyrolysis (including Tmax) are all masked or overprinted by the large Cretaceous component of the samples.

The three samples studied contained two specimens of Hamiapollenites c.f. perisporites, restricted to the Wolfcampian-Leonardian, two broken specimens assignable to Vittatina sp. and one specimen of Vittatina costabilis (known from Wolfcampian to Guadalupian). One specimen of each was found in sample P3974-38 (5430-50').

A single specimen of H. cf. perisporites was found in sample P3974-34 (4180-90'). A single specimen of Vittatina sp. was found in P3974-39 (6860-65'). How to unravel the reworking, caving or in-place determination is complicated by the quality of the samples available to be picked and the picking process itself.

*Steve*  
 S. R. JACOBSON  
 May 9, 1983

SRJ:mm

<u>FILE INDEXING INFO.</u>	
DISPLAYS	<u>T, B</u>
SMPL TYPE	<u>P</u>
FOSSIL TYPE	<u>P</u>
TYPE OF STUDY	<u>A</u>

P3974-38 #2 96.1-3.0

P3974-38 #2 92.1-23.3

P3974-39 #1 94.8-20.0

V.I.T.

V.I.T. ?

V.I.T.

90.5-14.5  
#2  
P3974-38

PLENN  
 5400  
 TOP/PLENN  
 6300  
 CISCO  
 TOP/CANYON  
 PLENN  
 6610  
 TOP/STRAWN  
 PLENN  
 7000  
 TOP/AT0AA  
 PLENN  
 7910  
 TOP/MISS  
 8250  
 TOP/ST...-DEV  
 8350  
 PRC/CAMERIAN  
 8560

#3974-30  
 #3974-39    6660-6865    TAI 3.8-3.9 = V<sub>0</sub> 2.7-3.4  
 #3974-10  
 #3974-16    7200-7220    TAI 3.8 = V<sub>0</sub> 2.7  
              7200-7230    TAI 3.8-3.9 = V<sub>0</sub> 2.7-3.4  
 #3974-51    7395-7400    TAI 3.8-3.9 = V<sub>0</sub> 2.7-3.4  
 #3974-11    8200-8250    TAI 3.8-3.9 = V<sub>0</sub> 2.7-3.4  
 #3974-12  
 #3974-18    8500-8510    TAI 3.8-3.9 = V<sub>0</sub> 2.7-3.4  
              8490-8550

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TOP OF CRT. 1590	P3974- 1	1630-1700		
TOP OF MANGOS (CRET.) 2035	P3974- 2	2160-2180	TAI 2.7-2.8 = $V_{0r}$	.70-.80
TOP OF GULLUP 2320	P3974- 3	2370-2400	TAI 2.6-2.7 = $V_{0r}$	.70-.80
TOP OF M. D. L. (CRET.) 2620				
TOP OF M. W. S. (CRET.) 2740				
TOP OF ORIENTAL (CRET.) 2850	P3974-15 P3974- 4	2930-2940 2920-2960	TAI 2.8-2.9 = $V_{0r}$	.80-.90
TOP OF S.S. (CRET.) 2950				
	P3974-33	3650-3660	TAI 2.9-3.0 = $V_{0r}$	.90-1.00
	P3974-34	4180-4190	TAI <u>3.8</u> -3.9 = $V_{0r}$	2.7-3.4
TOP OF SILL 4560				
BOTTOM OF SILL 5110				
TOP OF S.S. (CRET.) 5400	P3974-38	5430-5450	TAI <u>3.8</u> -3.9 = $V_{0r}$	2.7-3.4

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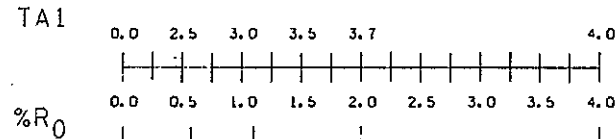
# GARTLAND (DREW MATTHEW) #1 BRISTER

## SEC. 8 - 12S - 4W

SIERRA CO., NEW MEXICO

### HYDROCARBON GENERATION ZONES

BIOSTUDY NO. 1096



IMMATURE ZONE    OIL ZONE    CONDENSATE AND GAS ZONE    DRY GAS ZONE

### % KEROGEN TYPES

OIL PRONE  
GAS-CONDENSATE  
INERT  
TMAX  
WEIGHT %

I    II    III    IV

TOP/RET.  
1580

P3974-1    1630-1700

NIR Brister, m.R.  
2/2

GEOCHEMICAL REPORT

Garland No. 1 Brister Well  
Sierra Co., New Mexico  
8-12S-4W

BROWN & RUTH LABORATORIES, INC.  
10690 Shadow Wood Drive, Suite 130  
Houston, Texas 77043



**BROWN & RUTH LABORATORIES, INC.**

10690 SHADOW WOOD DRIVE, SUITE 130, HOUSTON, TEXAS 77043 □ (713) 464-3284

November 2, 1982

Chevron U.S.A., Inc.  
Post Office Box 599  
Denver, Colorado 80201

Attention: Dr. Stephen R. Jacobson

Gentlemen:

Attached please find our analytical results from the geochemical analysis of twelve (12) cuttings samples from the Garland No. 1 Brister Well, Sierra Co., New Mexico.

The work was authorized by your Work Request CHEN-2100 of October 11, 1982. Analytical instructions were included in the requisition letter.

The unused sample material is being returned under separate cover.

If you have any questions concerning these results, or if we can be of additional assistance, please contact us.

Very truly yours,

BROWN & RUTH LABORATORIES, INC.

Stephen W. Brown

SWB/rh

Attachments

CLIENT: Chevron U.S.A., Inc.  
Post Office Box 599  
Denver, Colorado 80201

WELL: Garland No. 1 Brister, Sierra Co., New Mexico
---

AUTHORIZATION: Dr. Stephen R. Jacobson

#### SAMPLE DESCRIPTION

Twelve (12) cuttings samples were received as Work Order CHEN-2100. The samples represented twenty (20) to forty (40) foot intervals taken between the depths 1680 feet and 8510 feet. All the samples were in good condition.

#### SAMPLE PREPARATION

None of the samples appeared to be contaminated, and no special preparation was required. Following visual examination, the samples were ground for analysis.

#### ANALYTICAL DETERMINATIONS

The instructions contained in the Work Order requested that total organic carbon (T.O.C.) and Rock-Eval pyrolysis be performed on each of the twelve (12) samples. The results from both these analyses are contained in the attached Table I. The pyrograms are visually presented in Figure I.

In general, the sediments represented by the samples appear moderately immature and hold little potential for hydrocarbon generation. Although the T.O.C. levels reached a maximum value of 0.96%, the S2 values were consistently low (<0.10 mg/g to 0.88 mg/g), and not indicative of a potential source unit.

The S1 values were all very low (maximum value 0.20 mg/g), giving no evidence of the presence of out-of-place hydrocarbon.

The Tmax values were somewhat unusual, in that they exhibited a definite decrease with increasing depth. An examination of the S2 peaks offered no explanation, so at this time the cause of the alteration reversal is unknown.

Chevron U.S.A., Inc.  
 Garland No. 1 Brister  
 Sierra Co., New Mexico

TABLE I

File No.: 407  
 November 2, 1982

Results of Organic Carbon Analysis and Rock-Eval Pyrolysis

Sample Number	Depth* (ft)	T.O.C (wt.%)	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	Production Index	S2/S3	Hydrogen Index	Oxygen Index
407-001	1680-1700	0.27	0.10	0.17	0.34	**	0.37	0.49	63	126
407-002	2160-2180	0.63	<0.10	0.22	0.32	442	---	0.68	35	51
407-003	2370-2400	0.70	0.18	0.88	0.35	441	0.17	2.51	126	50
407-004	2920-2960	0.96	-0.11	0.70	0.49	443	0.14	1.44	73	51
407-005	3660-3690	0.54	0.10	0.21	0.42	438	0.32	0.51	39	78
407-006	4140-4150	0.42	<0.10	<0.10	0.80	**	---	---	---	190
407-007	4280-4290	0.57	0.14	0.52	0.72	437	0.21	0.73	91	126
407-008	5140-5150	0.88	0.20	0.60	0.73	435	0.25	0.82	68	83
407-009	5400-5430	0.66	0.24	0.58	0.38	434	0.29	1.55	88	58
407-010	7200-7220	0.41	<0.10	0.10	0.44	**	---	---	---	107
407-011	8200-8230	0.65	<0.10	<0.10	0.55	**	---	---	---	85
407-012	8500-8510	0.61	<0.10	<0.10	0.62	**	---	---	---	102

\* feet

\*\* Unable to determine due to insufficient S2 yield, multiple peaks, etc.

Figure 1-A

Rock-Eval Pyrograms

Sample - 001  
1680' - 1700'

Sample - 002  
2160' - 2180'

Sample - 003  
2370' - 2400'

Sample - 004  
2920' - 2960'

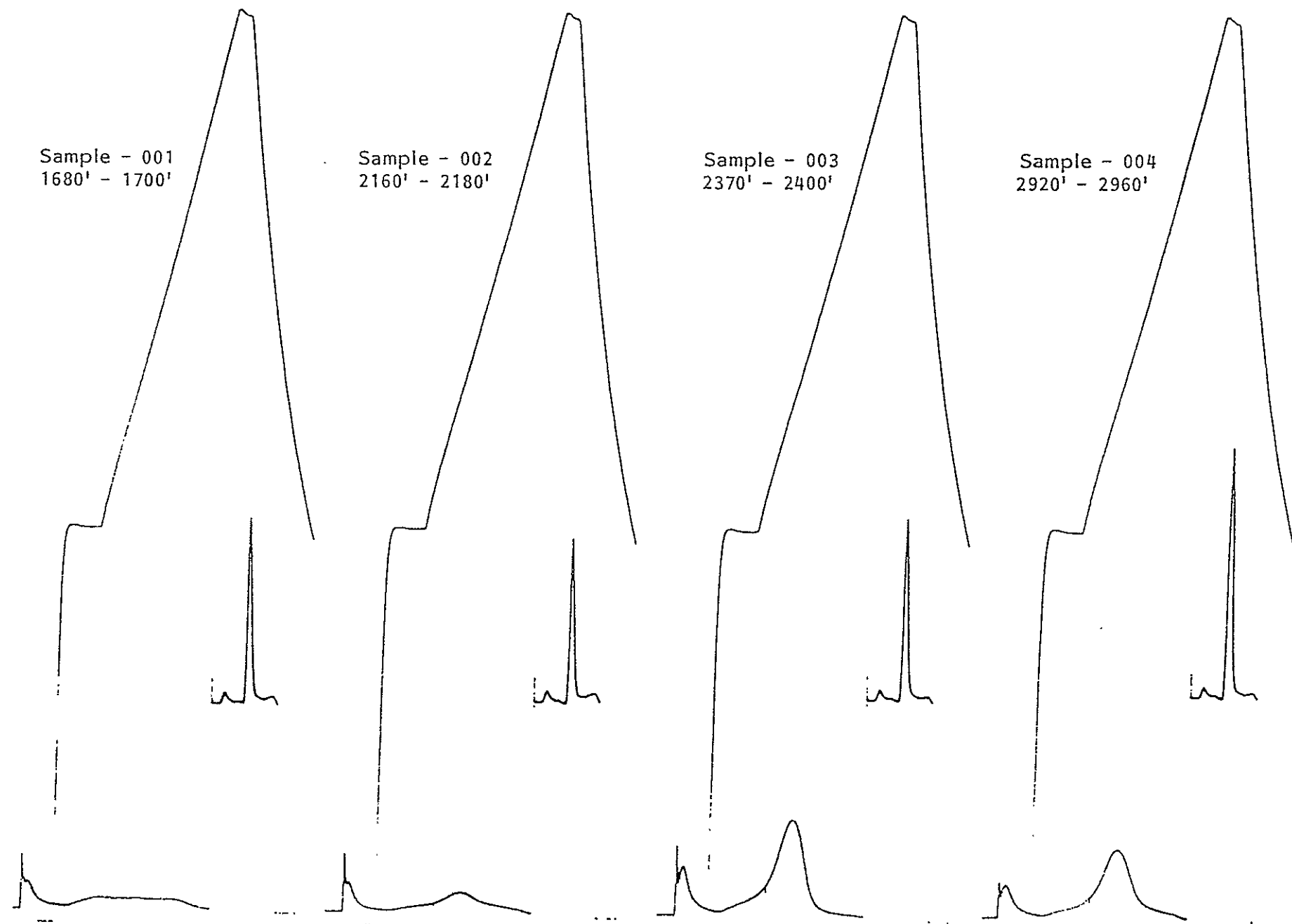


Figure 1-B  
Rock-Eval Pyrograms

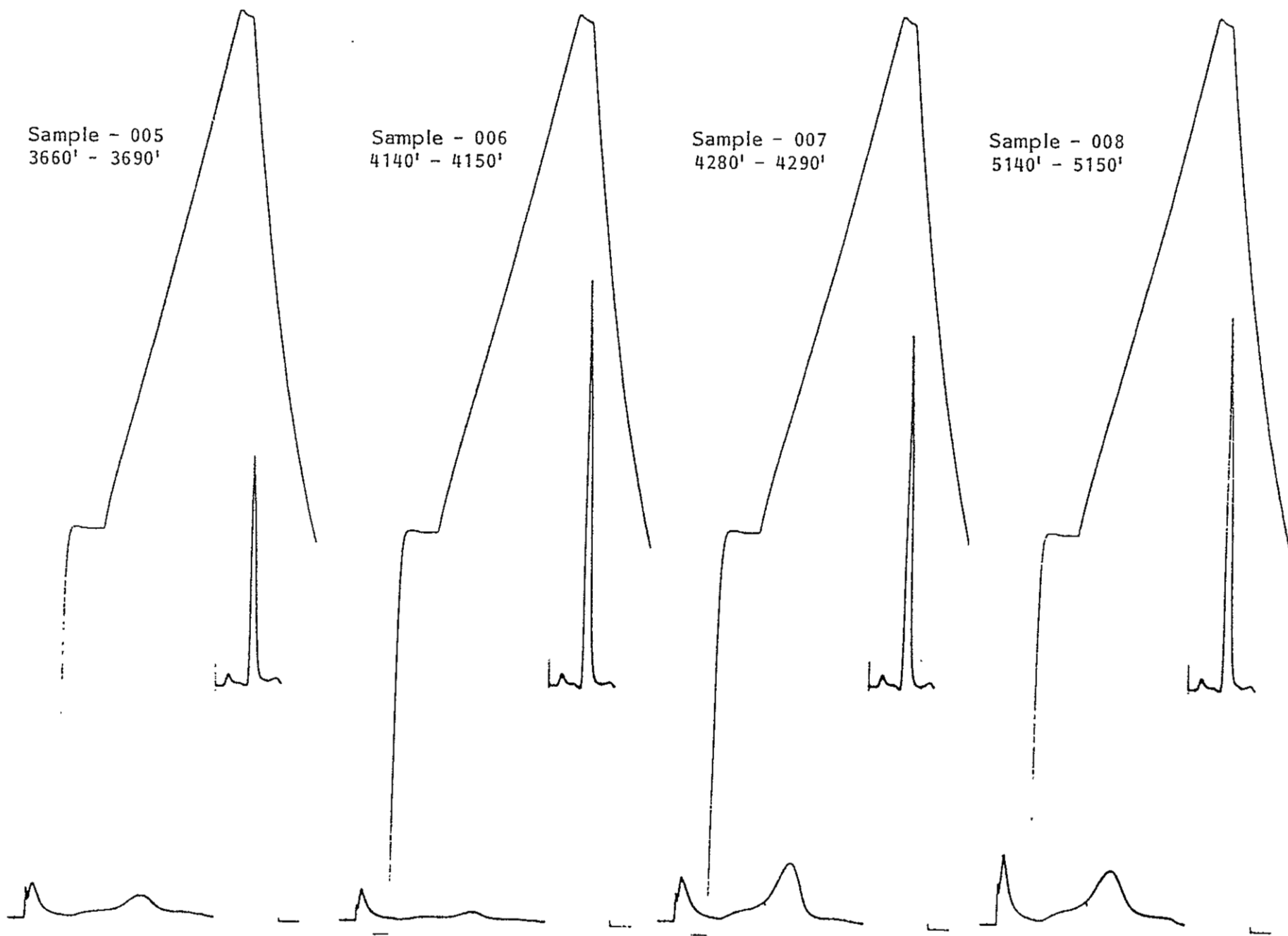
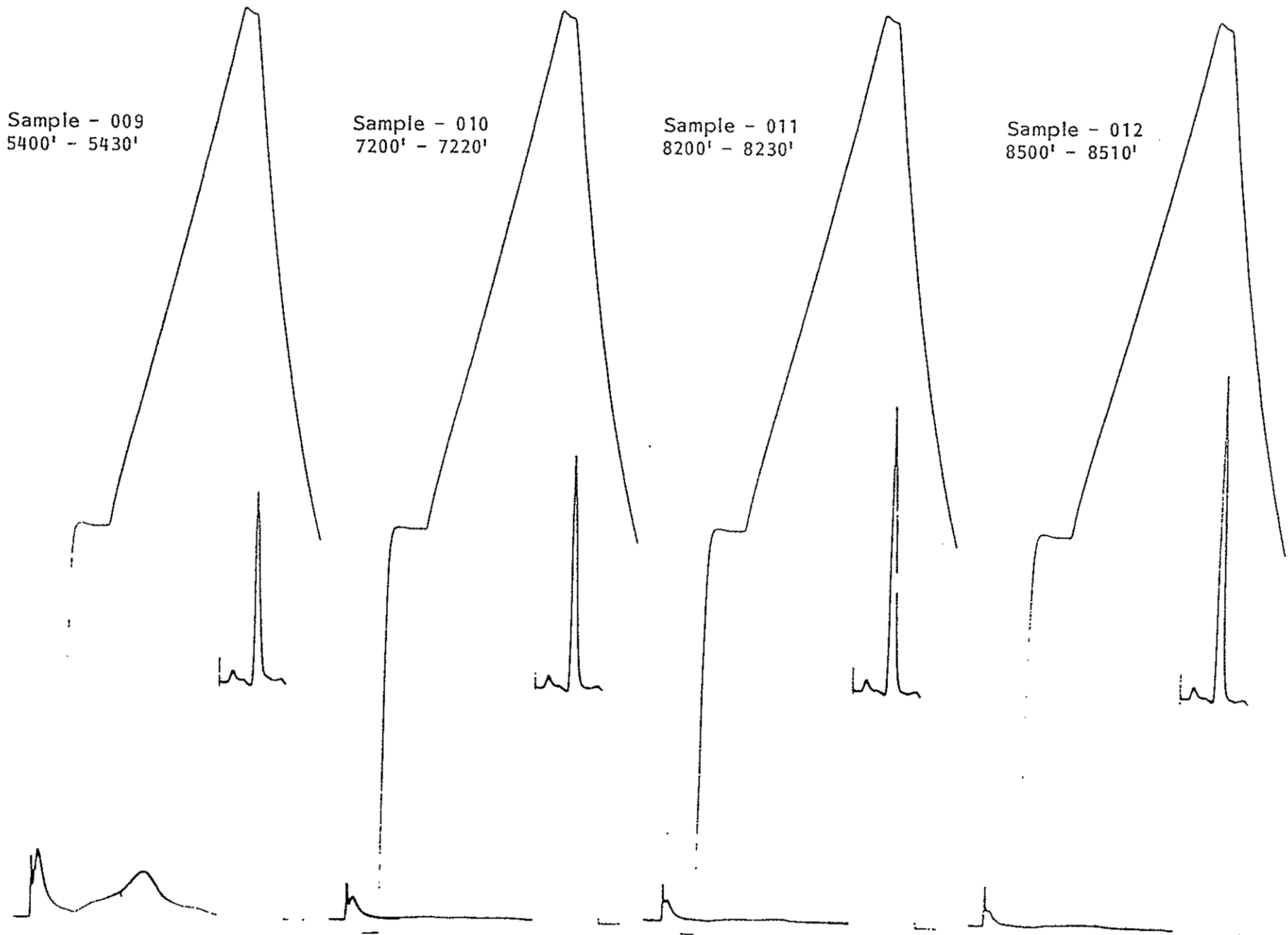


Figure 1-C  
Rock-Eval Pyrograms





NW 34 1/2 1/2  
182

GEOCHEMICAL REPORT

Total Organic Carbon & Rock-Eval Evaluation

Garland No. 1 Brister Well  
Sierra County, New Mexico  
Sec. 8-12S-4W



**BROWN & RUTH LABORATORIES, INC.**

10690 SHADOW WOOD DRIVE, SUITE 130, HOUSTON, TEXAS 77043 □ (713) 464-3284

December 22, 1982

Chevron U.S.A., Inc.  
P. O. Box 599  
Denver, Colorado 80201

Attention: Dr. Stephen R. Jacobson

Gentlemen:

Attached please find the results of geochemical analyses performed on nine (9) cuttings samples from the Garland No. 1 Brister Well, Sierra County, New Mexico. Authorization and analytical instructions were conveyed as Work Order CHEN-2100.

The small amount of unused sample material is being returned under separate cover.

We appreciate the opportunity to be of service to Chevron. If we can be of additional assistance, please contact us.

Very truly yours,

BROWN & RUTH LABORATORIES, INC.

  
Stephen W. Brown

SWB/kr

Enclosures

CLIENT: CHEVRON U.S.A. INC.  
P. O. Box 599  
Denver, Colorado 80201

WELL: Garland No. 1 Brister, Sierra County, New Mexico

AUTHORIZATION: Dr. Stephen R. Jacobson

SAMPLE DESCRIPTION:

Nine (9) cuttings samples from the Garland No. 1 Brister Well, Sierra County, New Mexico, were received as Work Order CHEN-2100. The samples appeared to be clean and totally free of contamination.

SAMPLE PREPARATION:

No special preparation procedures were necessary, and following visual examination, the samples were ground for analysis.

ANALYTICAL DETERMINATIONS:

The instructions contained in the Work Order requested that total organic carbon (T.O.C.) determinations be performed on every sample, and that Rock-Eval pyrolysis be performed on all samples with a T.O.C. content in excess of 0.2%. The tabulated results from both these analyses are presented in Table I. The Rock-Eval pyrograms are plotted in Figures I-A, and I-B.

In general, the samples appeared to have a source potential very similar to that observed in corresponding intervals previously analyzed from the Garland No. 1 Brister Well (Brown & Ruth Job No. 407). The only noticeable difference is a slight reduction in total organic carbon content in most of these samples, as compared to the roughly corresponding intervals in the first set of samples.

The sediments represented by these samples appear moderately immature and have poor potential for hydrocarbon generation. As in the first set of samples, the limited S<sub>2</sub> yields (maximum yield of 0.83 mg/g), suggest that the organic facies does not contain a large enough quantity of the type of organic matter that can be converted into hydrocarbons.

The apparent reversal in the alteration gradient observed in the first set of samples from the Garland No. 1 Brister well, was again observed in this set of samples. The T<sub>max</sub> was in excess of 440°C in the first two samples and tended to decrease with depth.

TABLE I

Chevron U.S.A. (Denver)  
Garland No. 1 Brister  
Sierra County, New Mexico

File No. 429  
December 22, 1982

## Results of Organic Carbon Analysis and Rock-Eval Pyrolysis

Sample Number	Client I.D.	T.O.C. (% Wt.)	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	Production Index	S2/S3	Hydrogen Index	Oxygen Index
429-001	P-3974-23 2920-2980	0.72	0.16	0.83	0.49	442	0.16	1.68	115	68
429-002	P-3974-24 3650-3660	0.42	0.12	0.25	0.42	440	0.33	0.59	59	101
429-003	P-3974-25 4180-4190	0.30	0.10	0.20	0.78	425	0.33	0.25	66	262
429-004	P-3974-26 4290-4300	0.21	0.22	0.38	0.57	427	0.36	0.72	183	256
429-005	P-3974-27 4300-4310	0.17	---	---	---	---	---	---	---	---
429-006	P-3974-28 5170-5180	0.30	0.14	0.36	0.33	424	0.27	1.11	122	110
429-007	P-3974-29 5430-5440	0.34	0.24	0.42	0.39	428	0.36	1.07	122	115
429-008	P-3974-30 6860-6865	0.45	<0.10	<0.10	0.61	**	---	---	---	136
429-009	P-3974-31 7395-7400	0.44	0.21	0.35	0.53	434	0.37	0.66	80	120

\*\*Unable to determine due to insufficient S2 yield, multiple peaks, etc.

FIGURE 1-A  
ROCK-EVAL PYROGRAMS

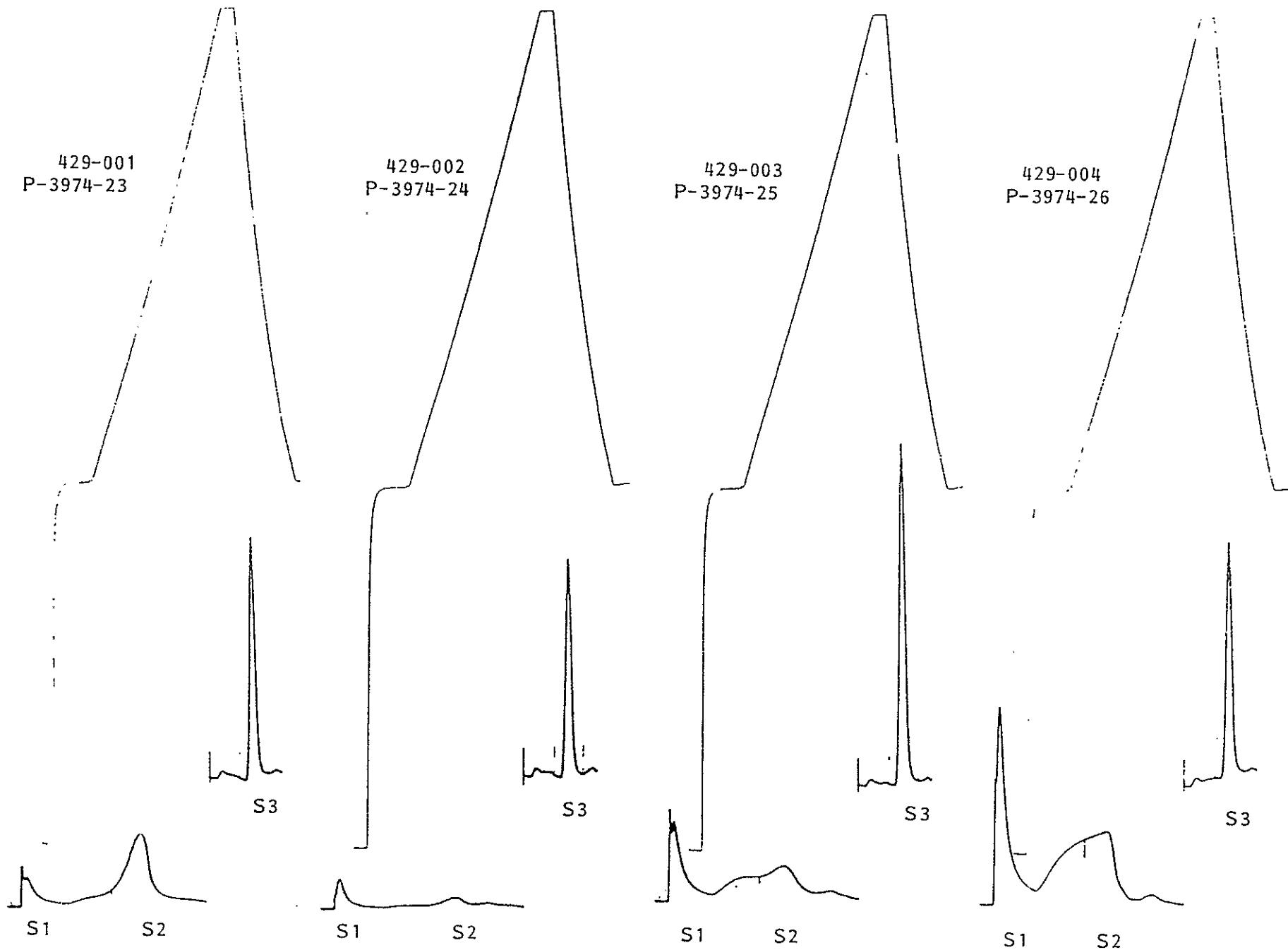


FIGURE I-B  
ROCK-EVAL PYROGRAMS

