S# 2238

GeoMark
Petroleum Services Division

Source Rock Analyses

TOC, Rock-Eval and Maturity Testing

Kemmer Unit #1
Ashtabula County, Ohio

Jackie Reed

June 14, 2011

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SOURCE ROCK ANALYSES

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Sample ID										Source Rock Analyses													
Project / Sample ID	API #	Well Name	Sampling Date	Sampling Time	Formation Name	Upper Depth (ft)	Lower Depth (ft)	Median Depth (ft)	Sample Type	Percent Carbonate (wt%)	Leco TOC (wt% HC)	Rock-Eval S1 (mg HC/g)	Rock-Eval S2 (mg HC/g)	Rock-Eval S3 (mg CO2/g)	Tmax (°C)	Measured %Ro (Vitrinite Refl.)	Calculated %Ro (RE-TMAX)	Hydrogen Index (S2x100/TOC)	Oxygen Index (S3x100/TOC)	S2/S3 Conc. (mg HC/mg CO2)	S1/TOC Norm. Oil Content	Production Index (S1/(S1+S2)	Experimental Notations
RJRE-110203-001	3400720213000 0	Kemmer Unit #1				4,900.00	4,920.00	4,910.00	Cuttings	20.42	0.27	0.73	0.57	0.30	362		-0.64	211	111	2	270	0.56	Low Temp S2 Peak
RJRE-110203-002	3400720213000 0	Kemmer Unit #1				4,920.00	4,940.00	4,930.00	Cuttings	17.79	0.46	1.19	0.95	0.23	392		-0.10	207	50	4	259	0.56	Low Temp S2 Peak
RJRE-110203-003	3400720213000 0	Kemmer Unit #1				4,940.00	4,960.00	4,950.00	Cuttings	17.10	0.46	1.12	0.79	0.31	375		-0.41	172	67	3	243	0.59	Low Temp S2 Peak
RJRE-110203-004	3400720213000 0	Kemmer Unit #1				4,960.00	4,980.00	4,970.00	Cuttings	15.59	2.22	2.99	3.80	0.38	444		0.83	171	17	10	135	0.44	Low Temp S2 Shoulder
RJRE-110203-005	3400720213000 0	Kemmer Unit #1				4,980.00	5,000.00	4,990.00	Cuttings	15.87	2.30	3.67	4.03	0.42	441		0.78	175	18	10	160	0.48	Low Temp S2 Shoulder
RJRE-110203-006	3400720213000 0	Kemmer Unit #1				5,000.00	5,020.00	5,010.00	Cuttings	15.38	2.30	3.84	4.11	0.40	442		0.80	179	17	10	167	0.48	Low Temp S2 Shoulder
RJRE-110203-007	3400720213000 0	Kemmer Unit #1				5,020.00	5,040.00	5,030.00	Cuttings	15.26	2.24	3.36	4.42	0.41	443		0.81	197	18	11	150	0.43	Low Temp S2 Shoulder
RJRE-110203-008	3400720213000 0	Kemmer Unit #1				5,040.00	5,060.00	5,050.00	Cuttings	15.65	2.45	5.27	4.81	0.37	443		0.81	196	15	13	215	0.52	Low Temp S2 Shoulder
RJRE-110203-009	3400720213000 0	Kemmer Unit #1				5,060.00	5,080.00	5,070.00	Cuttings	15.66	2.31	3.38	4.47	0.37	442		0.80	194	16	12	146	0.43	Low Temp S2 Shoulder
RJRE-110203-010	3400720213000 0	Kemmer Unit #1				5,080.00	5,100.00	5,090.00	Cuttings	15.78	2.28	3.23	4.40	0.40	441		0.78	193	18	11	142	0.42	Low Temp S2 Shoulder
RJRE-110203-011	3400720213000 0	Kemmer Unit #1				5,100.00	5,110.00	5,105.00	Cuttings	52.10	0.95	1.49	1.48	0.40	444		0.83	156	42	4	157	0.50	Low Temp S2 Shoulder
RJRE-110203-012	3400720213000 0	Kemmer Unit #1				5,110.00	5,120.00	5,115.00	Cuttings	48.12	1.04	1.56	1.68	0.37	445		0.85	162	36	5	150	0.48	Low Temp S2 Shoulder
RJRE-110203-013	3400720213000 0	Kemmer Unit #1				5,120.00	5,130.00	5,125.00	Cuttings	41.02	1.29	1.66	1.86	0.36	447		0.89	144	28	5	129	0.47	Low Temp S2 Shoulder
RJRE-110203-014	3400720213000 0	Kemmer Unit #1				5,130.00	5,140.00	5,135.00	Cuttings	40.59	1.31	1.94	1.84	0.35	447		0.89	140	27	5	148	0.51	Low Temp S2 Shoulder
RJRE-110203-015	3400720213000 0	Kemmer Unit #1				5,140.00	5,150.00	5,145.00	Cuttings	41.62	1.35	2.32	2.12	0.39	447		0.89	157	29	5	172	0.52	Low Temp S2 Shoulder
RJRE-110203-016	3400720213000 0	Kemmer Unit #1				5,150.00	5,160.00	5,155.00	Cuttings	39.74	1.33	2.17	2.10	0.35	446		0.87	158	26	6	163	0.51	Low Temp S2 Shoulder
RJRE-110203-017	3400720213000 0	Kemmer Unit #1				5,160.00	5,170.00	5,165.00	Cuttings	45.73	1.14	1.45	1.78	0.39	448		0.90	156	34	5	127	0.45	Low Temp S2 Shoulder
RJRE-110203-018	3400720213000 0	Kemmer Unit #1				5,170.00	5,180.00	5,175.00	Cuttings	48.30	1.13	1.47	1.53	0.40	450		0.94	135	35	4	130	0.49	Low Temp S2 Shoulder
RJRE-110203-019	3400720213000 0	Kemmer Unit #1				5,180.00	5,190.00	5,185.00	Cuttings	85.84	0.84	1.27	1.08	0.32	449		0.92	129	38	3	151	0.54	Low Temp S2 Shoulder
RJRE-110203-020	3400720213000 0	Kemmer Unit #1				5,190.00	5,200.00	5,195.00	Cuttings	86.61	0.76	1.05	1.03	0.32	450		0.94	136	42	3	138	0.50	Low Temp S2 Shoulder

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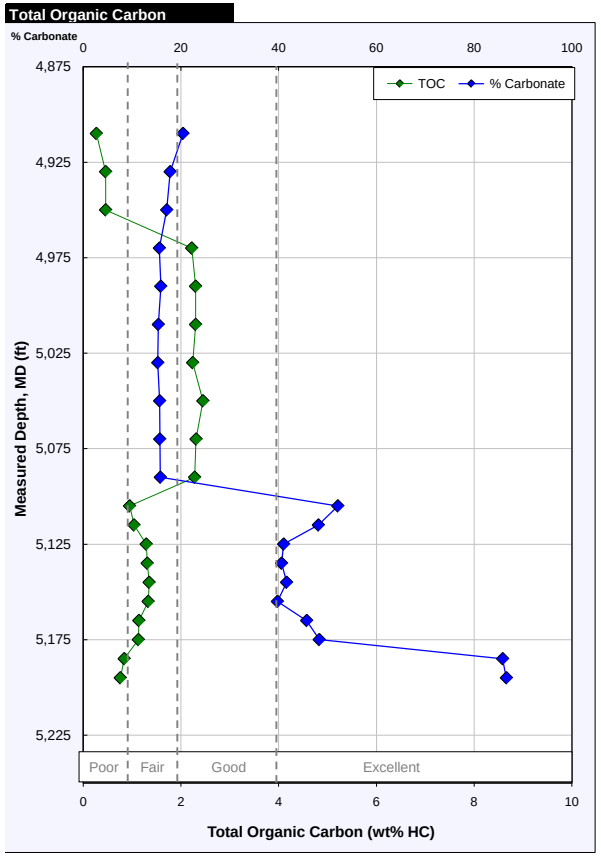
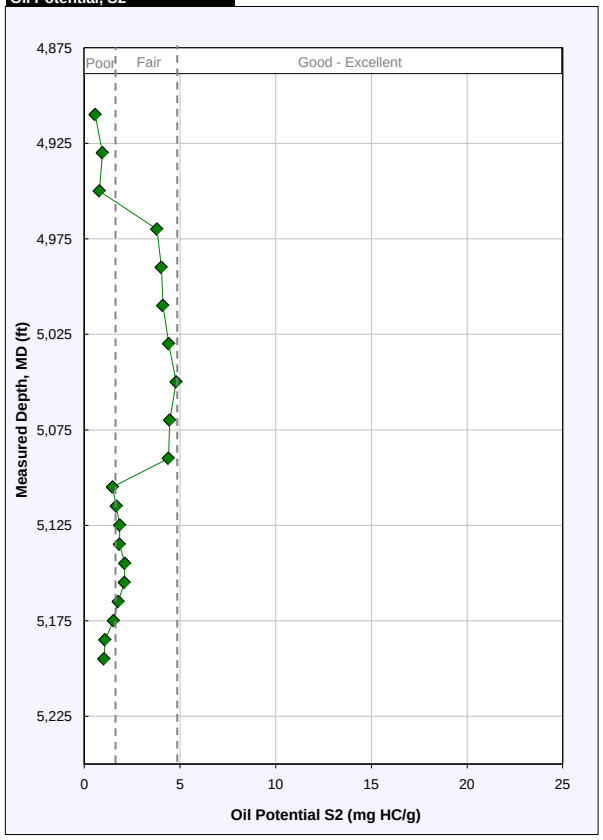
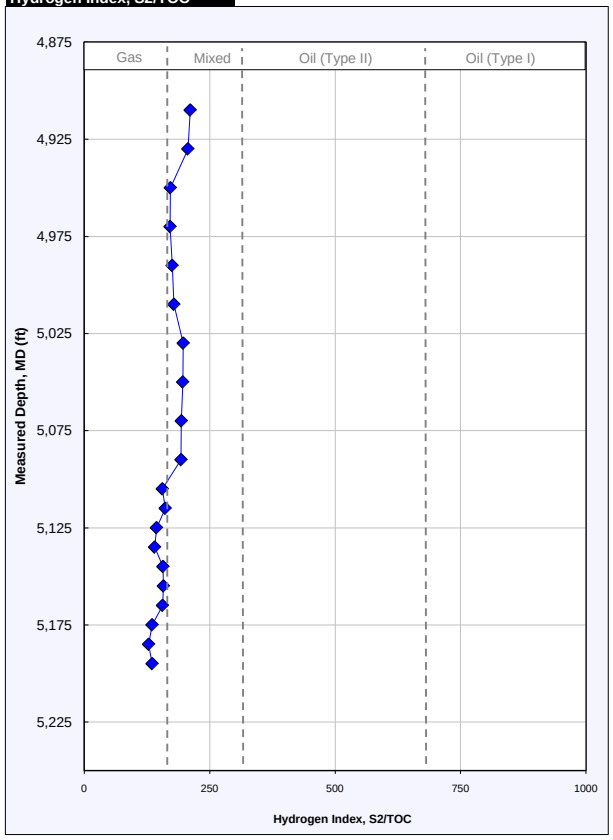
Total Organic Carbon



Oil Potential, S2



Hydrogen Index, S2/TOC



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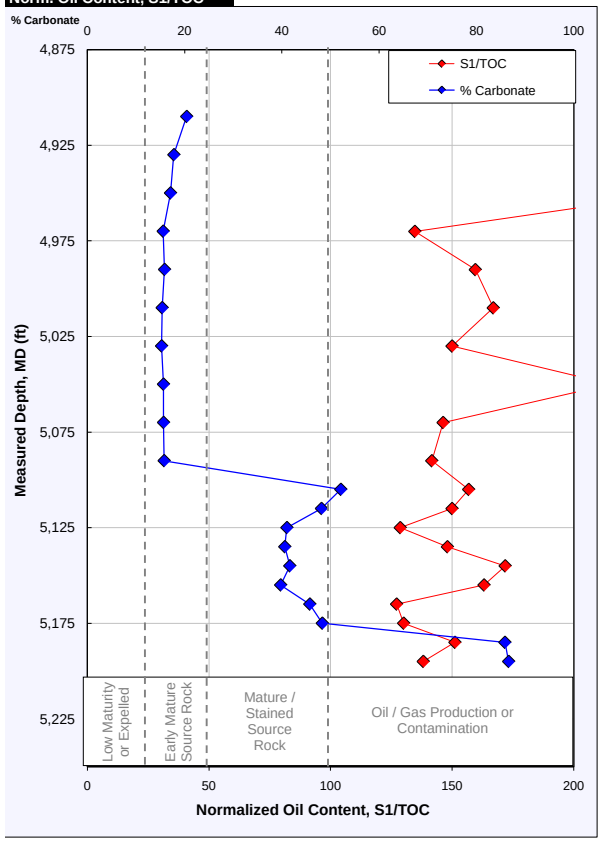
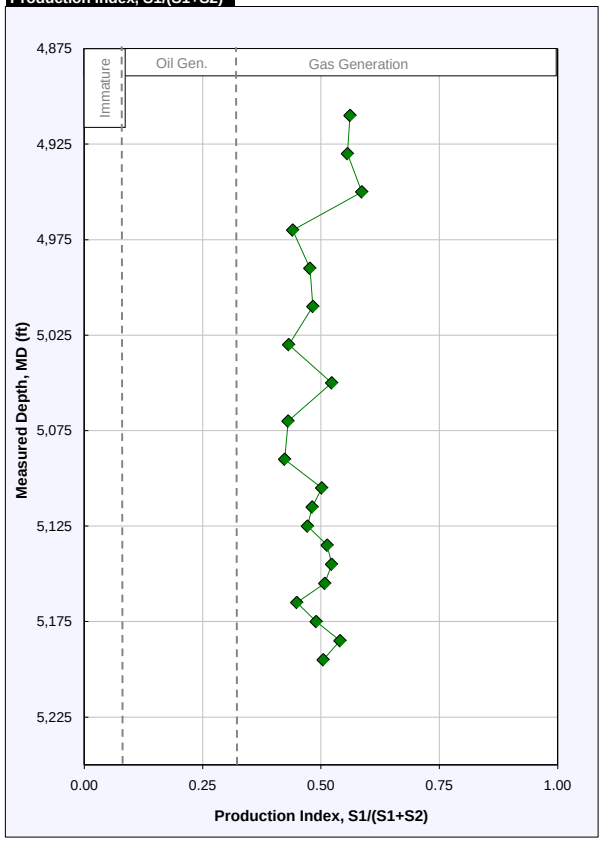
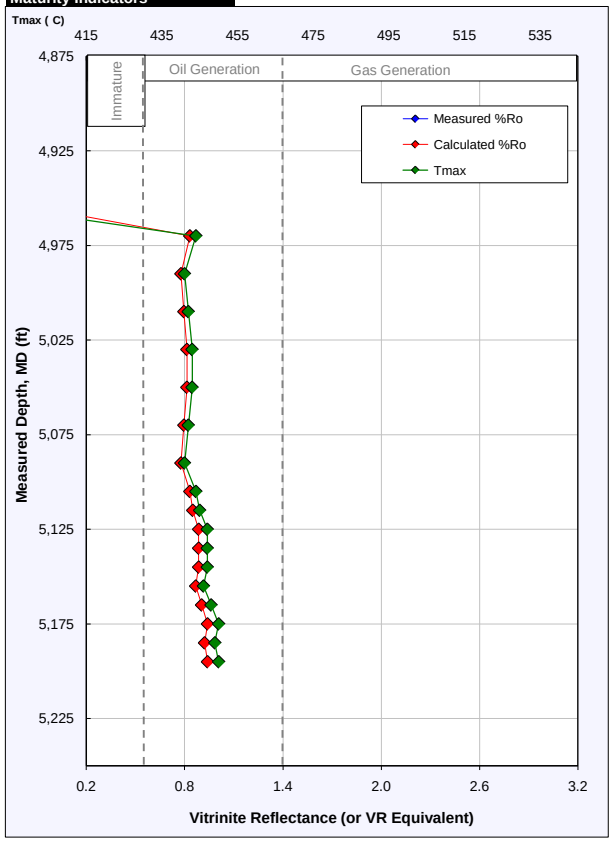
Norm. Oil Content, S1/TOC



Production Index, S1/(S1+S2)



Maturity Indicators



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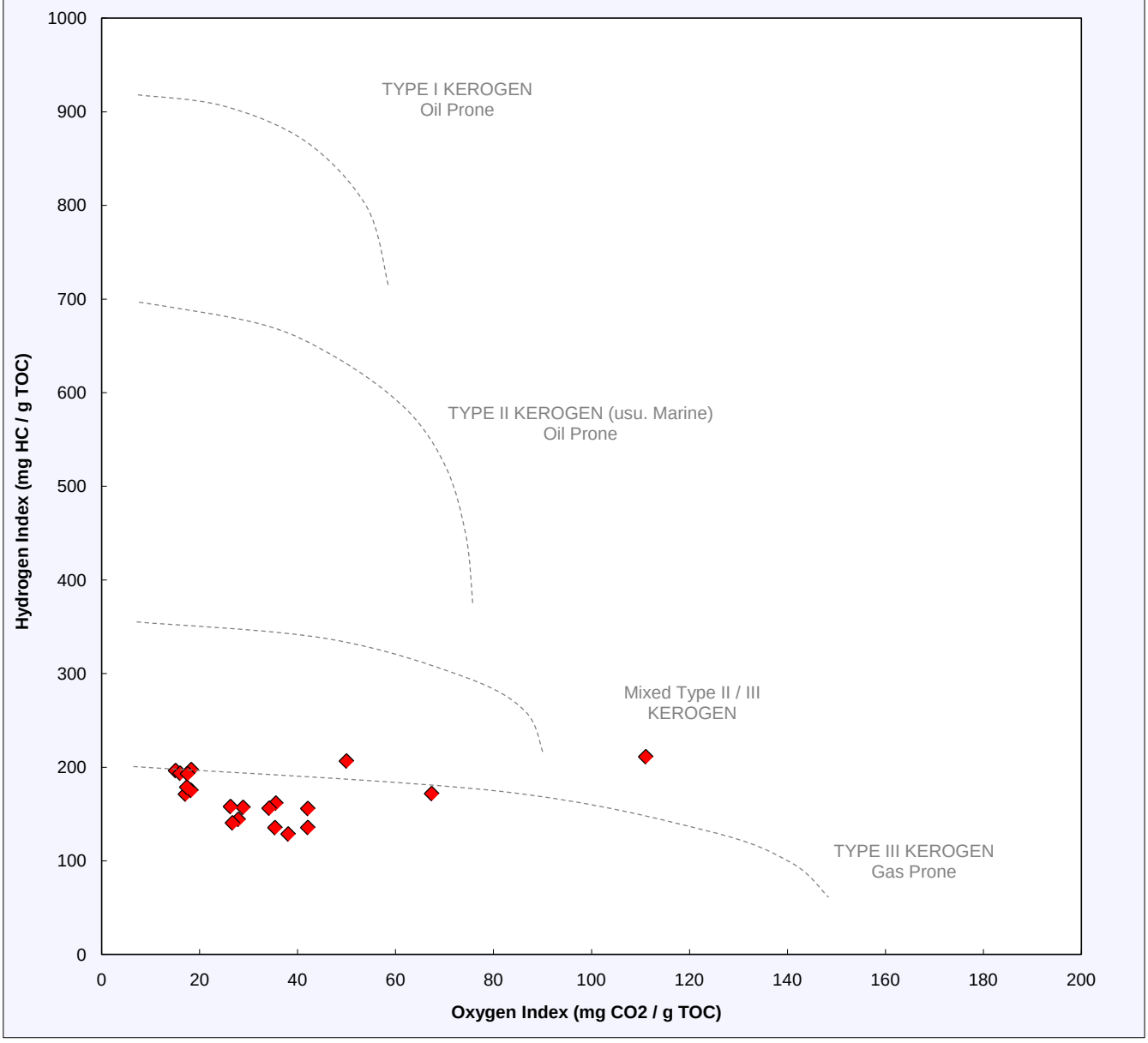
Pseudo Van Krevelen Plot



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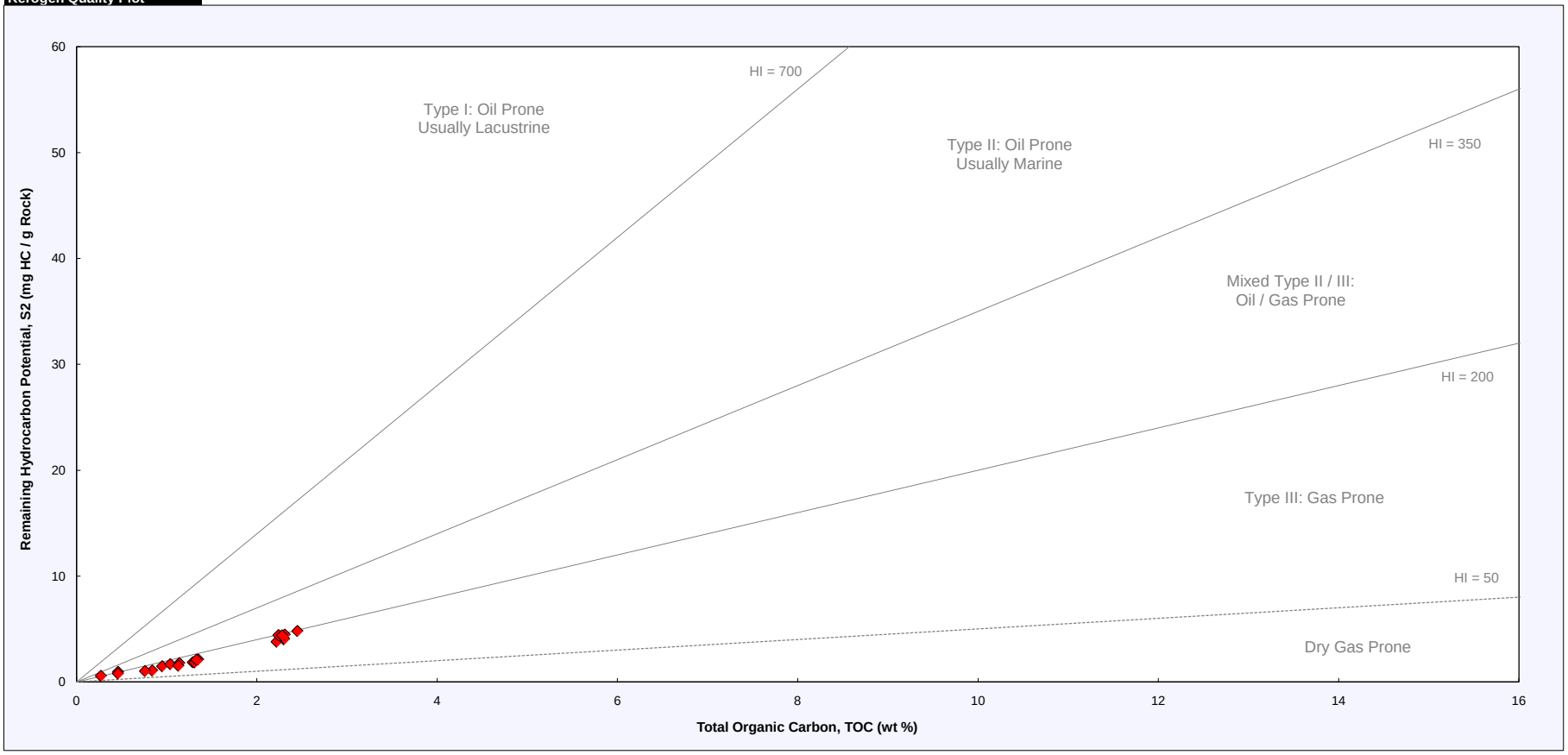
Kerogen Quality Plot



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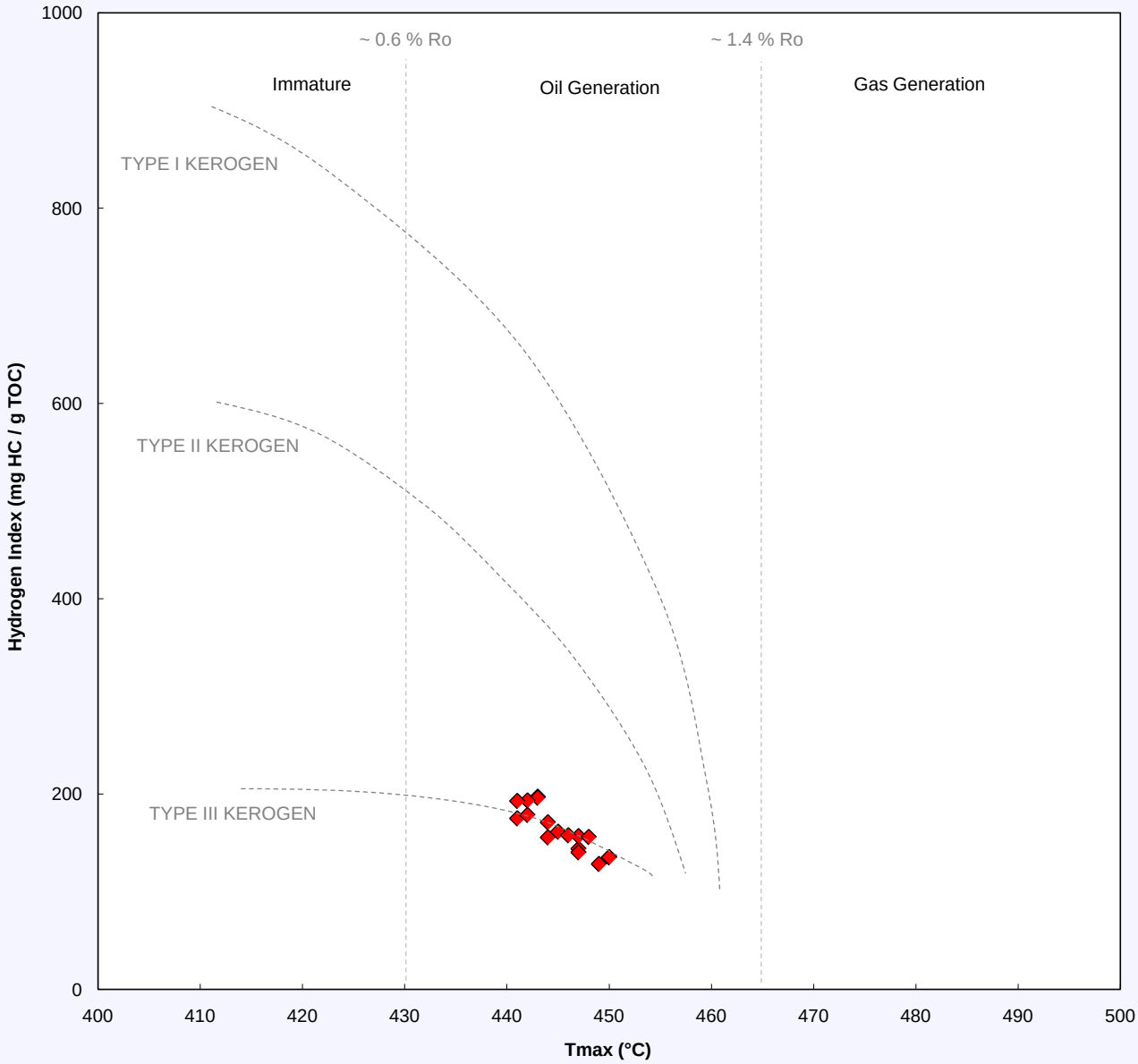
Kerogen Type and Maturity



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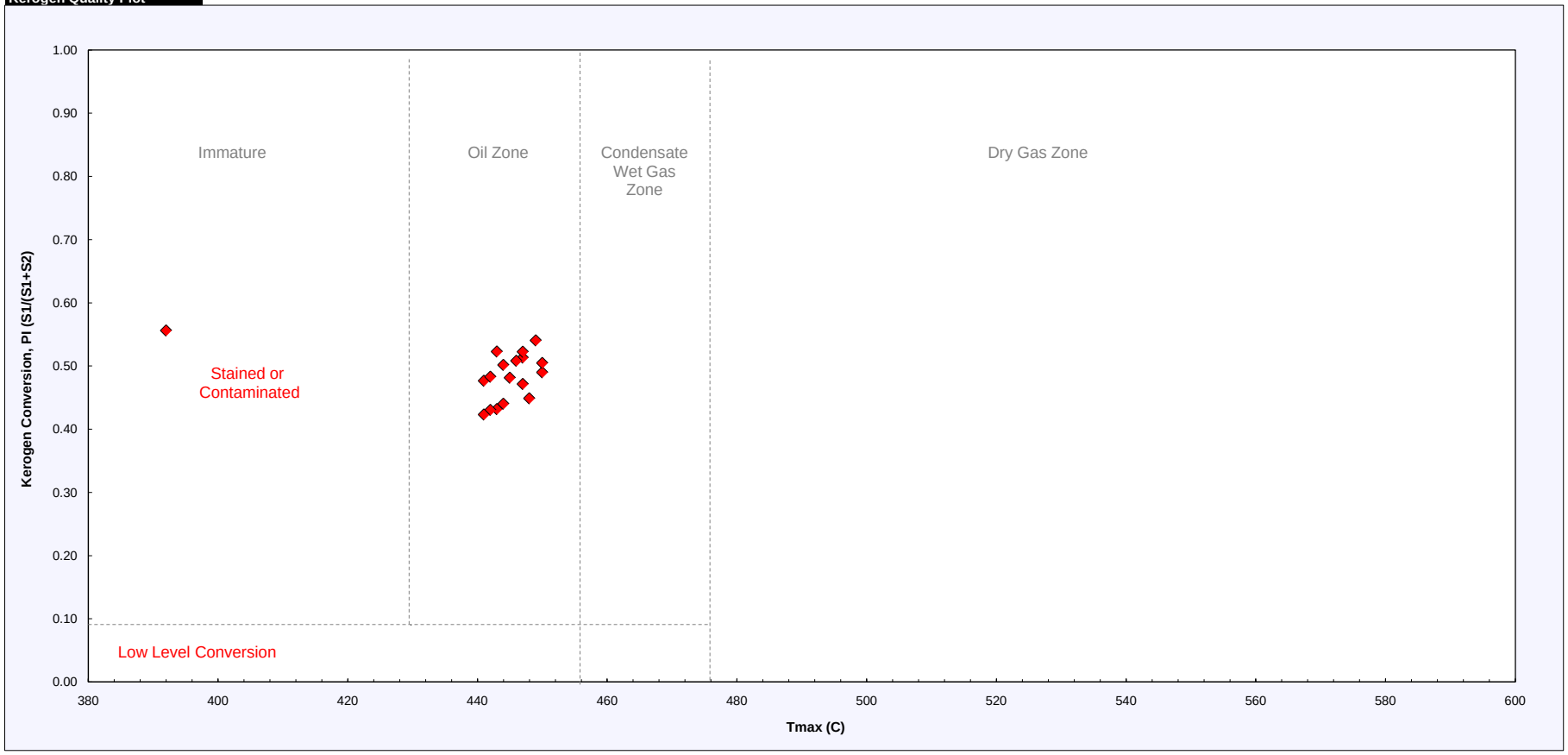
Kerogen Quality Plot



ANALYSIS OF ORDOVICIAN SHALES
RICH IN ORGANIC MATTER

Sample ID	Organic Carbon	S_1 Mg/gm	S_2 Mg/gm	S_3 Mg/gm	T°C	Hydrogen Index	Oxygen Index	Production Index	Depth (ft) Surface (S)	Formation
							OHIO			
O 1	1.29	0.61	3.73	0.53	440	289	41	0.14	1438-40	Cincinnatian Series
O 2a	2.43	3.01	4.45	0.62	439	183	25	0.40	4980-5000	Utica Sh.
*O 2b	1.37	1.56	2.10	0.56	444	153	40	0.43	5150-60	Utica Sh.
*O 3	1.36	0.58	4.06	0.87	444	298	63	0.12	1040-50	Reedville Sh.
O 4a	0.32	0.18	0.75	0.55	---	234	171	0.20	6860-80	Utica Sh.
*O 4b	2.83	1.15	1.56	0.80	466	55	28	0.43	7300-20	Utica Sh.
O 5a	0.29	0.04	0.39	0.45	430	134	155	0.10	970-80	Cincinnatian Series
*O 5b	0.66	0.20	2.17	0.37	439	328	56	0.08	1090-95	Pt. Pleasant Fm.
O 6a	2.30	1.15	5.03	0.83	441	218	36	0.19	5655-70	Utica Sh.
*O 6b	1.08	0.49	2.27	0.63	440	210	58	0.18	5705-19	Utica Sh.
O 7a	0.69	0.29	0.95	0.61	433	137	88	0.23	5544-61	Utica Sh.
*O 7b	1.81	1.96	3.42	0.81	443	188	44	0.36	5741-48	Utica Sh.
O 8a	0.40	0.19	0.54	0.40	425	135	100	0.26	6880-6910	Cincinnatian Series
*O 8b	1.68	0.65	1.66	0.59	461	98	35	0.28	6970-7000	Utica Sh.
O 9a	0.54	0.12	0.71	0.54	439	131	100	0.15	5130-40	Cincinnatian Series
*O 9b	2.86	1.58	6.40	0.79	440	223	27	0.20	5410-20	Utica Sh.
*O 10	1.82	0.88	4.26	0.69	435	234	37	0.17	1840-45	Utica Sh.
O 11a	0.97	0.16	2.24	0.57	435	230	58	0.07	2804-2813	Cincinnatian Series
*O 11b	1.55	0.55	4.56	0.79	434	294	50	0.11	3141-52	Utica Sh.
*O 12	2.02	0.69	10.00	1.63	436	495	80	0.06	2940-60	Utica Sh.
*O 13	0.72	0.11	3.10	0.63	432	430	87	0.03	1260-80	Utica Sh.
*O 14	1.38	0.51	4.86	1.03	440	352	74	0.10	1700-10	Utica Sh.
*O 15	1.80	0.75	3.95	0.68	440	219	37	0.16	2412-27	Utica Sh.
*O 16	2.27	2.03	4.33	0.89	438	190	39	0.32	6300-10	Utica Sh.
*O 17	0.99	0.16	2.86	0.66	439	288	66	0.05	1220-30	Utica Sh.
*O 18	0.28	0.06	0.33	0.65	437	117	232	0.16	4280-90	Utica Sh.
*O 19	2.70	1.03	5.56	1.07	438	205	39	0.16	5670-80	Utica Sh.

Sample ID	Organic Carbon	S_1 Mg/gm	S_2 Mg/gm	S_3 Mg/gm	T°C	Hydrogen Index	Oxygen Index	Production Index	Depth (ft) Surface (S)	Formation
*O 20	0.19	0.04	0.25	0.57	439	131	300	0.14	3470-80	Utica Sh.
*O 21	1.29	0.69	3.31	1.45	448	256	112	0.17	2980-3000	Utica Sh.
*O 22	1.37	0.54	1.55	0.73	---	113	53	0.26	4680-90	Utica Sh.
*O 23	1.86	1.04	4.58	1.87	449	246	100	0.19	3410-15	Utica Sh.
*O 24	1.58	0.44	4.77	0.89	446	301	56	0.08	3280-87	Utica Sh.
*O 25	0.93	0.37	2.85	0.68	438	306	73	0.11	1905-22	Utica Sh.
*O 26	1.03	0.34	4.54	1.27	439	440	123	0.07	1650-1710	Utica Sh.
*O 27	1.98	0.27	2.06	1.38	439	104	69	0.12	4960-5030	Utica Sh.
*O 28	0.90	0.29	2.10	0.70	438	233	77	0.12	5160-70	Utica Sh.
*O 29	0.68	0.13	2.42	0.76	433	355	111	0.05	1720-30	Utica Sh.
*O 30	2.64	1.15	10.39	2.62	443	393	99	0.10	3370-80	Utica Sh.
*O 31	0.66	0.36	2.53	0.88	432	383	133	0.12	1680-1705	Utica Sh.
*O 32	1.51	0.27	5.00	1.09	442	331	72	0.05	1230-35	Utica Sh.
*O 33	3.71	2.69	5.76	1.63	454	155	43	0.32	6500-20	Utica Sh.
*O 34	0.24	0.03	0.10	0.49	418	41	204	0.25	8500-10	Reedsville Sh.
*O 35	0.43	0.08	1.06	0.49	431	246	113	0.07	1763-73	Cincinnatian Series
*O 36	1.82	0.81	4.81	1.78	447	264	97	0.14	1340-50	Cincinnatian Series
*O 37	1.94	0.84	8.00	2.00	443	412	103	0.10	2785-2839	Cincinnatian Series

*Basal Utica

2 data sheets above taken from below Open-File Report

DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Petroleum source rock potential of the Upper Ordovician black shale sequence, northern Appalachian basin

by Laure G. Wallace[1] and John B. Roen[1]

Open-File Report 89-488

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

[1]Reston, Virginia

1989