TOC and ROCK-EVAL DATA REPORT

U.S.G.S., Permian Basin

HGS No.	County	State	Operator	Well Name	USGS ID	USGS Well	Top Depth (ft.)	Bottom Depth (ft.)	Median Depth (ft.)	Sample Type	Rock-Eval TOC	S1	S2	S3	Tmax (°C)	Cal. %Ro	Meas. %Ro	HI	OI	S2/S3	S1/TOC	PI	Notes Checks	Notes Pyrogram
05-3115-124312	Lea	NM	Phillips Petro.	9 Santa Fe		A753	4493		4493	core	1.87	3.16	6.04	0.39	438	0.72		323	21	15	169	0.34		n;lts2sh
05-3115-124313	Lea	NM	Phillips Petro.	3 Hale		A756	4132		4132	core	1.23	1.30	4.54	0.34	438	0.72		369	28	13	106	0.22		n
05-3115-124314	Lea	NM	Phillips Petro.	73 Santa Fe		A764	8962		8962	core	0.59	0.62	0.71	0.32	445	0.85		120	54	2	105	0.47		n
05-3115-124315	Lea	NM	Phillips Petro.	8 Woolworth		B014	3431		3431	core	0.26	0.45	0.45	0.19	377 *	-1.00		173	73	2	173	0.50		f
05-3115-124316	Yoakum	TX	Petro Lewis Corp.	1 Harrison		C822	9029		9029	core	0.18	0.12	0.22	0.11	443 *	0.81		122	61	2	67	0.35		n
05-3115-124317	Yoakum	TX	Petro Lewis Corp.	2 Bowden		C823	8925		8925	core	0.09	0.09	0.08	0.10	443 *	0.81		89	111	1	100	0.53		f
05-3115-124318	Yoakum	TX	Petro Lewis Corp.	1 Gentry		C824	8934		8934	core	0.34	0.38	0.65	0.17	442	0.80		191	50	4	112	0.37		n
05-3115-124319	DeBaca	NM	US Operating	1 Good State		DZ17942	4410	4420	4415	cuttings	0.32	0.18	0.24	0.30	486 *	1.59		75	94	1	56	0.43		f
05-3115-124320	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	13900	13910	13905	cuttings	10.15	3.60	2.60	0.44	574	3.17		26	4	6	35	0.58		lts2p;hts2p
05-3115-124321	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	13500	13510	13505	cuttings	1.64	0.97	0.51	0.22	463	1.17		31	13	2	59	0.66		f
05-3115-124322	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	13000	13010	13005	cuttings	4.80	2.95	2.05	0.29	504	1.91		43	6	7	61	0.59		lts2p;hts2p
05-3115-124323	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	12500	12510	12505	cuttings	2.40	1.10	0.97	0.27	473	1.35		40	11	4	46	0.53		n
05-3115-124324	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	12020	12030	12025	cuttings	1.79	0.77	0.84	0.28	464	1.19		47	16	3	43	0.48		n
05-3115-124325	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	11490	11500	11495	cuttings	1.73	0.79	0.92	0.28	469	1.28		53	16	3	46	0.46		n
05-3115-124326	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	10990	11000	10995	cuttings	2.86	1.43	1.82	0.30	459	1.10		64	10	6	50	0.44		n;lts2sh
05-3115-124327	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	10050	10060	10055	cuttings	3.28	2.34	3.26	0.37	454	1.01		99	11	9	71	0.42		n;lts2sh
05-3115-124328	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	9500	9510	9505	cuttings	1.41	1.77	1.96	0.74	447	0.89		139	52	3	126	0.47		n;lts2sh
05-3115-124329	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	9000	9010	9005	cuttings	1.88	2.04	3.06	0.47	450	0.94		163	25	7	109	0.40		n;lts2sh
05-3115-124330	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	8510	8520	8515	cuttings	2.03	1.13	2.14	0.43	444	0.83		105	21	5	56	0.35		n
05-3115-124331	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	8000	8010	8005	cuttings	2.63	1.91	3.95	0.41	446	0.87		150	16	10	73	0.33		n
05-3115-124332	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	7550	7560	7555	cuttings	4.69	3.11	7.53	0.55	443	0.81		161	12	14	66	0.29		n
05-3115-124333	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	6030	6040	6035	cuttings	1.66	1.06	5.29	0.41	441	0.78		319	25	13	64	0.17		n
05-3115-124334	Reeves	TX	Conoco	#1 Caldwell Estate 4		DZ19164	4470	4480	4475	cuttings	2.51	1.35	12.12	0.46	439	0.74		483	18	26	54	0.10		n
05-3115-124335	Lea	NM	Wainoco Oil	3 Aztec State		DZ19276	10280	10290	10285	cuttings	0.23	0.32	0.25	0.22	347 *	-1.00		109	96	1	139	0.56		f
05-3115-124336	Lea	NM	Wainoco Oil	3 Aztec State		DZ19276	10800	10810	10805	cuttings	0.74	0.64	0.77	0.27	453	0.99		104	36	3	86	0.45		n
05-3115-124337	Lea	NM	Wainoco Oil	3 Aztec State		DZ19276	11000	11010	11005	cuttings	1.14	0.72	1.31	0.34	442	0.80		115	30	4	63	0.35		n;lts2sh
05-3115-124338	Lea	NM	Wainoco Oil	3 Aztec State		DZ19276	11370	11375	11372.5	cuttings	0.68	0.62	0.66	0.27	451	0.96		97	40	2	91	0.48		n
05-3115-124339	DeBaca	NM	Hunt Oil	1 Cooper		DZ19403	2902		2902.2	core	0.14	0.11	0.32	0.14	509 *	2.00		229	100	2	79	0.26		f
05-3115-124340	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	11660	11670	11665	cuttings	1.36	0.61	0.93	0.43	460	1.12		68	32	2	45	0.40		n
05-3115-124341	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	11400	11410	11405	cuttings	1.24	0.37	1.02	0.39	465	1.21		82	31	3	30	0.27		n
05-3115-124342	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	10750	10760	10755	cuttings	0.46	0.34	0.39	0.21	458 *	1.08		85	46	2	74	0.47		n
05-3115-124343	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	10020	10030	10025	cuttings	1.11	0.78	1.19	0.36	449	0.92		107	32	3	70	0.40		n
05-3115-124344	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	9500	9510	9505	cuttings	1.45	1.16	1.54	0.43	451	0.96		106	30	4	80	0.43		n
05-3115-124345	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	8900	8910	8905	cuttings	0.75	0.68	1.07	0.28	447	0.89		143	37	4	91	0.39		n
05-3115-124346	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	8100	8110	8105	cuttings	1.04	0.52	1.43	0.27	450	0.94		138	26	5	50	0.27		n
05-3115-124347	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	7400	7410	7405	cuttings	0.82	0.80	0.90	0.28	452	0.98		110	34	3	98	0.47		n
05-3115-124348	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	6900	6910	6905	cuttings	2.05	1.58	4.25	0.34	448	0.90		207	17	12	77	0.27		n
05-3115-124349	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	6500	6510	6505	cuttings	1.02	0.67	0.53	0.26	463	1.17		52	25	2	66	0.56		f
05-3115-124350	Eddy	NM	Southland Royalty	1-8 Holly Federal		DZ19559	6200	6210	6205	cuttings	1.09	0.96	0.99	0.28	452	0.98		91	26	4	88	0.49		n
05-3115-124351	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	11740	11750	11745	cuttings	1.64	0.91	0.71	0.23	464	1.19		43	14	3	55	0.56		n
05-3115-124352	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	11000	11010	11005	cuttings	1.55	0.54	0.88	0.20	447	0.89		57	13	4	35	0.38		n
05-3115-124353	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	10000	10010	10005	cuttings	2.73	1.81	2.85	0.34	454	1.01		104	12	8	66	0.39		n;lts2sh
05-3115-124354	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	9500	9510	9505	cuttings	1.04	1.48	3.92	0.46	444	0.83		377	44	9	142	0.27		n;lts2sh
05-3115-124355	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	8990	9000	8995	cuttings	1.58	1.27	2.28	0.39	447	0.89		144	25	6	80	0.36		n;lts2sh
05-3115-124356	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	8500	8510	8505	cuttings	1.31	1.02	1.49	0.30	450	0.94		114	23	5	78	0.41		n
05-3115-124357	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	8010	8020	8015	cuttings	3.35	2.38	5.26	0.39	446	0.87		157	12	13	71	0.31		n;lts2sh
05-3115-124358	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	7510	7520	7515	cuttings	3.44	2.24	5.98	0.42	444	0.83		174	12	14	65	0.27		n

TOC and ROCK-EVAL DATA REPORT

U.S.G.S., Permian Basin

HGS No.	County	State	Operator	Well Name	USGS ID	USGS Well	Top Depth (ft.)	Bottom Depth (ft.)	Median Depth (ft.)	Sample Type	Rock-Eval TOC	S1	S2	S3	Tmax (°C)	Cal. %Ro	Meas. %Ro	HI	OI	S2/S3	S1/TOC	PI	Notes Checks	Notes Pyrogram
05-3115-124359	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	7000	7010	7005	cuttings	2.10	1.78	6.36	0.41	446	0.87		303	20	16	85	0.22		n
05-3115-124360	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	6500	6510	6505	cuttings	1.47	0.86	5.65	0.34	440	0.76		384	23	17	59	0.13		n
05-3115-124361	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	6000	6010	6005	cuttings	2.05	1.31	6.81	0.37	441	0.78		332	18	18	64	0.16		n
05-3115-124362	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	5520	5530	5525	cuttings	1.41	0.60	4.21	0.40	439	0.74		299	28	11	43	0.12		n
05-3115-124363	Reeves	TX	Conoco	#2 Caldwell Estate 4		DZ20112	4690	4700	4695	cuttings	1.68	0.61	6.94	0.46	439	0.74		413	27	15	36	0.08		n
05-3115-124364	Kent	TX	Hamilton Brothers	1-39 Wallace		DZ20330	5260	5270	5265	cuttings	0.73	0.55	0.73	0.46	436	0.69		100	63	2	75	0.43		n
05-3115-124365	Yoakum	TX	Tenneco Oil	1 Todd		DZ20473	13000	13010	13005	cuttings	0.66	0.32	1.28	0.26	443	0.81		194	39	5	48	0.20		n
05-3115-124366	Yoakum	TX	Tenneco Oil	1 Todd		DZ20473	12340	12350	12345	cuttings	2.22	0.38	2.57	0.38	442	0.80		116	17	7	17	0.13		n
05-3115-124367	Yoakum	TX	Tenneco Oil	1 Todd		DZ20473	11800	11810	11805	cuttings	0.80	0.20	0.50	0.23	453	0.99		62	29	2	25	0.29		n
05-3115-124368	Yoakum	TX	Tenneco Oil	1 Todd		DZ20473	10900	10910	10905	cuttings	1.03	0.66	2.23	0.33	442	0.80		217	32	7	64	0.23		n
05-3115-124369	Yoakum	TX	Tenneco Oil	1 Todd		DZ20473	10300	10310	10305	cuttings	1.76	0.83	4.49	0.42	439	0.74		255	24	11	47	0.16		n
05-3115-124370	Yoakum	TX	Tenneco Oil	1 Todd		DZ20473	9990	10000	9995	cuttings	2.46	0.67	6.59	0.49	436	0.69		268	20	13	27	0.09		n
05-3115-124371	Yoakum	TX	Tenneco Oil	1 Todd		DZ20473	9500	9510	9505	cuttings	1.11	0.71	2.01	0.35	446	0.87		181	32	6	64	0.26		n
05-3115-124372	Yoakum	TX	Tenneco Oil	1 Todd		DZ20473	9040	9050	9045	cuttings	1.16	0.97	2.47	0.40	442	0.80		213	34	6	84	0.28		n
05-3115-124373	Yoakum	TX	Tenneco Oil	1 Todd		DZ20473	8150	8160	8155	cuttings	1.32	0.80	3.10	0.37	438	0.72		235	28	8	61	0.21		n

Note: "-1" indicates not measured or meaningless ratio

* 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)
Calculcated%VRo = 0.0180 x Tmax - 7.16 (Jarvie et al., 2001)
Measured %Ro = measured vitrinite reflectance

Notes:
c = Rock-Eval analysis checked and confirmed
lc = Leco TOC analysis checked and confirmed

Pyrogram:
n=normal
ltS2sh = low temperature S2 shoulder
ltS2p = low temperature S2 peak
htS2p = high temperature S2 peak
f = flat S2 peak
na = printer malfunction pyrogram not available

Geochemical Log

U.S.G.S., Permian Basin

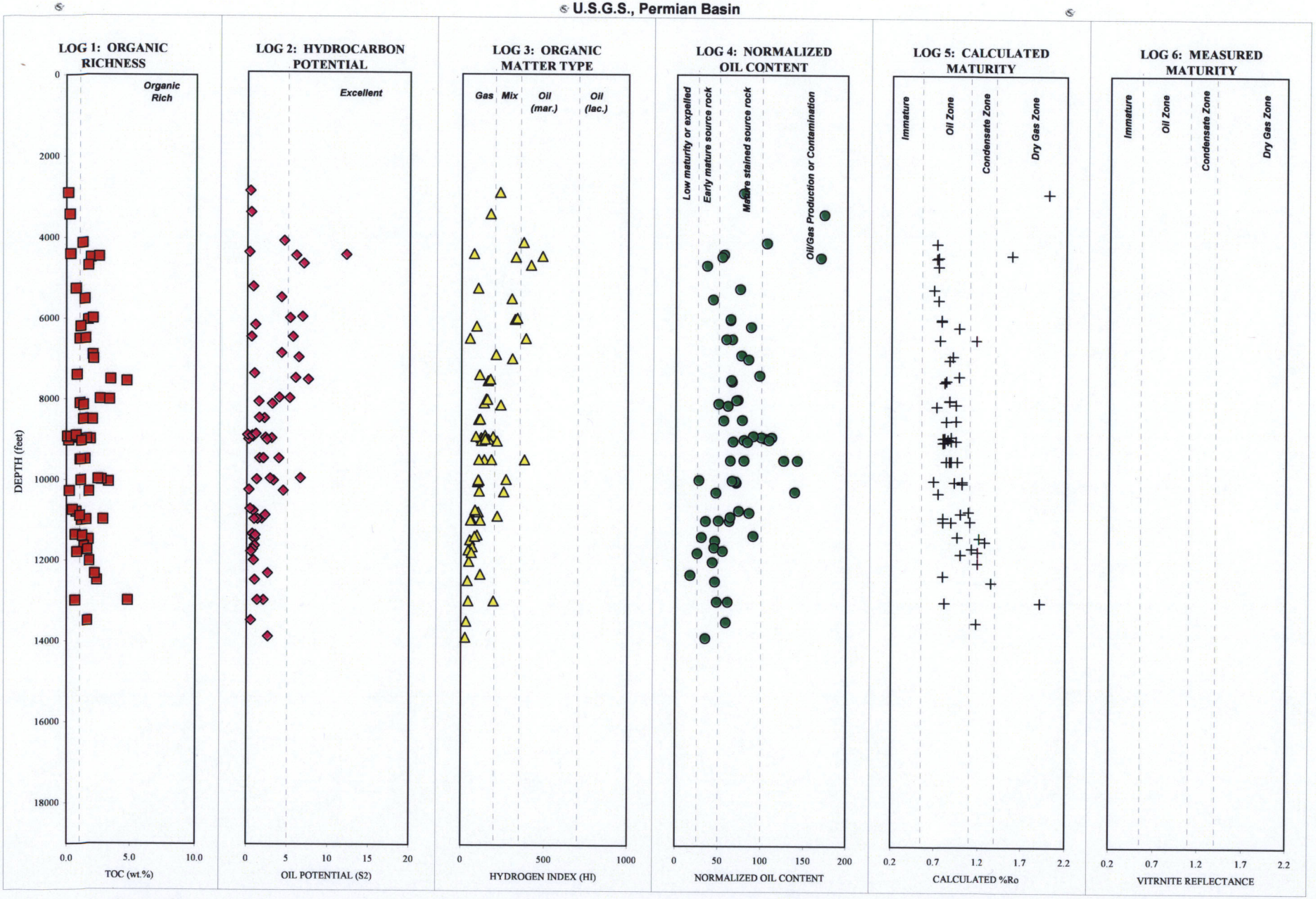

Figure 1. Geochemical log of TOC, remaining potential (S2), kerogen type (HI), normalized oil content, and calculated and measured vitrinite reflectance.

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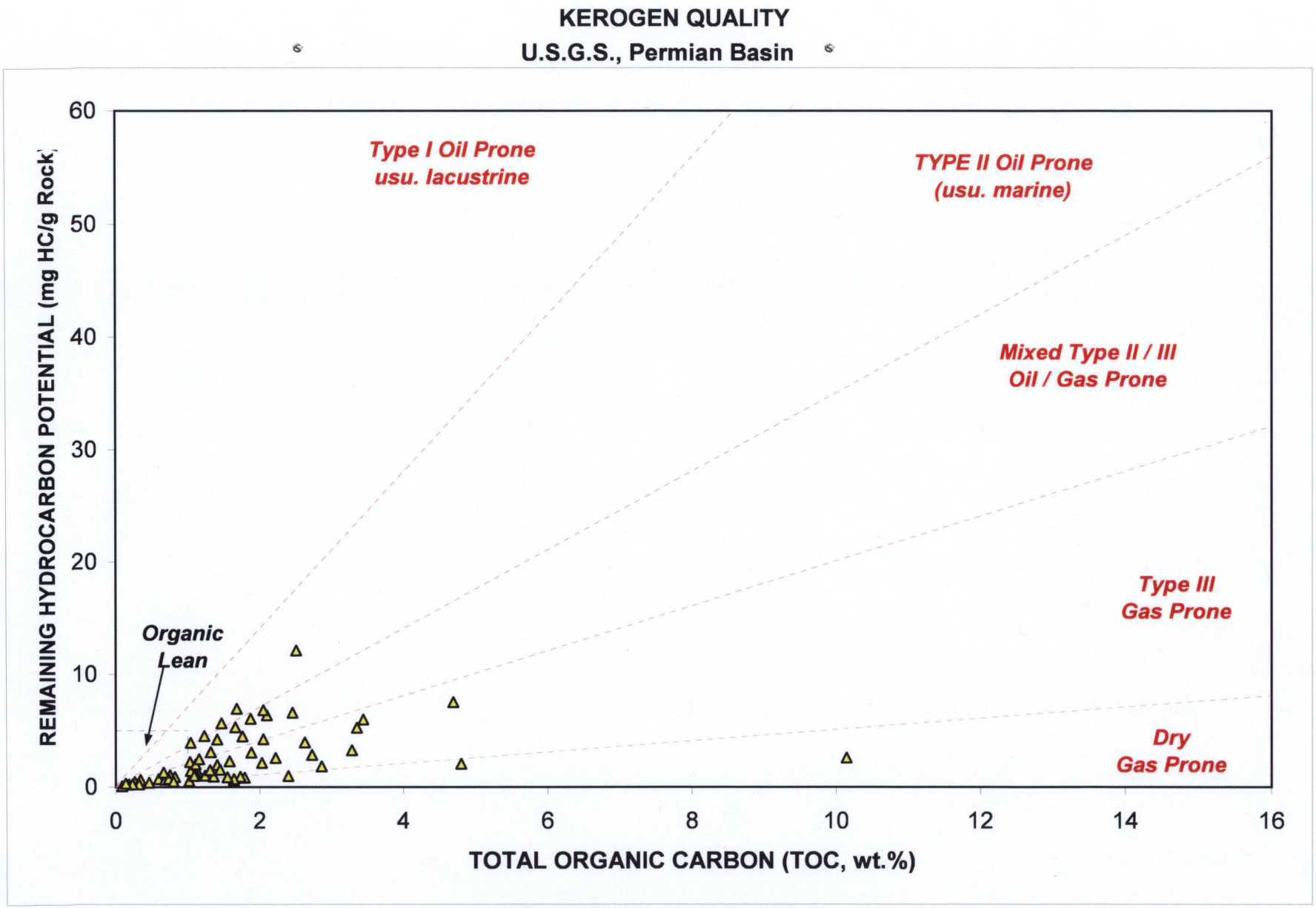

Figure 2. Kerogen Quality

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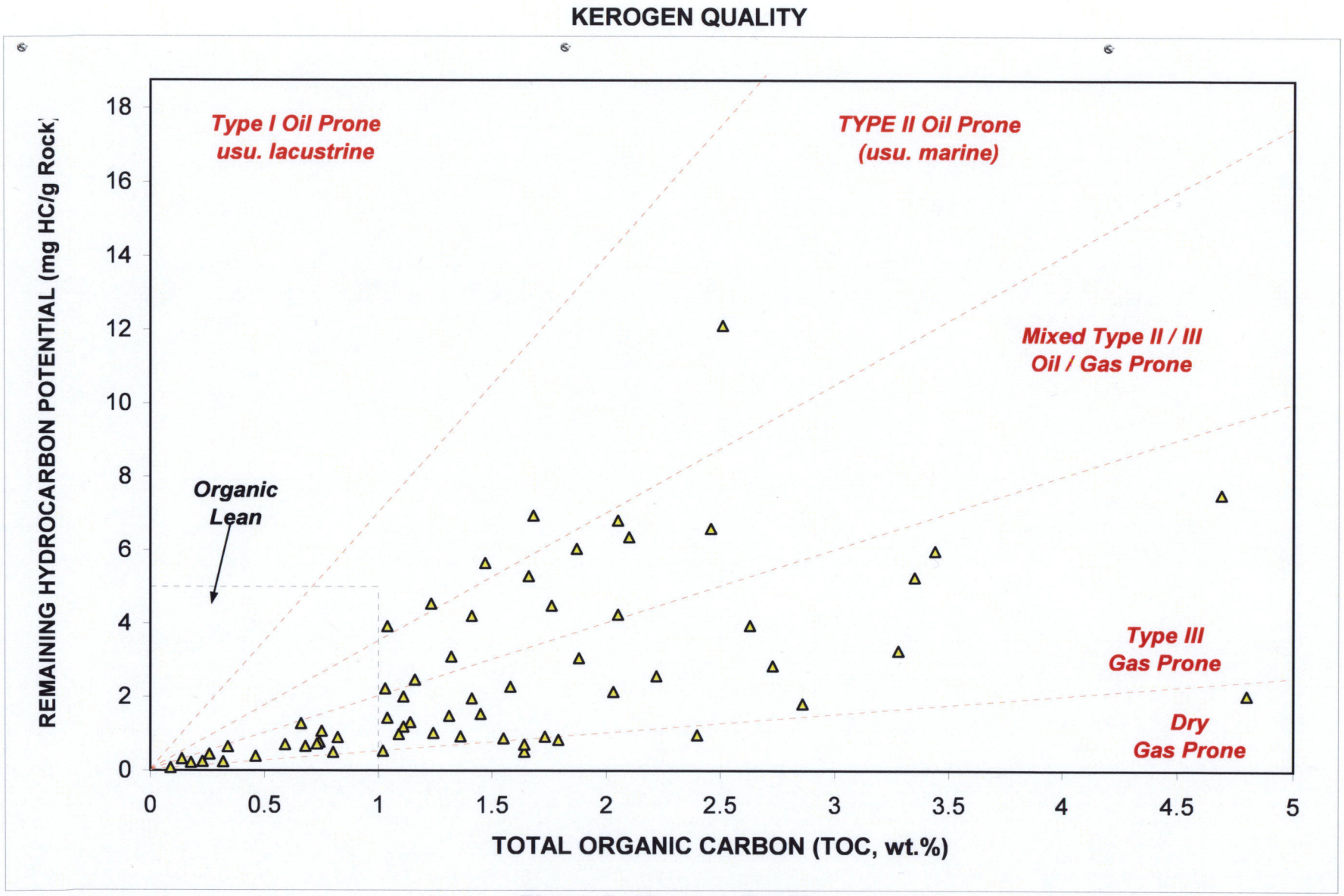

Figure 2. Kerogen Quality

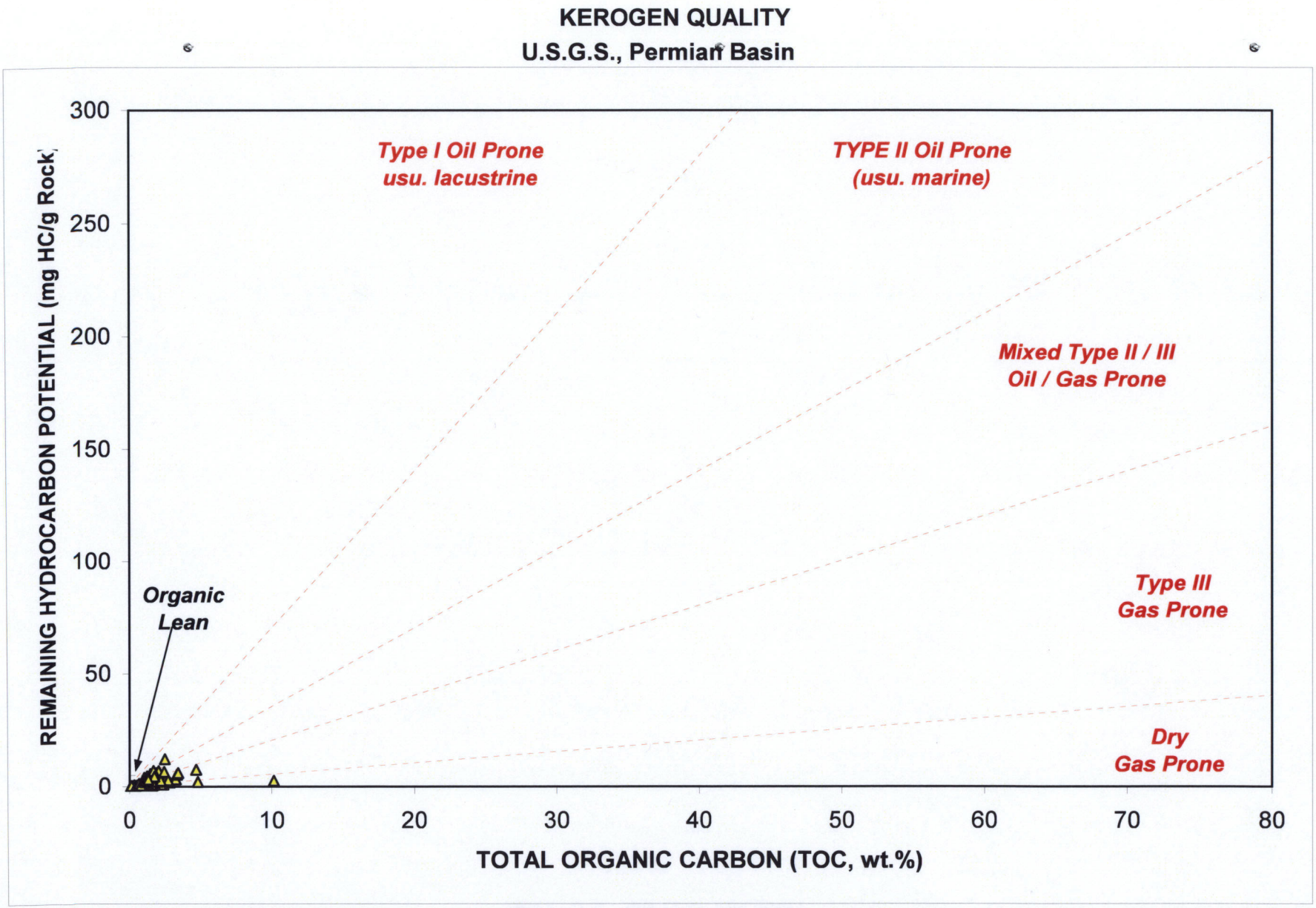

Figure 2. Kerogen Quality

Humble Geochemical Services Division

KEROGEN TYPE
U.S.G.S., Permian Basin

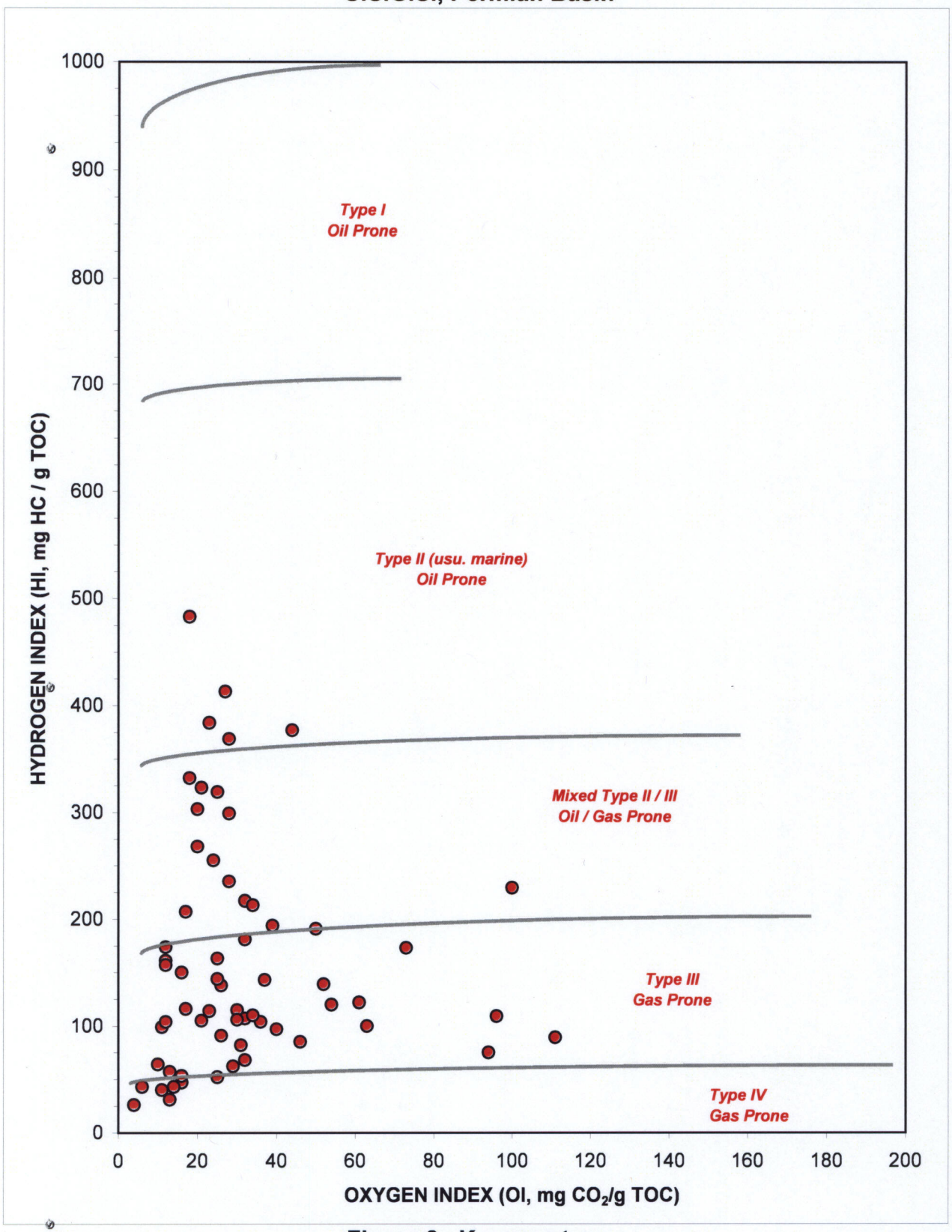

Figure 3. Kerogen type

KEROGEN TYPE and MATURITY
U.S.G.S., Permian Basin

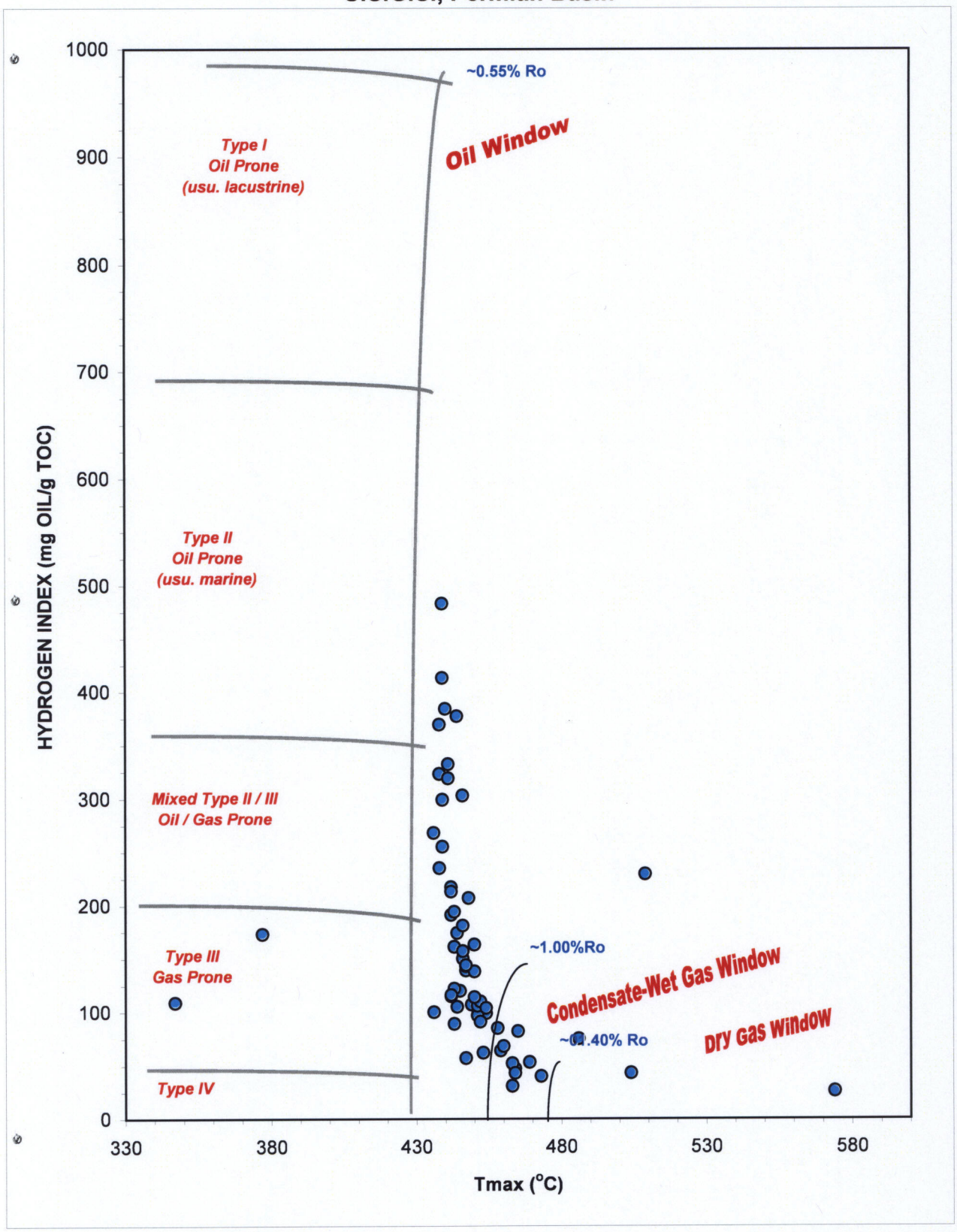

Figure 4a. Kerogen Type and Maturity (Tmax)

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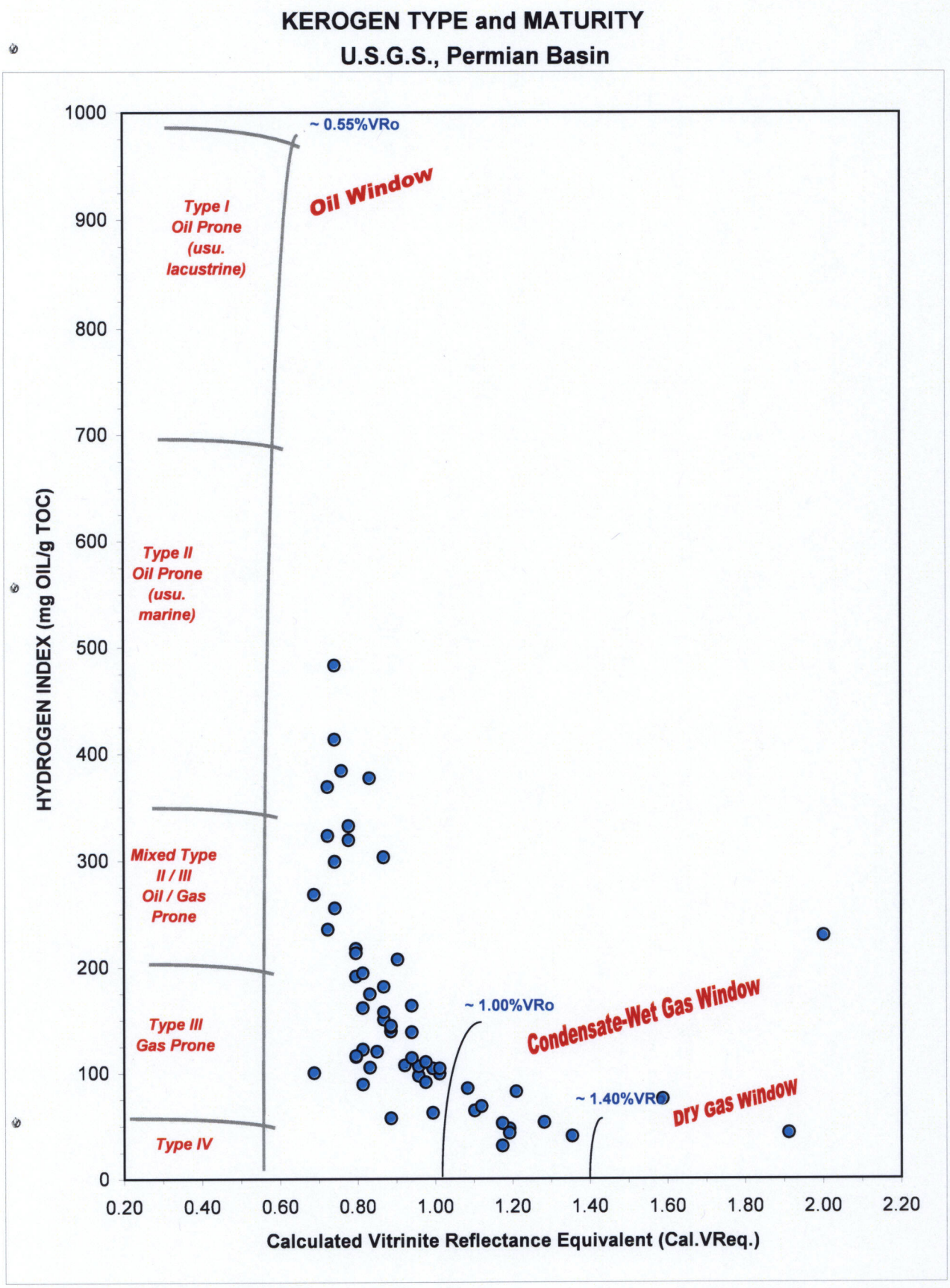

Figure 4b. Kerogen Type and Maturity (Tmax calculated %VRo)

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KEROGEN TYPE and MATURITY
U.S.G.S., Permian Basin

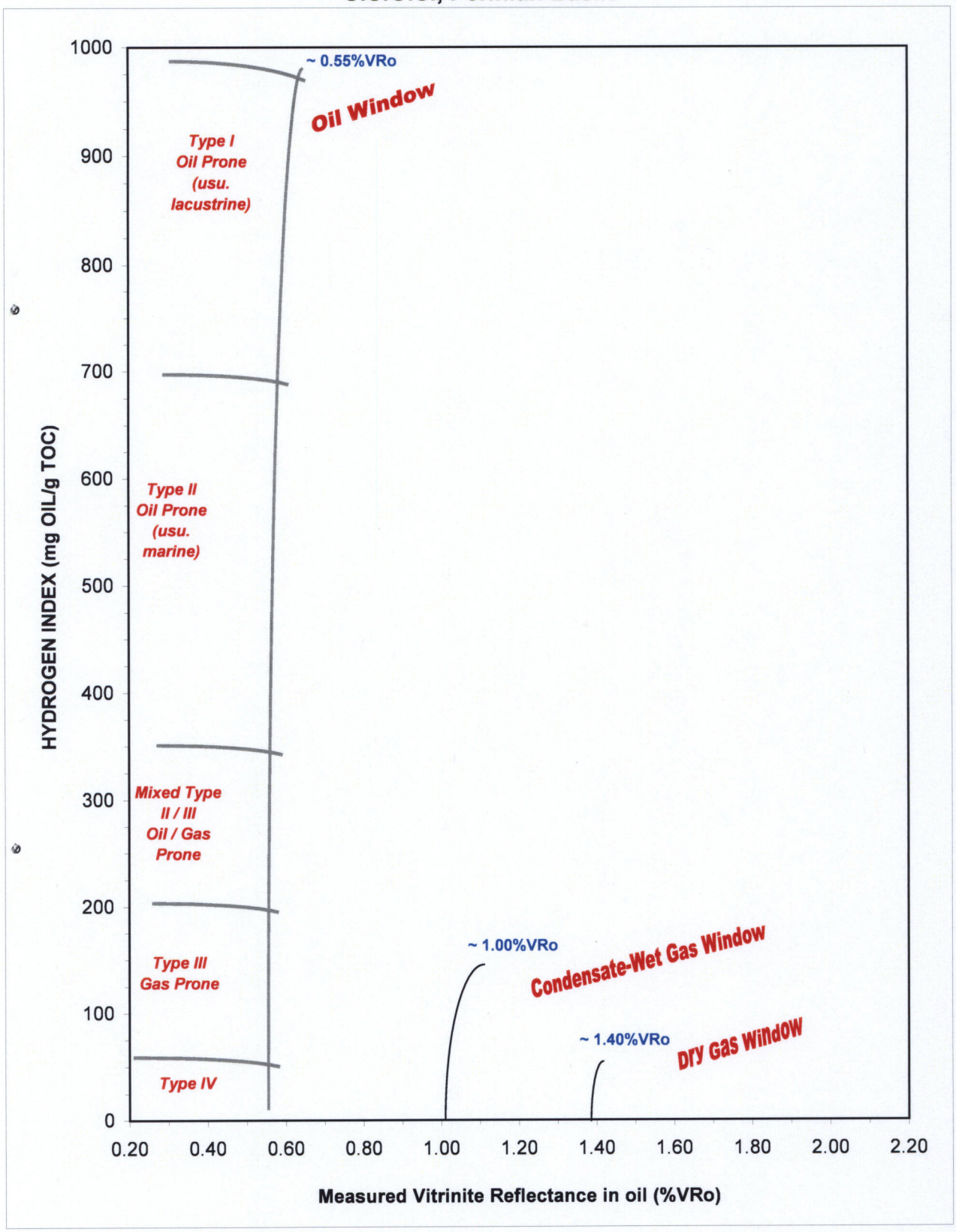

Figure 4c. Kerogen Type and Maturity (Measured vitrinite reflectance)

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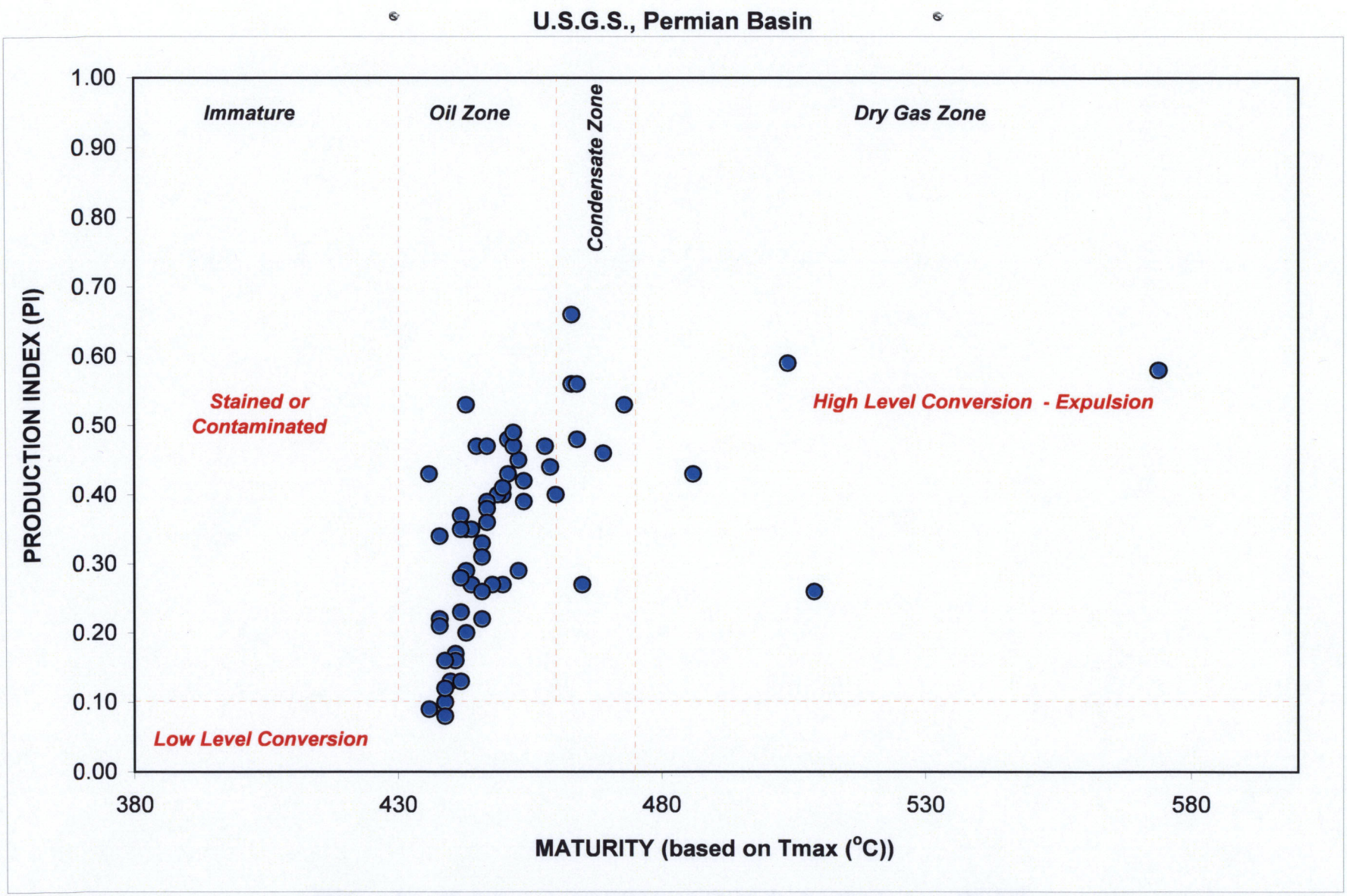

Figure 5a. Kerogen conversion and maturity (based on Tmax).

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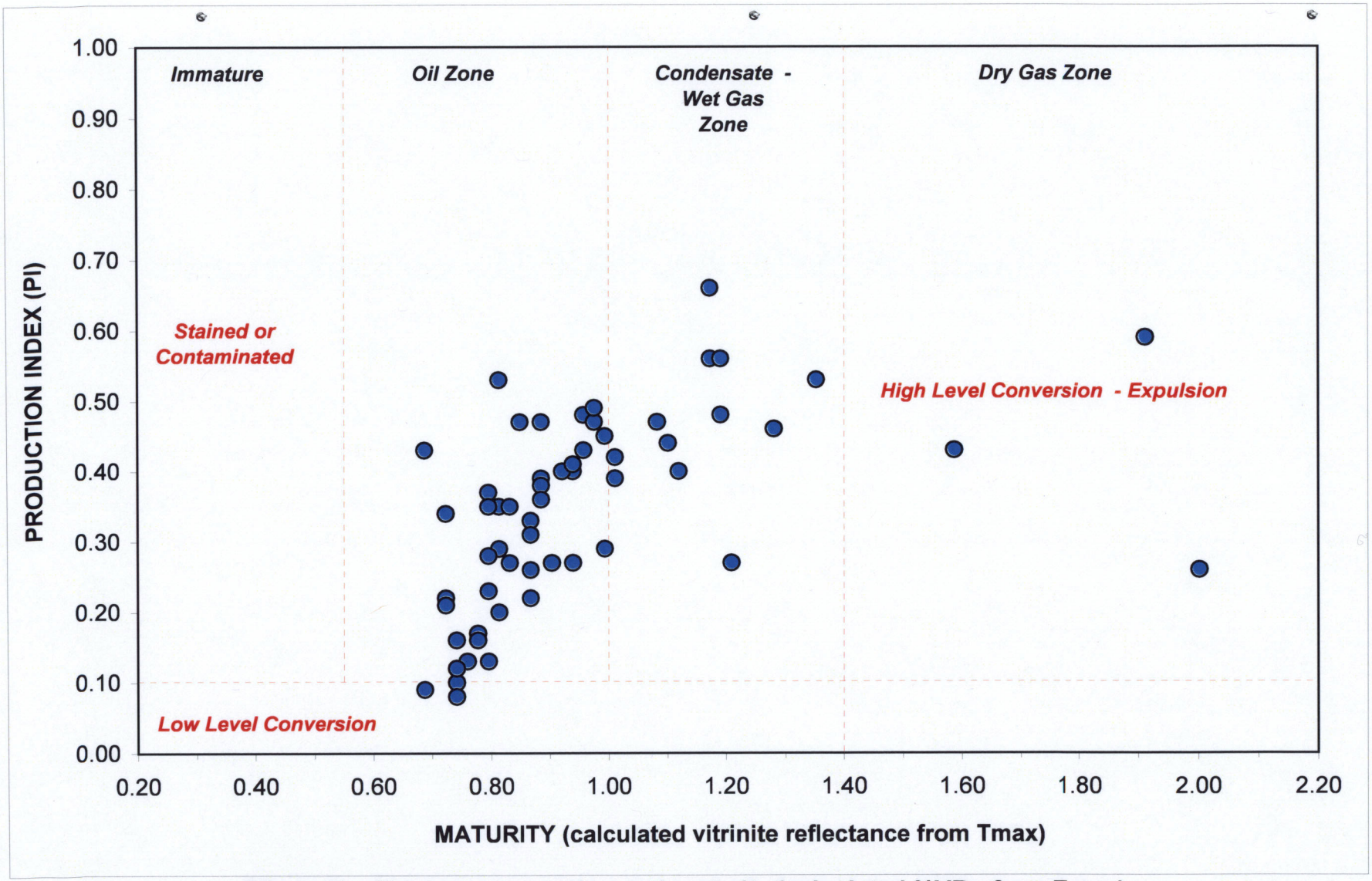

Figure 5b. Kerogen conversion and maturity (calculated %VRo from Tmax).

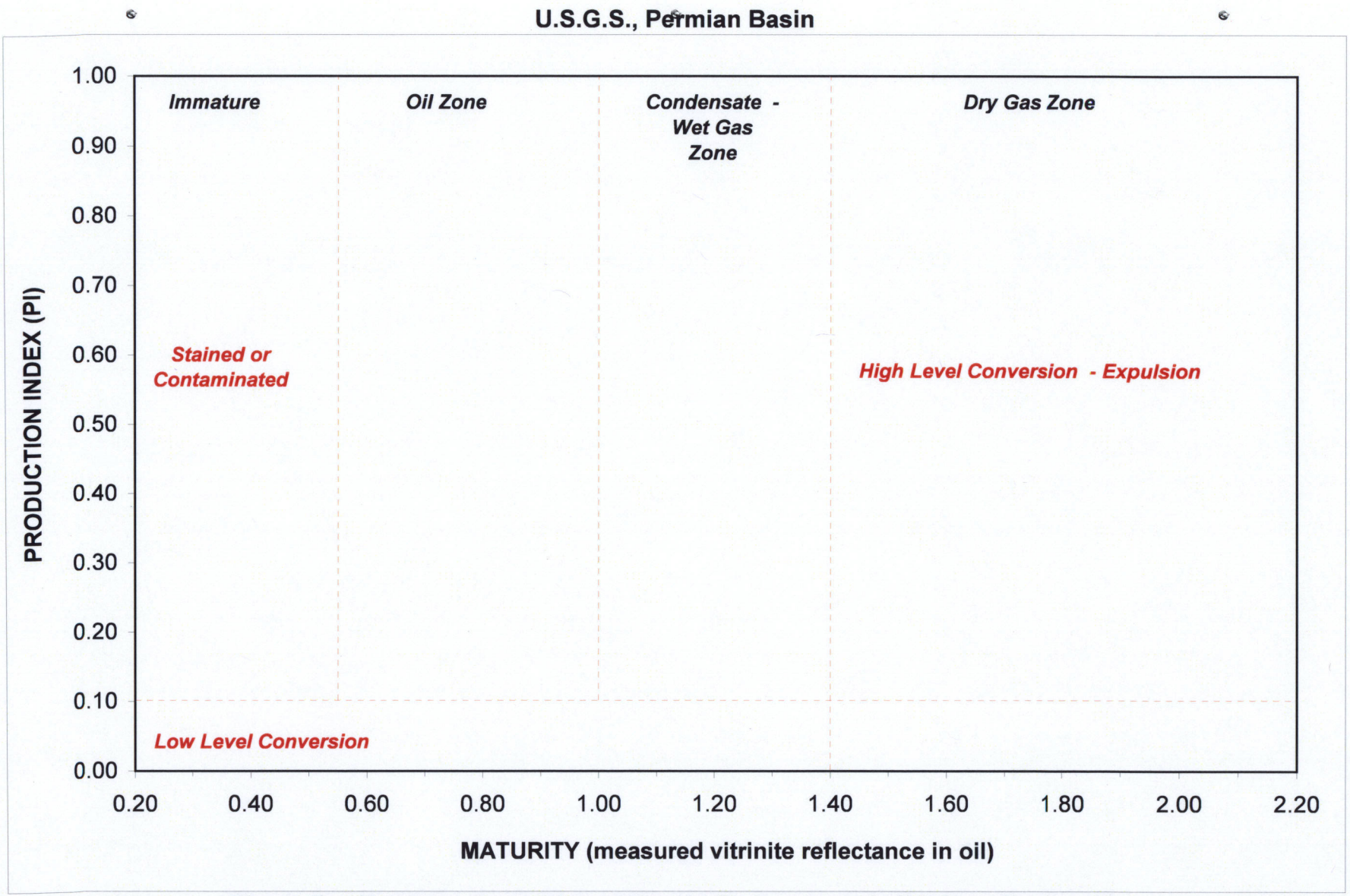

Figure 5c. Kerogen conversion and maturity (measured vitrinite reflectance).

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