New Mexico Bureau of Mines and Mineral Resources
Open File Report No. OF-205

ORGANIC GEOCHEMICAL ANALYSIS, PURE NO. 1 FEDERAL H
WELL, DOÑA ANA 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 31, 1983
Mr. Clayton S. Valder  
Marshall R. Young Oil Co.  
750 West Fifth Street  
Fort Worth, TX 76102

Dear Mr. Valder:

Enclosed please find results of the organic geochemical analyses performed on samples from the Pure #1-H Federal well, located in Section 24, T28S-R2W, Dona Ana Co., New Mexico.

The analyses includes the following tests:

1. Total Organic Carbon (TOC)  
2. Rock Eval (Pyrolysis)  
3. Microscopic Organic Analysis (MOA)  
4. Vitrinite Reflectance (Ro) or Thermal Alteration Index (TAI)

Yours truly,

M. I. Roberson  
District Geologist

Enclosures
Discussion of Results:

The Pure No. 1-H Federal well was air drilled, resulting in a very small average cuttings size. Over some intervals the sample size was very small, possibly causing either sampling and/or analytical problems. Through other intervals, however, such as part of the organically rich (TOC = 3.55) Percha shale section (3990-4010 ft.) the sample size was adequate and the geochemical results should be reliable.

I. Thermal Maturity:

Although the thermal results are based on "background material", which consists of unrecognizable organic residue, the verdict that the entire section cut by this well is thermally overmature appears to be justified. That recognizable palynomorphs are absent, S2 values are very low, Hydrogen indicies are low, all suggest overmaturity.

II. Organic Richness and Type:

Organic richness throughout the section is poor, except for one fair value (0.61 wt. %) in the lower part of the Penn section, one fair (0.64) and one very good (3.55) sample in the Devonian Percha shale interval. The organic remains were too highly altered to allow typing of the kerogen.
LOCATION: Pure Oil 1-H Federal
Sec. 24-28S-2W
Dona Ana Co., New Mexico

PROBLEM: Cuttings samples submitted by Jim Rankin for determination of maturity (TAI - Vo) and microscopic organic analysis (MOA) indices.

RESULTS: Note: Microscopic organic analysis (MOA) was not attempted because the kerogen is highly altered even to the point of having a mineral-like appearance. The vitrinite plugs were not useful in identifying the kerogen types either.

The TAI indices are not based on palynomorphs, as the entire suite of samples is apparently barren, but on the back-ground material. Using the back-ground organic debris, although less reliable, seems justified when maturity indices are post-mature. Laboratory flow sheets state these samples were very difficult to process because oxidation was not possible. This might imply the organic fraction was already oxidized.

Data

<table>
<thead>
<tr>
<th>Sample</th>
<th>Kerogen Types (MOA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P4016-23,1</td>
<td></td>
</tr>
<tr>
<td>(800-900)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tmax</td>
</tr>
<tr>
<td>Vo</td>
</tr>
<tr>
<td>TAI</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Amount (of organics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt % TOC</td>
</tr>
<tr>
<td>Organic yield</td>
</tr>
</tbody>
</table>

1980' Top Permian
Sample
P4016-24,2
(2250-2300)

Kerogen Types (MOA)
no data.

Maturity
Tmax  low S2 yield.
Vo    plug not useful.
TAI   4.0 + post mature.

Amount
WT % TOC .30 poor.
Organic yield .3 ml. / 10 grams.

2250' Top Hueco - Walfcamp (Permian)

Sample
P4016-25,3
(2710-2780)

Kerogen Types
no data.

Maturity
Tmax  low S2 yield.
Vo    -
TAI   4.0 + post mature.

Amount
WT % TOC .15 poor.
Organic yield .2 ml. / 10 grams.

3215' Top Penn.

Sample
P4016 26,4
(3240-3290)

Kerogen Types
no data.

Maturity
Tmax  low S2 yield.
Vo    -
TAI   4.0 + post mature.

Amount
WT % TOC .35 poor.
Organic yield .2 ml. / 10 grams.
Sample
P4016-27,5
(3320-3390)

Kerogen Types
no data.

Maturity
Tmax: low S2 yield.
Vo: -
TAI: 4.0 + post mature.

Amount
WT % TOC: 0.33 poor.
Organic yield: 0.2 ml. / 10 grams.

Sample
P4016-28,6
(3390-3500)

Kerogen Type
no data.

Maturity
Tmax: low S2 yield.
Vo: -
TAI: 4.0 + post mature.

Amount
WT % TOC: 0.33 poor.
Organic yield: 0.2 ml. / 10 grams.
Sample
P4016-29.7
(3620-3700)

Kerogen Type
no data.

Maturity
Tmax  low S2 yield.
Vo     plug not useful.
TAI    4.0 + post mature.

Amount
WT % TOC .61 fair.
Organic yield .3 ml. / 10 grams.

3850' ? Top Percha
(Devonian)

Sample
P4016-30.8
(3860-3910)

Kerogen Type
no data.

Maturity
Tmax  low S2 yield.
Vo     -
TAI    4.0 + post mature.

Amount
WT % TOC .64 fair.
Organic yield .2 ml. / 10 grams.
Sample
P4016-31.9
(3990-4030)

**Kerogen Type**
no data.

**Maturity**
- Tmax: low S2 yield.
- Vo: plug not useful.
- TAI: 4.0 + post mature.

**Amount**
- Wt % TOC: 3.55 very good.
- Organic yield: 1.2 ml. / 10 grams.

4060' Top Fusselman
(Silurian)

Sample
P4016-32.10
(5390-5460)

**Kerogen Type**
no data.

**Maturity**
- Tmax: low S2 yield.
- Vo: -
- TAI: 4.0 + post mature.

**Amount**
- Wt % TOC: .26 poor.
- Organic yield: trace.
Sample
P4016-33,11
(6210-6290)

Kerogen Type
no data.

Maturity
Tmax    low S2 yield.
Vo      -
TAI     4.0 + post mature.

Amount
Wt % TOC .27 poor.
Organic yield, trace.

Attachments:  Brown-Ruth Geochemical Report 432
               Fig. 1

May 18, 1983
J. D. SAXTON
GEOCHEMICAL REPORT

Total Organic Carbon & Rock-Eval Evaluation

Pure Oil Co. No. 1-H Federal
Dona Ana County, New Mexico
SEC 24-28S-2W

4014
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 eleven (11) cuttings samples from the Pure Oil Co. No. 1-H Federal Well, Dona Ana County, New Mexico. Authorization and analytical instructions were contained in Work Order CMEN-2100.

The limited amount of sample material not used in the analyses will be 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:  Pure Oil Co. No. 1-H Federal, Dona Ana County, New Mexico

AUTHORIZATION:  Dr. Stephen R. Jacobson

SAMPLE DESCRIPTION:

Eleven (11) cuttings samples were received from the Pure Oil Co. No. 1-H Federal, Dona Ana County, New Mexico. The project was authorized as Work Order CMEN-2100. The samples appeared to be in good condition and free of any type of contamination.

SAMPLE PREPARATION:

Following a thorough visual examination, the samples were ground for analysis. No special preparation was necessary.

ANALYTICAL DETERMINATIONS:

As per the instructions contained in the Work Order, total organic carbon (T.O.C.) determinations and Rock-Eval pyrolysis was performed on each of the samples. The tabulated results from both these analyses are presented in Table I. The Rock-Eval pyrograms are plotted in Figures I-A, I-B, and I-C.

Although the total organic carbon content of the samples ranges from low, to in one case, very good, none of the samples appear to be capable of generating significant quantities of oil or gas. Based on the physical appearance of the samples and on the limited S2 yields, we conclude that the section represented by these samples has probably experienced a moderate to extreme thermal history. No Tmax values were obtainable from any of the samples, due to the low S2 yields.

One sample in particular appears to best demonstrate the effect of the probable thermal influence. Sample P-4016-9 has an extremely high total organic carbon content (3.55%) but has very negligible S2 yield and a very small Hydrogen Index. Apparently, any hydrocarbon that could have been produced from this organic facies has already been generated and released.
## TABLE I

Chevron U.S.A. (Denver)
Pure Oil Co. No. 1-H Federal
Dona Ana County, New Mexico

File No. 432
December 22, 1982

Results of Organic Carbon Analysis and Rock-Eval Pyrolysis

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Client I.D.</th>
<th>T.O.C. (% Wt.)</th>
<th>S1 (mg/g)</th>
<th>S2 (mg/g)</th>
<th>S3 (mg/g)</th>
<th>Tmax (°C)</th>
<th>Production Index</th>
<th>S2/S3</th>
<th>Hydrogen Index</th>
<th>Oxygen Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>432-001</td>
<td>P-4016-1</td>
<td>0.39</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>0.23</td>
<td>**</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>59</td>
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<tr>
<td>432-002</td>
<td>P-4016-2</td>
<td>0.30</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>0.31</td>
<td>**</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>104</td>
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<tr>
<td>432-003</td>
<td>P-4016-3</td>
<td>0.15</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>0.29</td>
<td>**</td>
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<td>432-004</td>
<td>P-4016-4</td>
<td>0.35</td>
<td>0.10</td>
<td>&lt;0.10</td>
<td>0.32</td>
<td>**</td>
<td>---</td>
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<tr>
<td>432-005</td>
<td>P-4016-5</td>
<td>0.33</td>
<td>0.10</td>
<td>0.12</td>
<td>0.30</td>
<td>**</td>
<td>0.46</td>
<td>0.39</td>
<td>35</td>
<td>91</td>
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<td>432-006</td>
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<td>0.33</td>
<td>&lt;0.10</td>
<td>0.10</td>
<td>0.27</td>
<td>**</td>
<td>---</td>
<td>0.35</td>
<td>29</td>
<td>82</td>
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<tr>
<td>432-007</td>
<td>P-4016-7</td>
<td>0.61</td>
<td>&lt;0.10</td>
<td>0.11</td>
<td>0.53</td>
<td>**</td>
<td>---</td>
<td>0.21</td>
<td>18</td>
<td>86</td>
</tr>
<tr>
<td>432-008</td>
<td>P-4016-8</td>
<td>0.64</td>
<td>0.10</td>
<td>0.11</td>
<td>0.21</td>
<td>**</td>
<td>0.46</td>
<td>0.53</td>
<td>18</td>
<td>33</td>
</tr>
<tr>
<td>432-009</td>
<td>P-4016-9</td>
<td>3.55</td>
<td>0.18</td>
<td>0.16</td>
<td>0.19</td>
<td>**</td>
<td>0.53</td>
<td>0.86</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>432-010</td>
<td>P-4016-10</td>
<td>0.26</td>
<td>&lt;0.10</td>
<td>0.10</td>
<td>0.42</td>
<td>**</td>
<td>---</td>
<td>0.24</td>
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<tr>
<td>432-011</td>
<td>P-4016-11</td>
<td>0.27</td>
<td>&lt;0.10</td>
<td>0.15</td>
<td>0.51</td>
<td>**</td>
<td>---</td>
<td>0.29</td>
<td>56</td>
<td>190</td>
</tr>
</tbody>
</table>

**Unable to determine due to insufficient S2 yield, multiple peaks, etc.
FIGURE 1-A
ROCK-EVAL PYROGRAMS

432-001
P-4016-1

432-002
P-4016-2

432-003
P-4016-3

432-004
P-4016-4