



Humble Geochemical Services

Division of Humble Instruments & Services, Inc.

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Geochemical Services for Exploration, Development and Production

August 6, 2002

Dallas Spear
EOG Resources, Inc.
Millcraft Plaza 1
400 Southpointe Blvd.
Suite 300
Canonsburg, PA 15317

Dear Dr. Spear:

Enclosed are the Rock-Eval, TOC and vitrinite data as requested for samples 60201 through 60213. Also included is an invoice for these services.

Please let Jack Burgess or Mark Tobey know if you have any questions or if we may be of further assistance.

Thank you for this opportunity to be of service.

Sincerely,

Charlene Boggs

/cb

Project H02-1700



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August 6, 2002

Company: EOG Resources
Attn: Dallas Spear

Enclosed are three vitrinite acritarch histograms from samples 60201 Devonian shale outcrop, 60205 Devonian shale outcrop and 60212 Ordovician shale outcrop, that were examined for their maturity. TOC's for these samples were 4.23 wt.%, 4.28 wt.%, and 2.19 wt.% respectively. These samples with high TOC's and high Tmax 564°C - 568°C indicated over maturity, but justified a visual examination of the remaining organic matter.

Conclusions

1. Vitrinite reflectance maturity of the Devonian shale outcrops; 60201 & 60205 was 1.35 R_O and 1.39 R_O falls between the end of oil generation at 1.30 R_O to condensate/wet gas at 1.40 R_O. The remaining TOC suggests remaining dry gas generation is possible.
2. Acritarch reflectance maturity of the Ordovician shale 60212 outcrop sample was measured at 1.75 R_O to a vitrinite reflectance of 1.42 R_{O corr.} and also at the condensate/wet gas boundary. Again, this sample has the capability of additional dry gas generation.
3. The inconsistency between the Tmax and vitrinite reflectance is probably the result of weathering of the organic matter as these are outcrop samples.

The kerogen slides, vitrinite pellets and unused sample will be returned under separate cover.


Jack Burgess

TOC and ROCK-EVAL DATA REPORT

EOG Resources

Attn: Dallas B. Spear

HGS No.	Well Name	Formation Name	Sample Type	TOC	S1	S2	S3	Tmax (°C)	Cal. %Ro	Mes. %Ro	HI	OI	S1/TOC	PI	Notes
02-1700-047886	60201	Devonian shale	outcrop	4.23	0.11	0.89	0.21	564	2.99	1.35	21	5	3	0.11	c n
02-1700-047887	60202	Devonian shale	outcrop	3.12	0.06	0.81	0.23	551	2.76		26	7	2	0.07	n
02-1700-047888	60203	Devonian shale	outcrop	2.18	0.07	0.58	0.21	543	2.61		27	10	3	0.11	c n
02-1700-047889	60204	Devonian shale	outcrop	2.19	0.07	0.52	0.15	542	2.60		24	7	3	0.12	n
02-1700-047890	60205	Devonian shale	outcrop	4.28	0.10	1.16	0.59	551	2.76	1.39	27	14	2	0.08	c n
02-1700-047891	60206	Devonian shale	outcrop	1.19	0.03	0.39	0.02	509	2.00		33	2	3	0.07	n
02-1700-047892	60207	Devonian Limestone	outcrop	0.47	0.05	0.10	0.00	484	1.55		21	0	11	0.33	f
02-1700-047893	60208	Devonian shale	outcrop	2.48	0.11	0.54	0.11	571	3.12		22	4	4	0.17	c n
02-1700-047894	60209	Devonian Limestone	outcrop	0.14	0.03	0.05	0.26	420	0.40		36	186	21	0.37	n
02-1700-047895	60210	Ordovician shale	outcrop	0.89	0.06	0.04	0.03	433	0.63		4	3	7	0.60	c f
02-1700-047896	60211	Ordovician shale	outcrop	1.59	0.04	0.07	0.34	525	2.29		4	21	3	0.36	c f
02-1700-047897	60212	Ordovician shale	outcrop	2.19	0.07	0.53	0.09	568	3.06	1.42	24	4	3	0.12	c n
02-1700-047898	60213	Ordovician shale	outcrop	2.07	0.05	0.32	0.44	577	3.23		15	21	2	0.14	n

Notes:

c = analysis checked and confirmed

* Tmax data not reliable due to poor S2 peak

TOC = weight percent organic carbon in rock

S1, S2 = mg hydrocarbons per gram of rock

S3 = mg carbon dioxide per gram of rock

Tmax = °C

HI = hydrogen index = S2 x 100 / TOC

OI = oxygen index = S3 x 100 / TOC

S1/TOC = normalized oil content = S1 x 100 / TOC

PI = production index = S1 / (S1+S2)

Cal. %Ro = calculated vitrinite reflectance based on Tmax

Measured %Ro = measured vitrinite reflectance

Pyrogram:

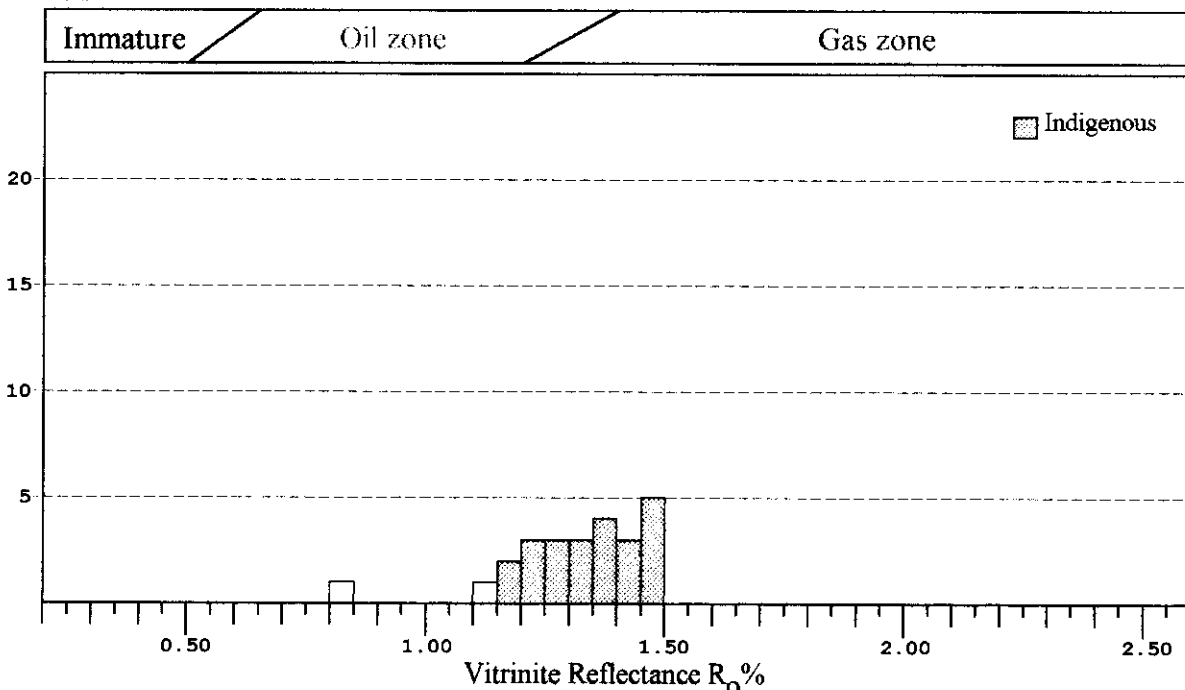
n=normal

hIS2sh = low temperature S2 shoulder

hIS2p = low temperature S2 peak

hIS2p = high temperature S2 peak

Customer: **EOG RESOURCES**
 Well name: **OUTCROP 60201**
 Sample ID: **DEV. SH.**
 Mean depth (ft): **0**
 Sample type: **OUTCROP**



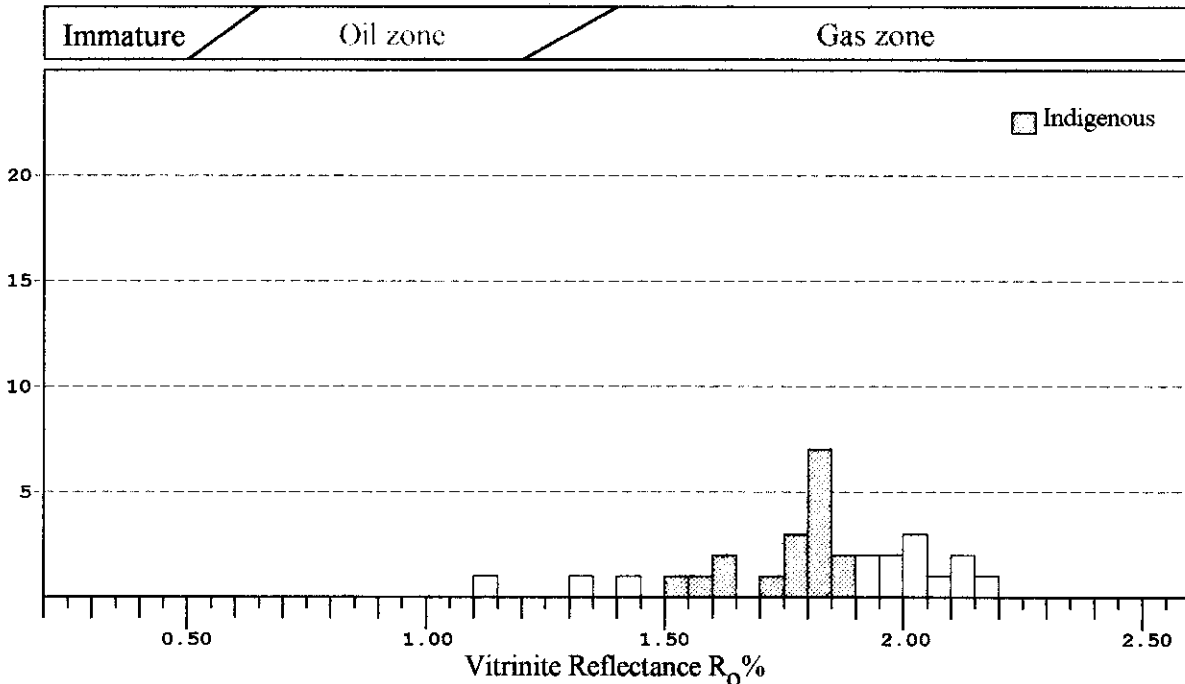
Indigenous population statistics
Mean: 1.35 Min: 1.17 Max: 1.49 Std. Dev.: 0.10 Count: 23

Total population statistics
Mean: 1.32 Min: 0.83 Max: 1.49 Std. Dev.: 0.15 Count: 25

- 01 - 0.83
- 02 - 1.10
- 03 - 1.17 <
- 04 - 1.19 <
- 05 - 1.20 <
- 06 - 1.22 <
- 07 - 1.22 <
- 08 - 1.28 <
- 09 - 1.28 <
- 10 - 1.29 <
- 11 - 1.33 <
- 12 - 1.33 <
- 13 - 1.33 <
- 14 - 1.36 <
- 15 - 1.38 <
- 16 - 1.39 <
- 17 - 1.39 <
- 18 - 1.40 <
- 19 - 1.40 <
- 20 - 1.44 <
- 21 - 1.46 <
- 22 - 1.46 <
- 23 - 1.49 <
- 24 - 1.49 <
- 25 - 1.49 <

Note: Reflectance values rounded to nearest hundredth, [] indicates indigenous reflectance value

Customer: **EOG RESOURCES**
 Well name: **OUTCROP 60212**
 Sample ID: **ORD. SH.**
 Mean depth: **0**
 Sample type: **OUTCROP**



1.42 $R_{0\text{ corr}}$ Acritarch

Indigenous population statistics

Mean: 1.75 Min: 1.45 Max: 1.89 Std. Dev.: 0.11 Count: 17

Total population statistics

Mean: 1.81 Min: 1.13 Max: 2.16 Std. Dev.: 0.24 Count: 31

- | | |
|-------------|-----------|
| 01 - 1.13 | 21 - 1.92 |
| 02 - 1.30 | 22 - 1.93 |
| 03 - 1.44 | 23 - 1.98 |
| 04 - 1.51 < | 24 - 1.98 |
| 05 - 1.58 < | 25 - 2.00 |
| 06 - 1.62 < | 26 - 2.02 |
| 07 - 1.64 < | 27 - 2.03 |
| 08 - 1.72 < | 28 - 2.06 |
| 09 - 1.75 < | 29 - 2.12 |
| 10 - 1.76 < | 30 - 2.13 |
| 11 - 1.78 < | 31 - 2.16 |
| 12 - 1.80 < | |
| 13 - 1.80 < | |
| 14 - 1.81 < | |
| 15 - 1.81 < | |
| 16 - 1.83 < | |
| 17 - 1.83 < | |
| 18 - 1.84 < | |
| 19 - 1.86 < | |
| 20 - 1.89 < | |

Note: Reflectance values rounded to nearest hundredth, [<] indicates indigenous reflectance value

KEROGEN QUALITY

EOG Resources

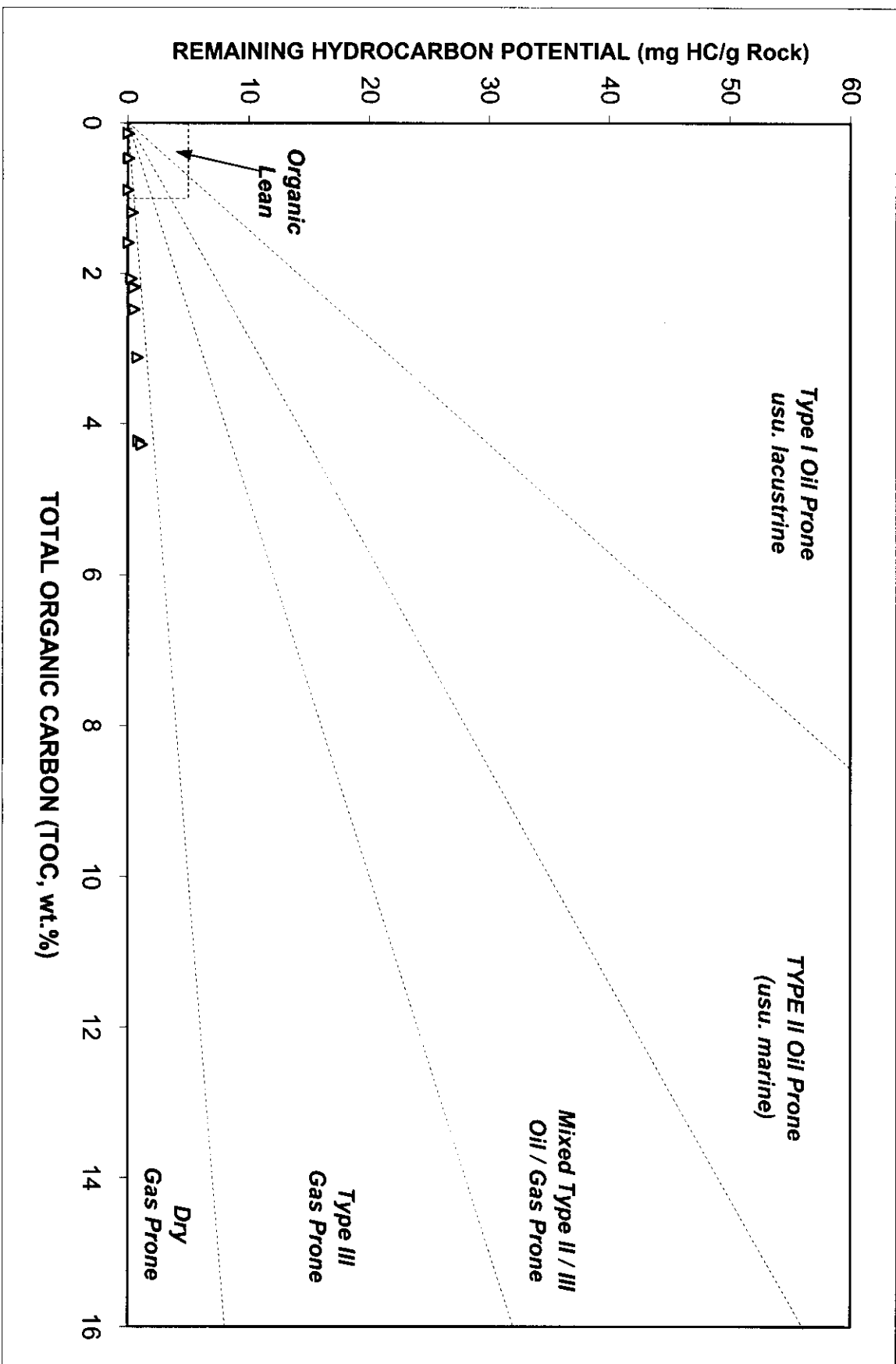


Figure 1. Kerogen Quality

Figure 2. Kerogen type

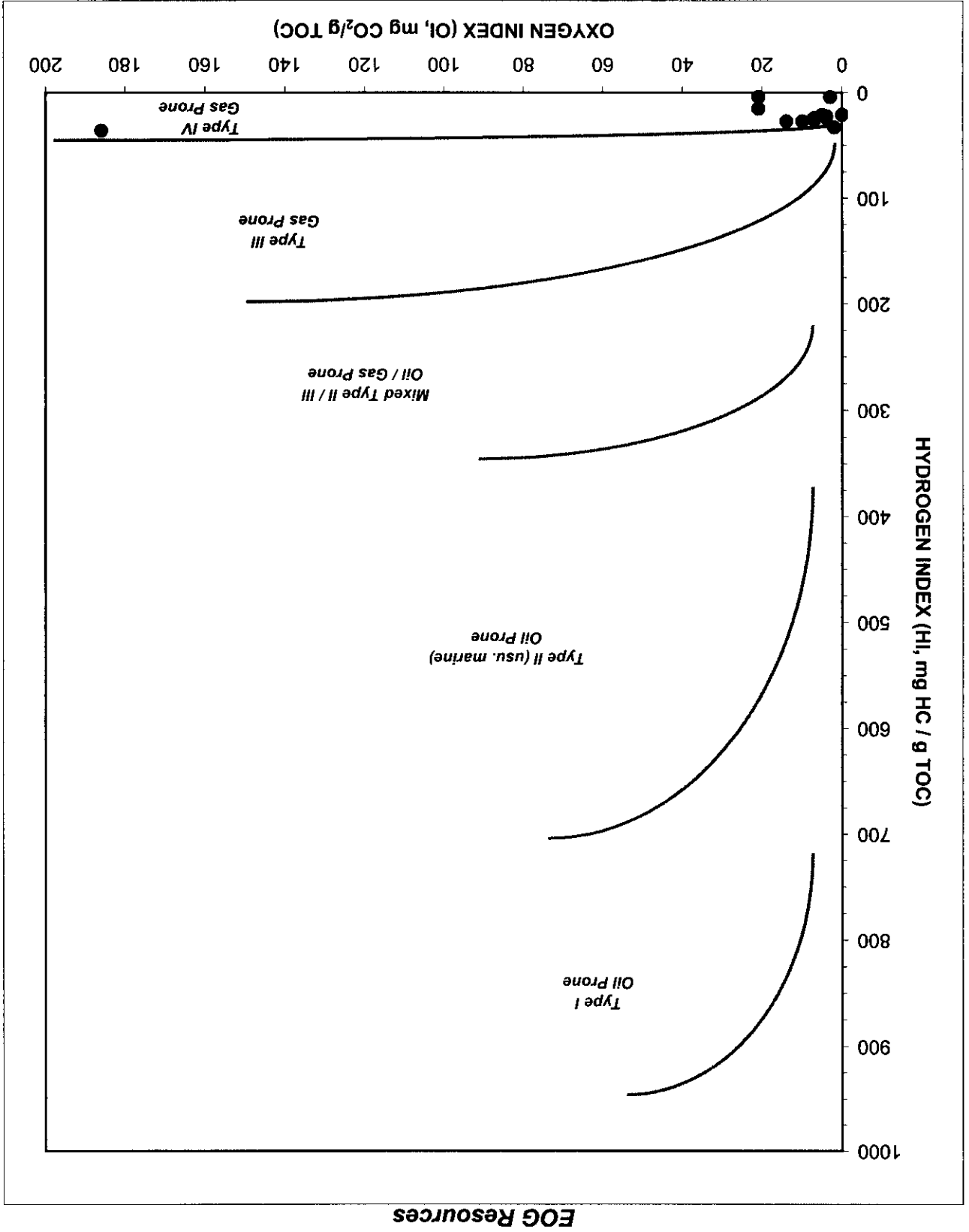
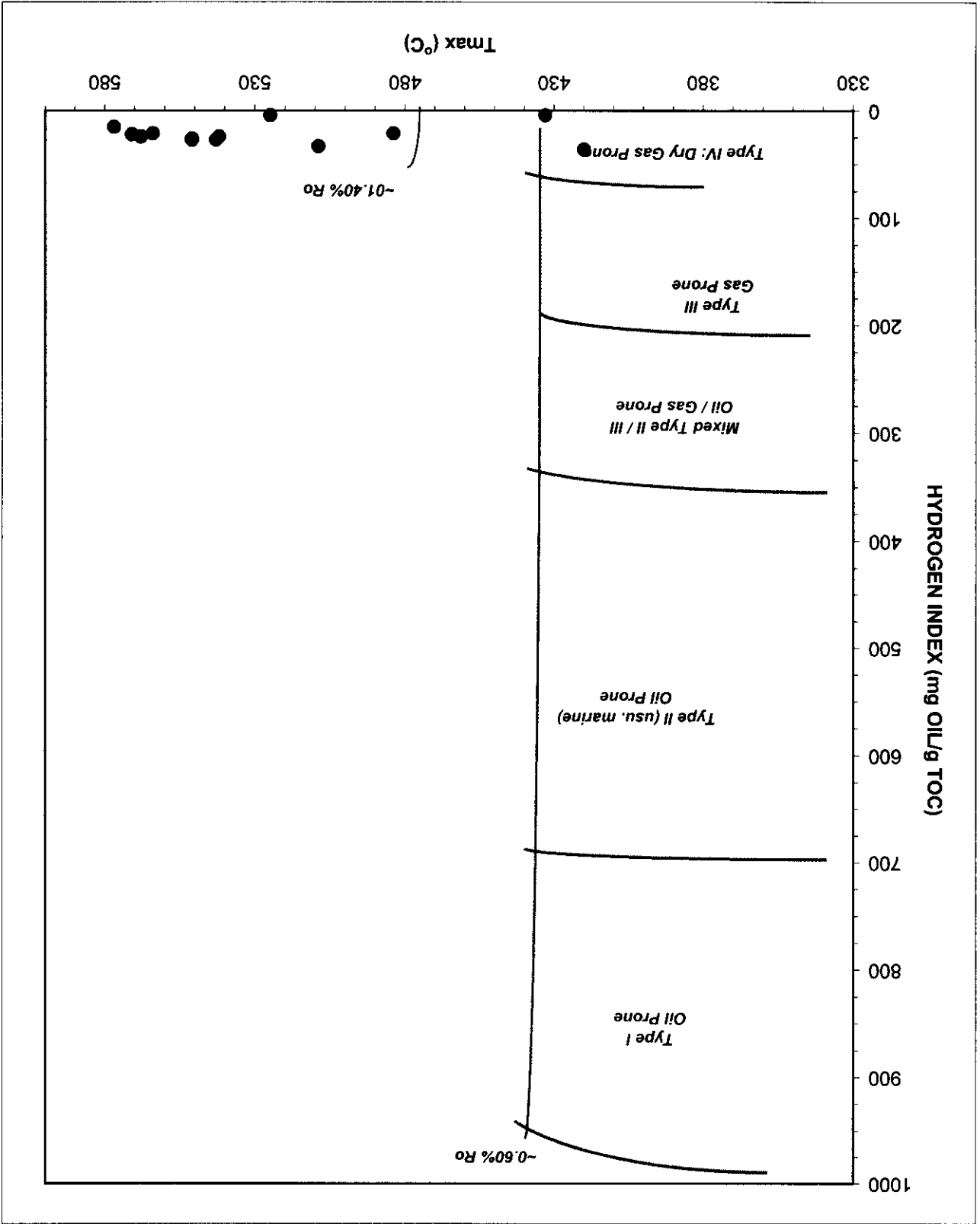


Figure 3. Kerogen Type and Maturity



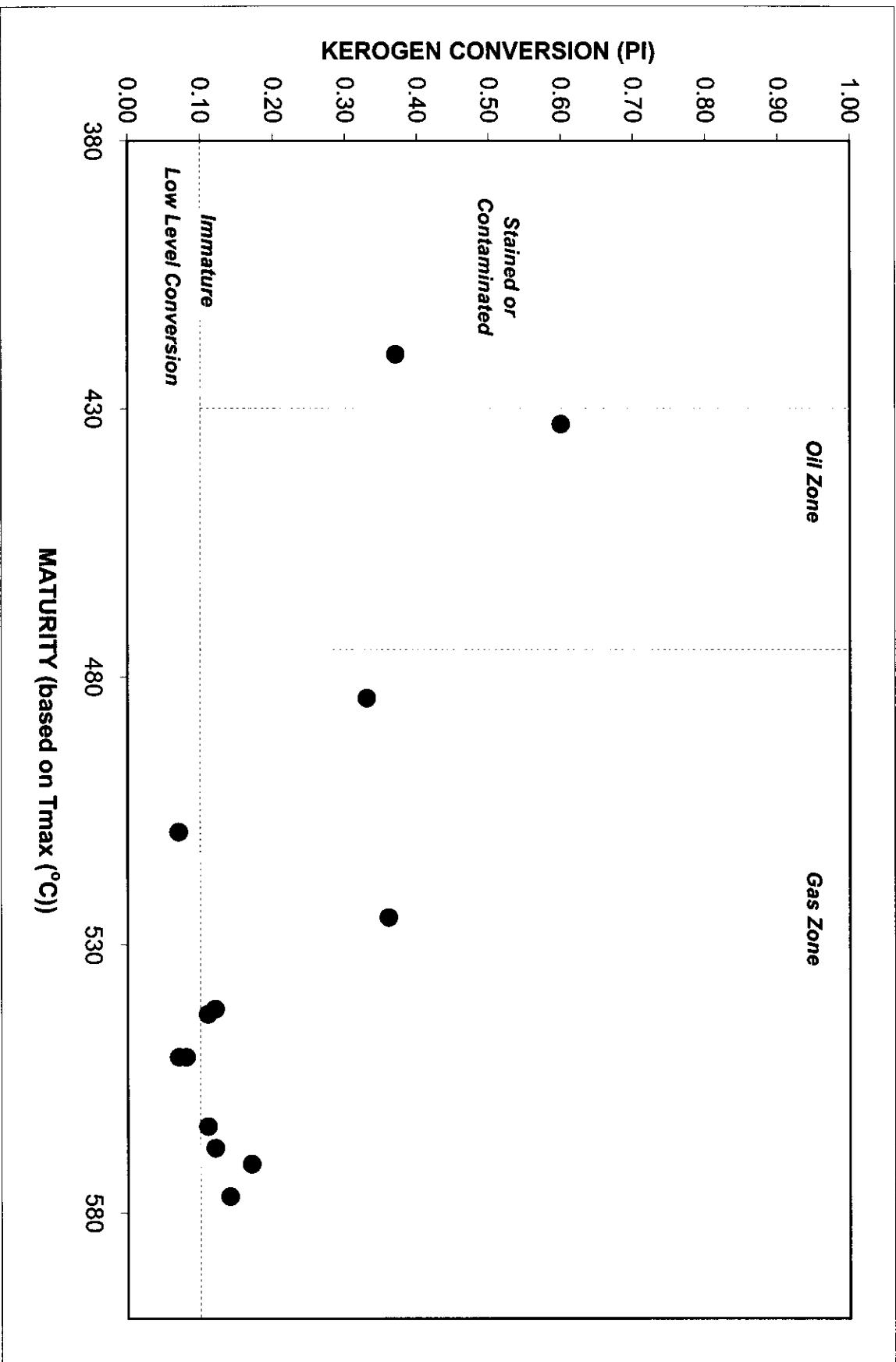


Figure 4. Kerogen conversion and maturity.