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CZ 10351

Summary Visual Kerogen and Vitrinite Reflectance Report

EnCana Corporation
#1-33 USA, Crooks Creek #1-27, Lost Creek #1, #45-25G, #32-27 Unit
HGS Study # H04-2450

Introduction:

Ten cuttings samples from 5 wells were analyzed for vitrinite reflectance thermal maturity (%Ro) and for visual kerogen study. TAI values and fluorescence data for these samples are reasonably consistent with the vitrinite reflectance thermal maturity ranges in all 5 wells. Samples vary from amorphous kerogen prone to terrestrial kerogen prone as can be seen in Table 1, Dispersed Organic Matter Thermal Alteration, Kerogen Type and Total Compositional Analysis.

Vitrinite values are generally divided into the following categories of thermal maturity:

- Early oil window maturity: 0.5% and 0.7%
- Peak oil window maturity: 0.7% to 1.1%
- Late oil early condensate maturity: 1.1% to 1.3%
- Condensate/dry gas: 1.3% to 2.0%
- Dry gas: 2.0% to 3.0%

Each well is discussed below:

#1-33 USA (2 cuttings samples, 11,100 to 11,820 feet)
The %Ro values are 0.62% and 0.80 %(?). The deeper value is questioned because the vitrinite population was very spread out in this sample. The data for this sample is considered to be of poor quality. The TAI on the deeper sample was also questioned (2+?, 3-?) because no pollen or spores could be found. TAI was based on the amorphous fraction.

Crooks Creek #1-27 (2 cuttings samples, 10,950 to 13,200 feet)
The %Ro values are 0.70% and 1.94%. The upper sample has vitrinite values that are very spread out, but there is a reasonable group that fits with the TAI of 3-. TAI is based on pollen/spores present. The reflectance data are considered to be of only fair quality for this sample.
The deeper samples has some poorly preserved pollen/spores that are dark (TAI in the 4- range) that are consistent with the abundant high reflectance vitrinite particles. A large majority of the

kerogen present is also very dark. Some very minor kerogen with TAI of 3?, 3+? is also present but it's normal for cuttings to have some minor caved debris like this.

A very large increase in %Ro in only 2100 feet here makes one question the reliability of the vitrinite reflectance data. If there isn't an unconformity, a fault or other reason known to the reader that would help explain this, then there may be a data problem. The %Ro could be too high if kerogen from the deeper sample happens to be nearly all recycled, or oxidized before burial. This is not all that common but not impossible.

Lost Creek #1 (2 cuttings samples, 8,850 to 9,160 feet)
The %Ro values are 0.97% and 0.98%. Both samples seem to have reasonably good quality vitrinite data along with pollen and spores for TAI values. An acritarch was noticed in the deeper sample. This may indicate a marine influence if it's *in-situ*.

#45-25G (2 cuttings samples, 6,400 to 8,800 feet)
The %Ro values are 0.63% and 1.01%. Both samples seem to have reasonably good quality vitrinite data. Pollen and spores are present in the upper sample for TAI.

#32-27 Unit (2 cuttings samples, 1,300 to 3,790 feet)
The %Ro values are 0.65% and 0.83%. Vitrinite values are fairly spread out in the upper sample so the reflectance data is considered to be of only fair quality. The deeper sample has reasonably good quality vitrinite data.

Other Discussion:

Common to abundant framboidal pyrite was noticed in 7 of the 10 samples. This may be indicative of some marine influence. See Table 4, Pyrite types and abundance in kerogen. The sulfate reducing bacteria activity on organic matter in marine deposits reportedly can result in this type of pyrite. It is normally most common in hydrogen rich (reducing) marine source rocks. No marine palynomorphs were noted in these 10 samples.

Fluorescence of pollen and spores generally disappears in the approximate 1.0% to 1.1% vitrinite reflectance range. This is generally true for the samples in this study.

Five of the samples had some very large particles of vitrinite. It may be from zones that have some coal content. Their occurrence is noted in the comments in Table 1, Dispersed Organic Matter Thermal Alteration, Kerogen Type and Total Compositional Analysis.

Various spreadsheets and/or plots herein include data on vitrinite reflectance measurements, kerogen types & abundances, pyrite types & abundances and fluorescence colors & intensities.

Dan Pearson
For Humble Geochemical Services

Table 1
Dispersed Organic Matter Thermal Alteration, Kerogen Type and Total Compositional Analysis

Client: EnCana, Attn. David Schmude

Location: Antelope Arch, WY
Sample Type: Cuttings

HGS ID	Well	Initial Depth (ft.)	Final Depth (ft.)	Mean Depth (feet)	Source Quality				Color	TAI	% Source Material							Preservation				Recovery			% Kerogen Comp.							Vitrinite				Comments
					TOC	S2	Hydrogen Index (HI)	Tmax (°C)			Amorphous Debris	Finely Dissem. OM	Herb. Plant Debris	Woody Plant Debris	Coaly Fragments	Algal Debris	Palynomorphs	Good	Fair	Poor	Very poor	Good	Very Poor	Barren	Indigenous Vitrinite	Caved Vitrinite	Recycled Vitrinite	Inertinite	Bitumen	Drilling Additive	Amorphous Kerogen	# of Readings	Total Sample Ro (%)	# of Indigenous Readings	Indigenous Ro (%)	
04-2450-083707	#1-33 USA	11100	11110	11105	1.89	1.81	96	438	YO	2.3	91	3	6				trace	X				X			4.0	1.0	1.0	1.0			93.0	40	0.69	25	0.62	Some very large vitrinite particles
04-2450-083712	#1-33 USA	11810	11820	11815	1.04	0.46	44	444	YO?, OB?	2.3?, 2.7?	30	50	20					X				X			18.0	1.0	2.0	5.0			74.0	40	1.04	18	0.80	Large vitrinite particles
04-2450-083713	Crooks Creek #1-27	10950	10960	10955	1.42	1.22	86	411	OB	2.7	25	20	55				trace	X				X			50.0	2.0	2.0	10.0			36.0	40	0.87	27	0.70	Minerals 50 %, Large vit. Particles
04-2450-083721	Crooks Creek #1-27	13050	13200	13125	1.60	1.06	67	421	DBDG	3.7	25	10	65				trace	X				X	X		64.0	1.0		5.0			30.0	40	1.53	25	1.94	Large vitrinite particles
04-2450-083722	Lost Creek #1	8850	8860	8855	1.31	0.90	69	444	LB	3.0	17	5	77				1	X				X	X		70.0	2.0	3.0	5.0			20.0	40	1.01	23	0.97	acritarch
04-2450-083728	Lost Creek #1	9150	9160	9155	1.41	0.81	57	447	LB	3.0	63	5	32				trace	X				X	X		28.0	1.0	1.0	10.0			60.0	40	1.02	27	0.98	
04-2450-083729	#45-25G	6400	6500	6450	1.67	1.67	100	433	YO, OB	2.3, 2.7	57	3	40				trace	X				X			38.0	1.0	1.0	5.0			55.0	40	0.65	36	0.63	Large vitrinite particles
04-2450-083733	#45-25G	8700	8800	8750	1.53	1.59	104	440	OB?, LB?	2.7?,3?	94	3	3				trace	X				X			3.0	1.0	1.0	2.0			93.0	40	0.97	28	1.01	
04-2450-083734	#32-27 Unit	1300	1400	1350	0.63	0.24	38	419	YO?, OB?	2.3?, 2.7?	90	2	8					X				X			6.0	1.0	1.0	3.0			89.0	40	0.67	26	0.65	whitish gel-like contamination
04-2450-083740	#32-27 Unit	3690	3790	3740	3.48	7.99	229	424	OB?	2.7?	95	1	4					X				X			2.0	1.0	1.0	2.0			94.0	40	0.81	25	0.83	

Color Abbreviations:

GLY Green-Light Yellow
Y Yellow
YO Yellow-Orange
OB Orange-Brown
LB Light Brown
B Brown
DBDG Dark Brown-Dark Gray
DGBL Dark Gray-Black
BLK Black

TAI Scale:
1=Unaltered
1+ or 1.5
2=Slight alteration
2+ or 2.5
3=Moderate alteration
3+ or 3.5
4=Strong alteration
4+ or 4.5
5=Severe alteration

HGS Reference: 04-2450

Table 2. Individual Reflectance Readings

Client: EnCana, Attn. David Schmude

Location: Antelope Arch, WY
Sample Type: Cuttings

HGS ID	04-2450-083707		04-2450-083712		04-2450-083713	
Well	#1-33 USA		#1-33 USA		Crooks Creek #1-27	
Mean Depth (ft.)	11105		11815		10955	
	All Data	Indigenous Data	All Data	Indigenous Data	All Data	Indigenous Data
	0.41	0.54	0.49	0.58	0.42	0.50
	0.41	0.54	0.49	0.60	0.50	0.51
	0.43	0.55	0.50	0.61	0.51	0.52
	0.43	0.55	0.54	0.61	0.52	0.54
	0.46	0.56	0.58	0.65	0.54	0.54
	0.49	0.56	0.60	0.67	0.54	0.56
	0.54	0.59	0.61	0.70	0.56	0.58
	0.54	0.59	0.61	0.75	0.58	0.60
	0.55	0.59	0.65	0.77	0.60	0.61
	0.55	0.62	0.67	0.82	0.61	0.61
	0.56	0.62	0.70	0.85	0.61	0.62
	0.56	0.62	0.75	0.92	0.62	0.64
	0.59	0.63	0.77	0.93	0.64	0.64
	0.59	0.63	0.82	0.94	0.64	0.67
	0.59	0.64	0.85	1.00	0.67	0.68
	0.62	0.64	0.92	1.01	0.68	0.71
	0.62	0.64	0.93	1.01	0.71	0.71
	0.62	0.65	0.94	1.02	0.71	0.71
	0.63	0.66	1.00		0.71	0.74
	0.63	0.67	1.01		0.74	0.78
	0.64	0.67	1.01		0.78	0.81
	0.64	0.68	1.02		0.81	0.89
	0.64	0.71	1.11		0.89	0.89
	0.65	0.73	1.12		0.89	0.90
	0.66	0.73	1.20		0.90	0.93
	0.67		1.24		0.93	0.98
	0.67		1.27		0.98	0.99
	0.68		1.33		0.99	
	0.71		1.33		1.04	
	0.73		1.35		1.09	
	0.73		1.37		1.13	
	0.80		1.40		1.14	
	0.81		1.46		1.16	
	0.85		1.46		1.20	
	0.88		1.50		1.20	
	1.11		1.54		1.24	
	1.13		1.54		1.29	
	1.16		1.57		1.31	
	1.18		1.67		1.74	
	1.57		1.78		1.79	
Average %Ro	**0.69**	**0.62**	**1.04**	**0.80**	**0.87**	**0.70**
Standard Dev.		**0.06**		**0.16**		**0.15**
#of Points		**25**		**18**		**27**

HGS Reference: 04-2450

Table 2. Individual Table 2. Individual Reflectance Readings

Client: Client: EnCana, Attn. David Schmude

Location: Location: Antelope Arch, WY
Sample Type: Sample Ty| Cuttings

HGS ID	04-2450-083721		04-2450-083722		04-2450-083728	
Well	Crooks Creek #1-27		Lost Creek #1		Lost Creek #1	
Mean Depth (ft.)	13125		8855		9155	
	All Data	Indigenous Data	All Data	Indigenous Data	All Data	Indigenous Data
	0.28	1.73	0.55	0.72	0.50	0.76
	0.29	1.74	0.59	0.77	0.54	0.83
	0.29	1.76	0.63	0.80	0.71	0.84
	0.30	1.76	0.64	0.82	0.72	0.84
	0.31	1.81	0.65	0.83	0.76	0.88
	0.34	1.84	0.66	0.84	0.83	0.90
	0.35	1.85	0.72	0.89	0.84	0.90
	0.58	1.85	0.77	0.90	0.84	0.91
	0.61	1.86	0.80	0.90	0.88	0.93
	0.77	1.87	0.82	0.92	0.90	0.93
	1.34	1.91	0.83	0.94	0.90	0.94
	1.46	1.91	0.84	0.96	0.91	0.95
	1.57	1.95	0.89	1.00	0.93	0.96
	1.63	1.97	0.90	1.01	0.93	0.98
	1.73	1.98	0.90	1.05	0.94	1.00
	1.74	1.99	0.92	1.05	0.95	1.00
	1.76	2.00	0.94	1.07	0.96	1.02
	1.76	2.00	0.96	1.09	0.98	1.03
	1.81	2.04	1.00	1.11	1.00	1.04
	1.84	2.06	1.01	1.13	1.00	1.05
	1.85	2.07	1.05	1.13	1.02	1.05
	1.85	2.07	1.05	1.14	1.03	1.05
	1.86	2.11	1.07	1.15	1.04	1.06
	1.87	2.17	1.09		1.05	1.12
	1.91	2.17	1.11		1.05	1.16
	1.91		1.13		1.05	1.17
	1.95		1.13		1.06	1.19
	1.97		1.14		1.12	
	1.98		1.15		1.16	
	1.99		1.17		1.17	
	2.00		1.18		1.19	
	2.00		1.19		1.25	
	2.04		1.22		1.25	
	2.06		1.26		1.25	
	2.07		1.28		1.27	
	2.07		1.28		1.34	
	2.11		1.31		1.35	
	2.17		1.45		1.37	
	2.17		1.47		1.40	
	2.56		1.55		1.47	
Average %Ro	**1.53**	**1.94**	**1.01**	**0.97**	**1.02**	**0.98**
Standard Dev.		**0.13**		**0.13**		**0.11**
#of Points		**25**		**23**		**27**

HGS Reference: 04-24

Table 2. Individual Table 2. Individual Reflectance Readings

Client: Client: EnCana, Attn. David Schmude

Location: Location: Antelope Arch, WY
Sample Type: Sample Ty| Cuttings

HGS ID	04-2450-083729		04-2450-083733		04-2450-083734	
Well	#45-25G		#45-25G		#32-27 Unit	
Mean Depth (ft.)	6450		8750		1350	
	All Data	Indigenous Data	All Data	Indigenous Data	All Data	Indigenous Data
	0.39	0.45	0.37	0.84	0.25	0.41
	0.45	0.47	0.45	0.84	0.30	0.42
	0.47	0.47	0.54	0.87	0.31	0.43
	0.47	0.48	0.57	0.88	0.31	0.43
	0.48	0.50	0.68	0.88	0.33	0.44
	0.50	0.50	0.72	0.88	0.36	0.52
	0.50	0.52	0.76	0.89	0.41	0.54
	0.52	0.54	0.84	0.89	0.42	0.55
	0.54	0.54	0.84	0.92	0.43	0.58
	0.54	0.54	0.87	0.94	0.43	0.61
	0.54	0.55	0.88	0.94	0.44	0.62
	0.55	0.55	0.88	0.94	0.52	0.64
	0.55	0.56	0.88	0.97	0.54	0.64
	0.56	0.56	0.89	0.97	0.55	0.65
	0.56	0.56	0.89	0.98	0.58	0.66
	0.56	0.58	0.92	0.99	0.61	0.70
	0.58	0.59	0.94	1.05	0.62	0.71
	0.59	0.61	0.94	1.08	0.64	0.74
	0.61	0.61	0.94	1.08	0.64	0.74
	0.61	0.62	0.97	1.13	0.65	0.76
	0.62	0.62	0.97	1.14	0.66	0.79
	0.62	0.63	0.98	1.14	0.70	0.83
	0.63	0.64	0.99	1.15	0.71	0.83
	0.64	0.65	1.05	1.16	0.74	0.83
	0.65	0.68	1.08	1.16	0.74	0.86
	0.68	0.70	1.08	1.17	0.76	0.86
	0.70	0.70	1.13	1.18	0.79	
	0.70	0.73	1.14	1.18	0.83	
	0.73	0.75	1.14		0.83	
	0.75	0.77	1.15		0.83	
	0.77	0.78	1.16		0.86	
	0.78	0.80	1.16		0.86	
	0.80	0.81	1.17		0.91	
	0.81	0.82	1.18		0.93	
	0.82	0.85	1.18		0.94	
	0.85	0.88	1.20		0.97	
	0.88		1.21		0.98	
	1.01		1.27		1.02	
	1.01		1.30		1.20	
	1.11		1.40		1.20	
Average %Ro	**0.65**	**0.63**	**0.97**	**1.01**	**0.67**	**0.65**
Standard Dev.		**0.12**		**0.12**		**0.15**
#of Points		**36**		**28**		**26**

HGS Reference: 04-24

Table 2. Individual Table 2. Individual Reflecta

Client: Client: EnCana, Attn. Da

Location: Location: Antelope Arch, WY
Sample Type: Sample Ty| Cuttings

HGS ID	04-2450-083740	
Well	#32-27 Unit	
Mean Depth (ft.)	3740	
	All Data	Indigenous Data
	0.31	0.66
	0.34	0.69
	0.40	0.71
	0.40	0.74
	0.44	0.74
	0.53	0.74
	0.57	0.74
	0.57	0.76
	0.66	0.78
	0.69	0.79
	0.71	0.82
	0.74	0.82
	0.74	0.83
	0.74	0.86
	0.74	0.87
	0.76	0.88
	0.78	0.88
	0.79	0.89
	0.82	0.89
	0.82	0.92
	0.83	0.92
	0.86	0.93
	0.87	0.95
	0.88	0.96
	0.88	0.97
	0.89	
	0.89	
	0.92	
	0.92	
	0.93	
	0.95	
	0.96	
	0.97	
	1.00	
	1.08	
	1.11	
	1.13	
	1.15	
	1.29	
	1.34	
Average %Ro	0.81	0.83
Standard Dev.		0.09
#of Points		25

HGS Reference: 04-24

Table 3. Kerogen Fluorescence colors and brightness intensities (subjective determinations)

Client: EnCana, Attn. David Schmude

Location: Antelope Arch, WY
Sample Type: Cuttings

1 = very low intensity
2 = low intensity
3 = medium intensity
4 = high intensity
5 = very high intensity

G = Green
Y = Yellow
O = Orange
B = Brown

HGS ID	Well	Mean Depth (ft.)	Sample Type	Pollen / Spores				Amorphous				Mounting Medium			
				G	Y	O	B	G	Y	O	B	G	Y	O	B
04-2450-083707	#1-33 USA	11105.0	Cuttings		2	2			1	1		2			
04-2450-083712	#1-33 USA	11815.0	Cuttings	0?	0?	0?	0?	0	0	0	0	1			
04-2450-083713	Crooks Creek #1-27	10955.0	Cuttings		1	1				1?	1?	1			
04-2450-083721	Crooks Creek #1-27	13125.0	Cuttings	0	0	0	0	0	0	0	0	1			
04-2450-083722	Lost Creek #1	8855.0	Cuttings		1	1		0	0	0	0	1			
04-2450-083728	Lost Creek #1	9155.0	Cuttings	0	0	0	0	0	0	0	0	1			
04-2450-083729	#45-25G	6450.0	Cuttings		2					1	1	1			
04-2450-083733	#45-25G	8750.0	Cuttings		2?					1?	1?	1			
04-2450-083734	#32-27 Unit	1350.0	Cuttings		2					2	1	1			
04-2450-083740	#32-27 Unit	3740.0	Cuttings	3	2				2	2	1	1			

HGS Reference: 04-2450

Table 4. Pyrite types and abundance in kerogen

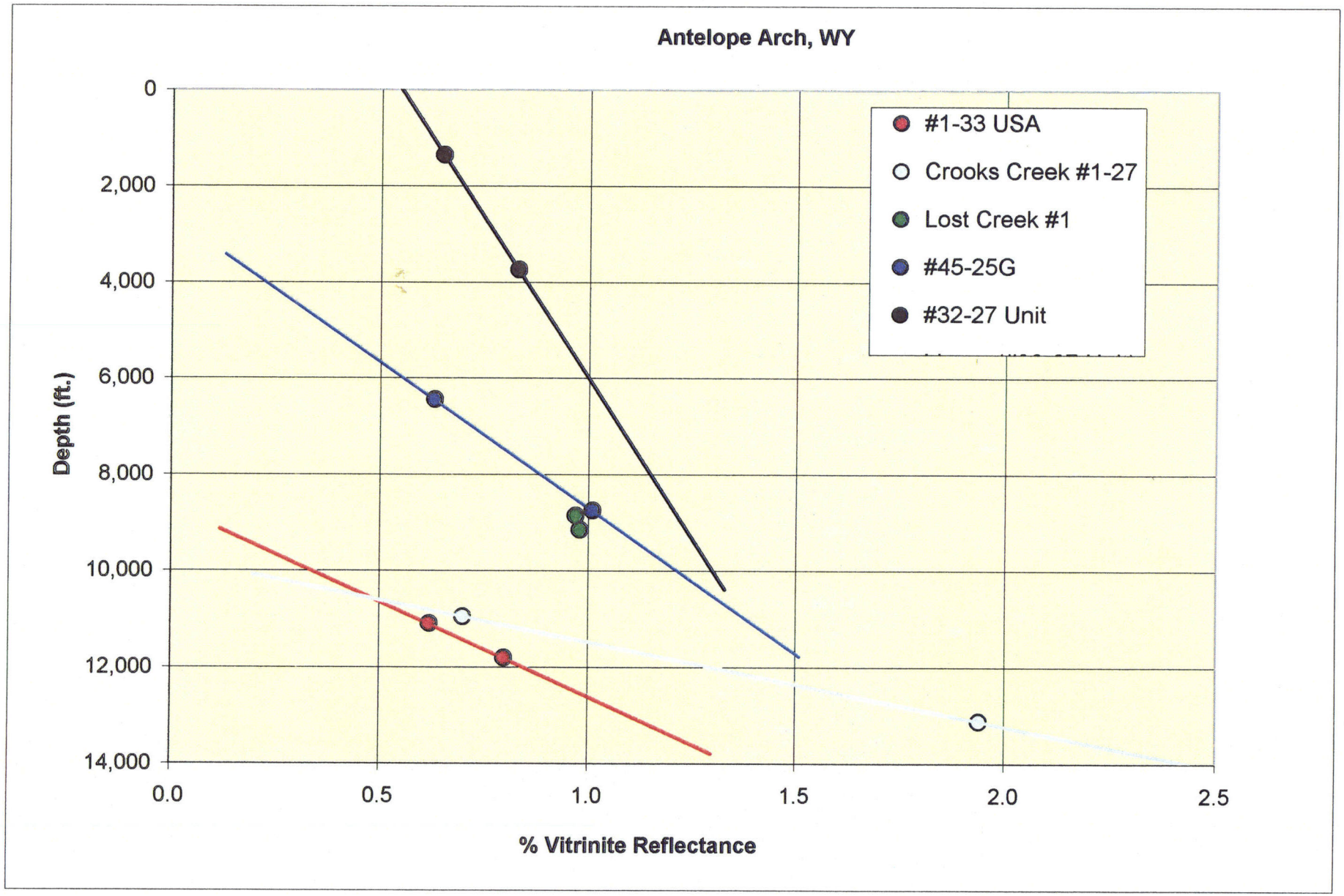
Client: EnCana, Attn. David Schmude

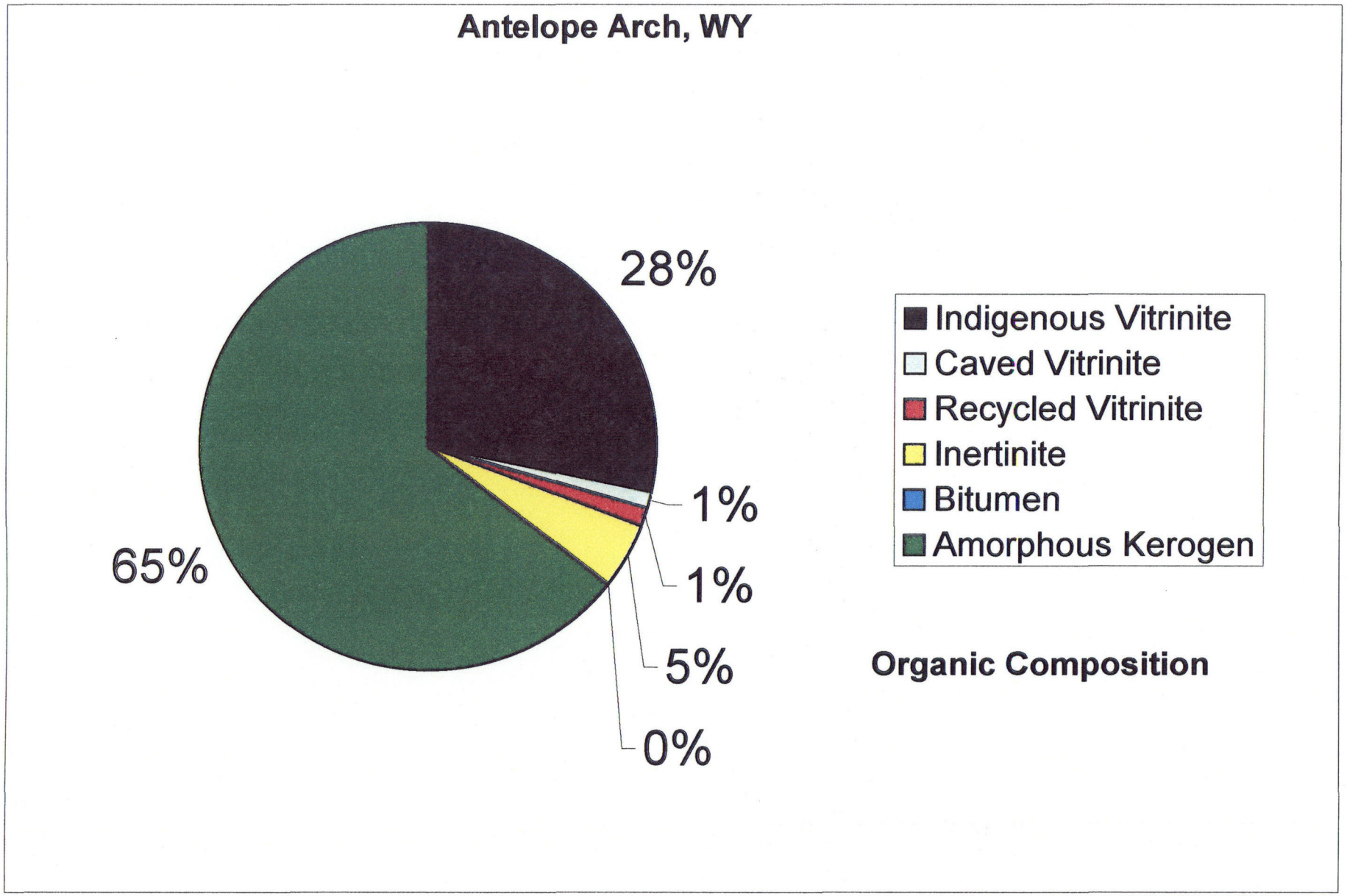
Location: Antelope Arch, WY
Sample Type: Cuttings

1 = very rare
2 = rare
3 = common
4 = abundant
5 = very abundant

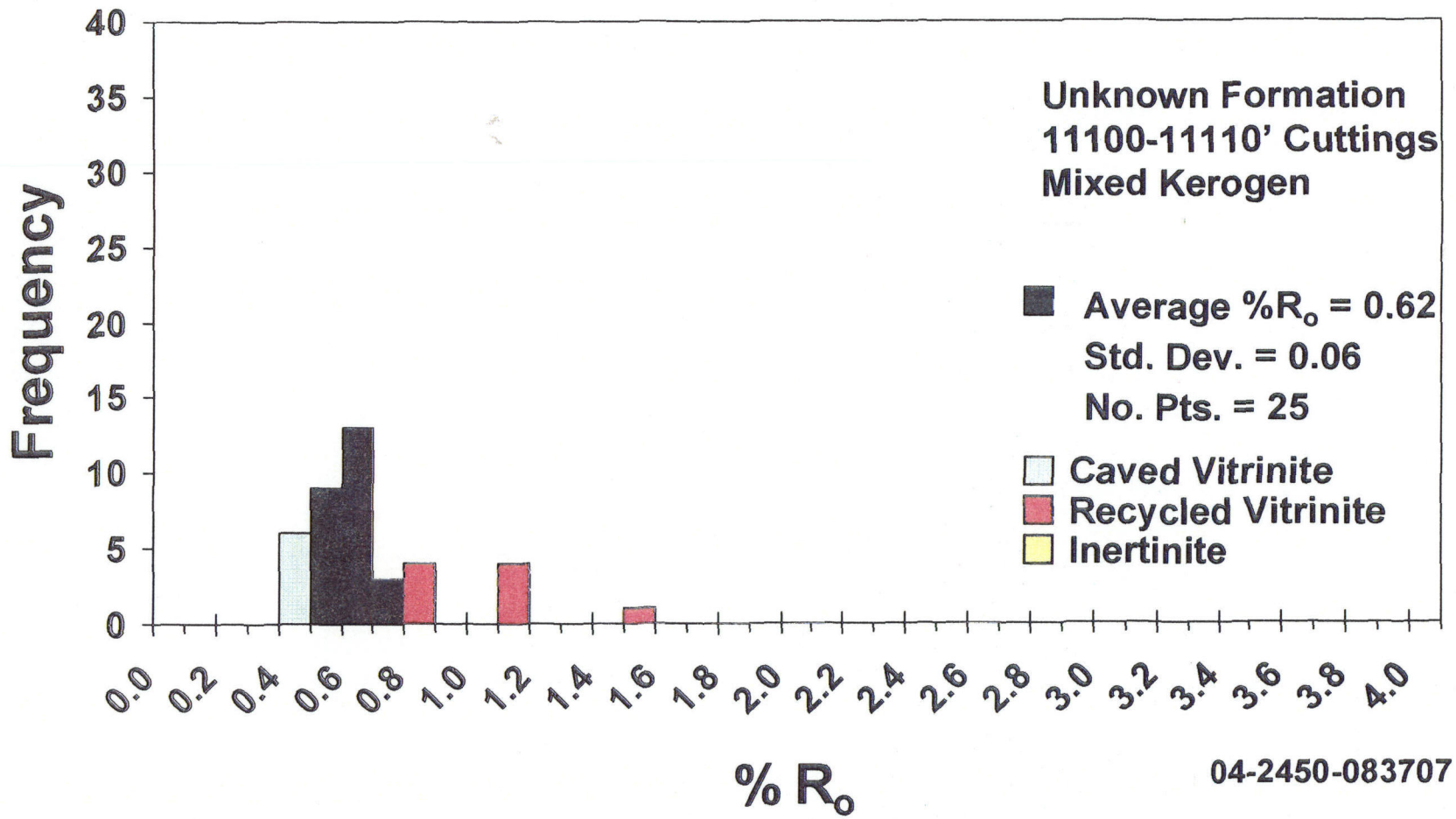
HGS ID	Well	Mean Depth (ft.)	Sample Type	Pyrite types		
				Finely Disseminated	Euhedral	Framboidal
04-2450-083707	#1-33 USA	11105.0	Cuttings	1	2	3
04-2450-083712	#1-33 USA	11815.0	Cuttings	3	2	4
04-2450-083713	Crooks Creek #1-27	10955.0	Cuttings	2	2	3
04-2450-083721	Crooks Creek #1-27	13125.0	Cuttings	2	1	1
04-2450-083722	Lost Creek #1	8855.0	Cuttings	2	2	1
04-2450-083728	Lost Creek #1	9155.0	Cuttings	2	1	1
04-2450-083729	#45-25G	6450.0	Cuttings	3	2	4
04-2450-083733	#45-25G	8750.0	Cuttings	2	2	4
04-2450-083734	#32-27 Unit	1350.0	Cuttings	3	2	4
04-2450-083740	#32-27 Unit	3740.0	Cuttings	2	2	4

HGS Reference: 04-2450


Antelope Arch, WY
#1-33 USA
Crooks Creek #1-27
Lost Creek #1
#45-25G
#32-27 Unit
Depth (ft.)
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
0.0
0.5
1.0
1.5
2.0
2.5
% Vitrinite Reflectance


Antelope Arch, WY
28%
1%
1%
5%
0%
65%
Indigenous Vitrinite
Caved Vitrinite
Recycled Vitrinite
Inertinite
Bitumen
Amorphous Kerogen
Organic Composition

#1-33 USA



04-2450-083707

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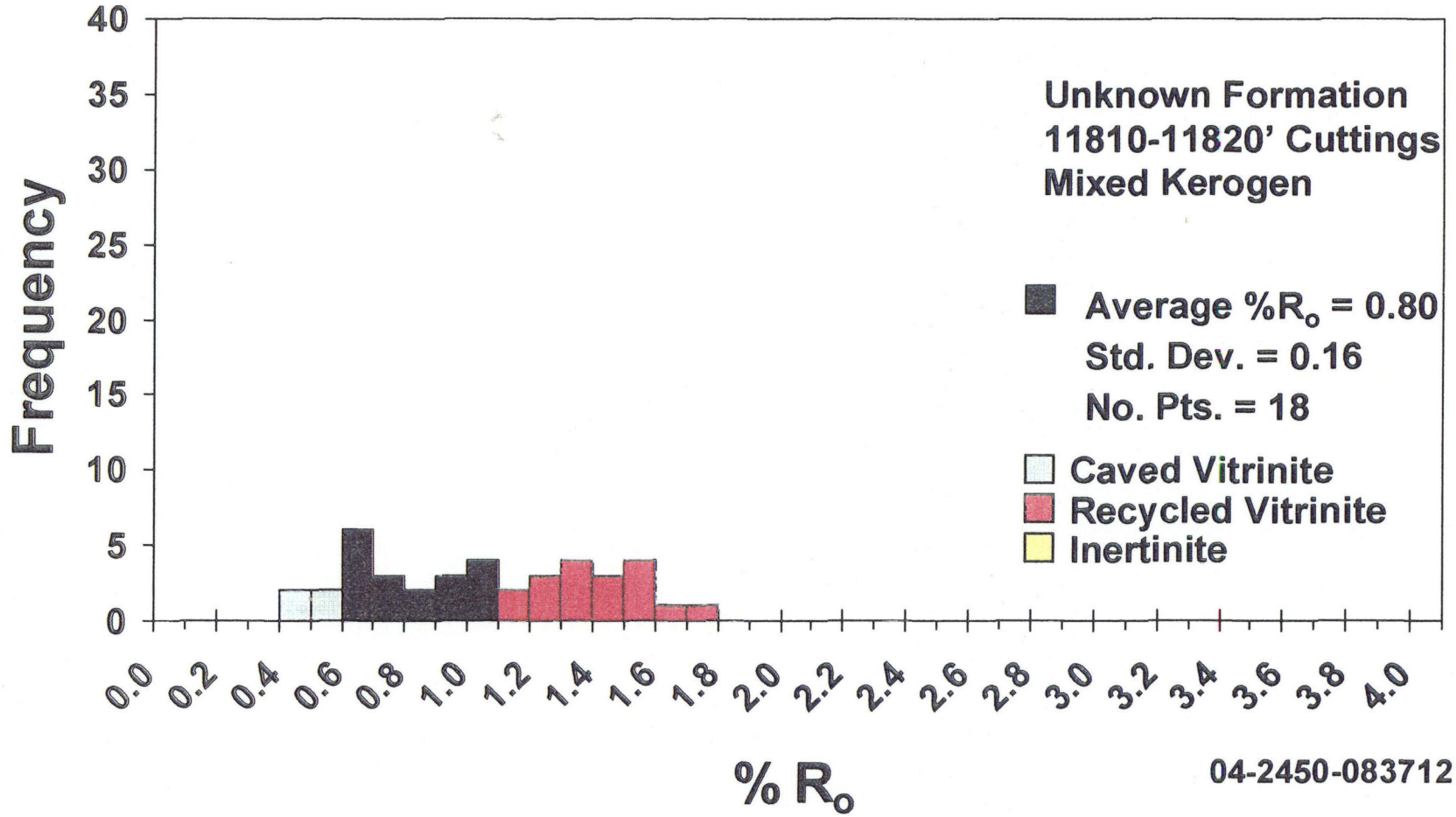
#1-33 USA



04-2450-083712

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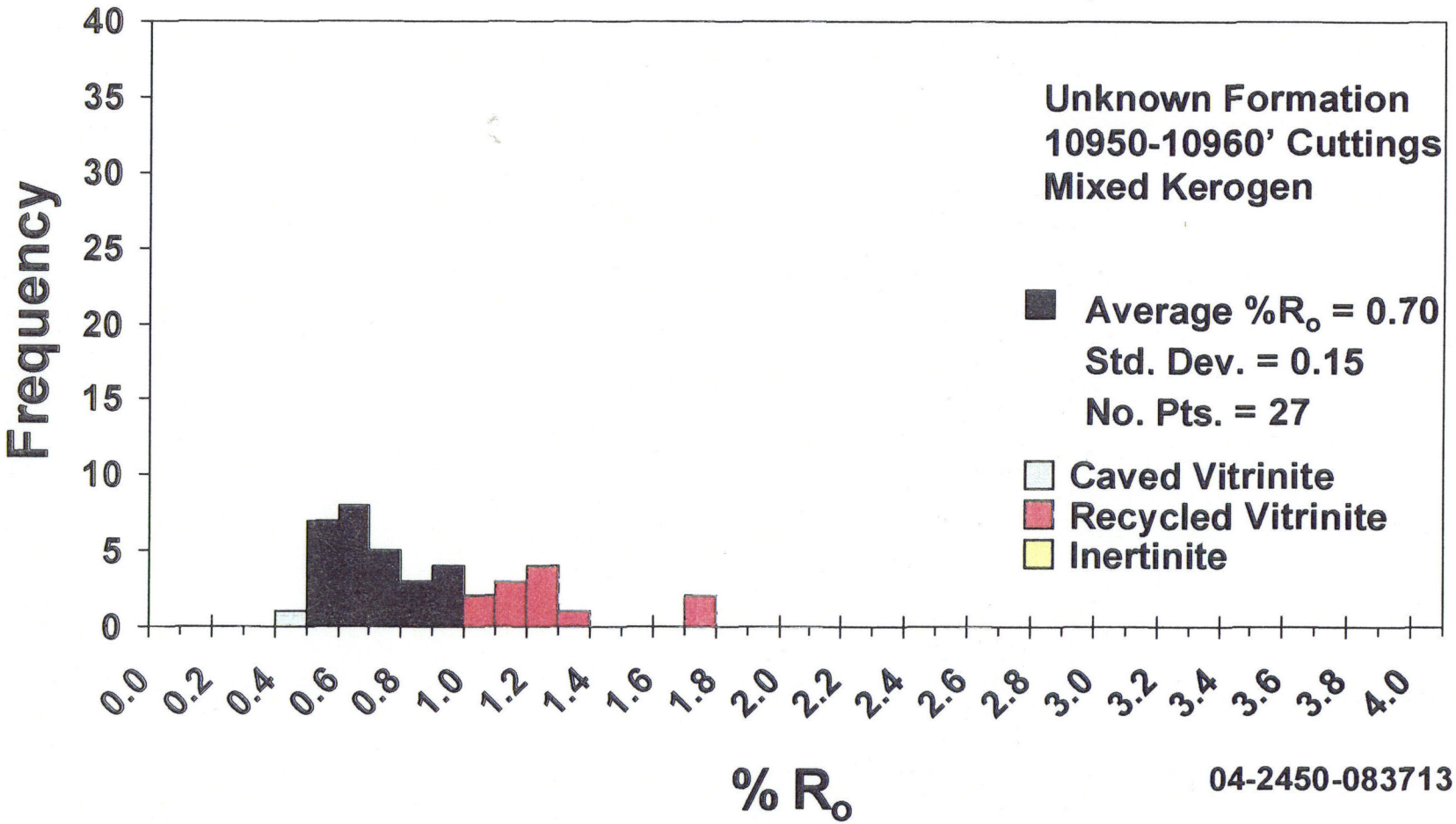
Crooks Creek #1-27



04-2450-083713

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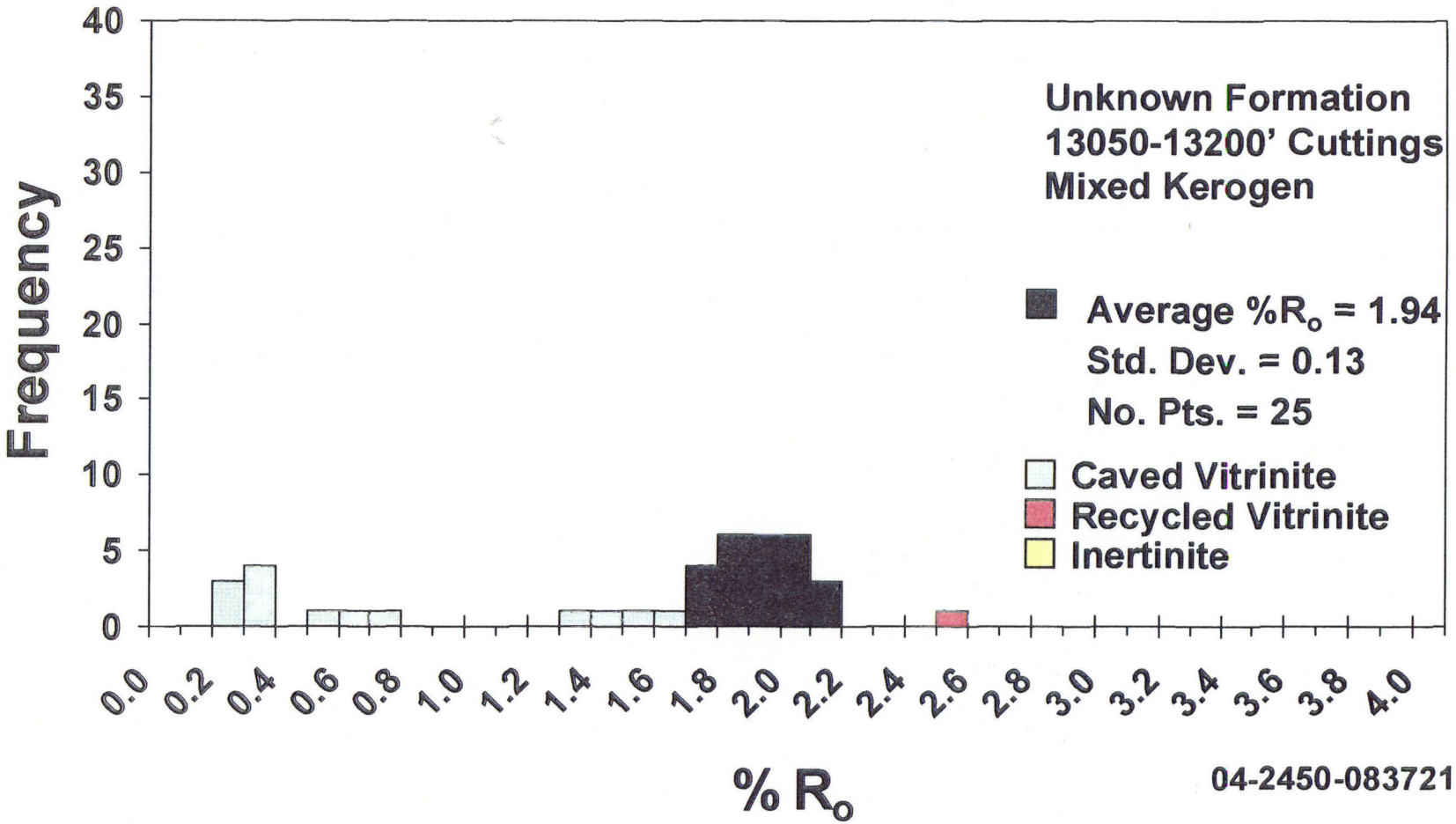
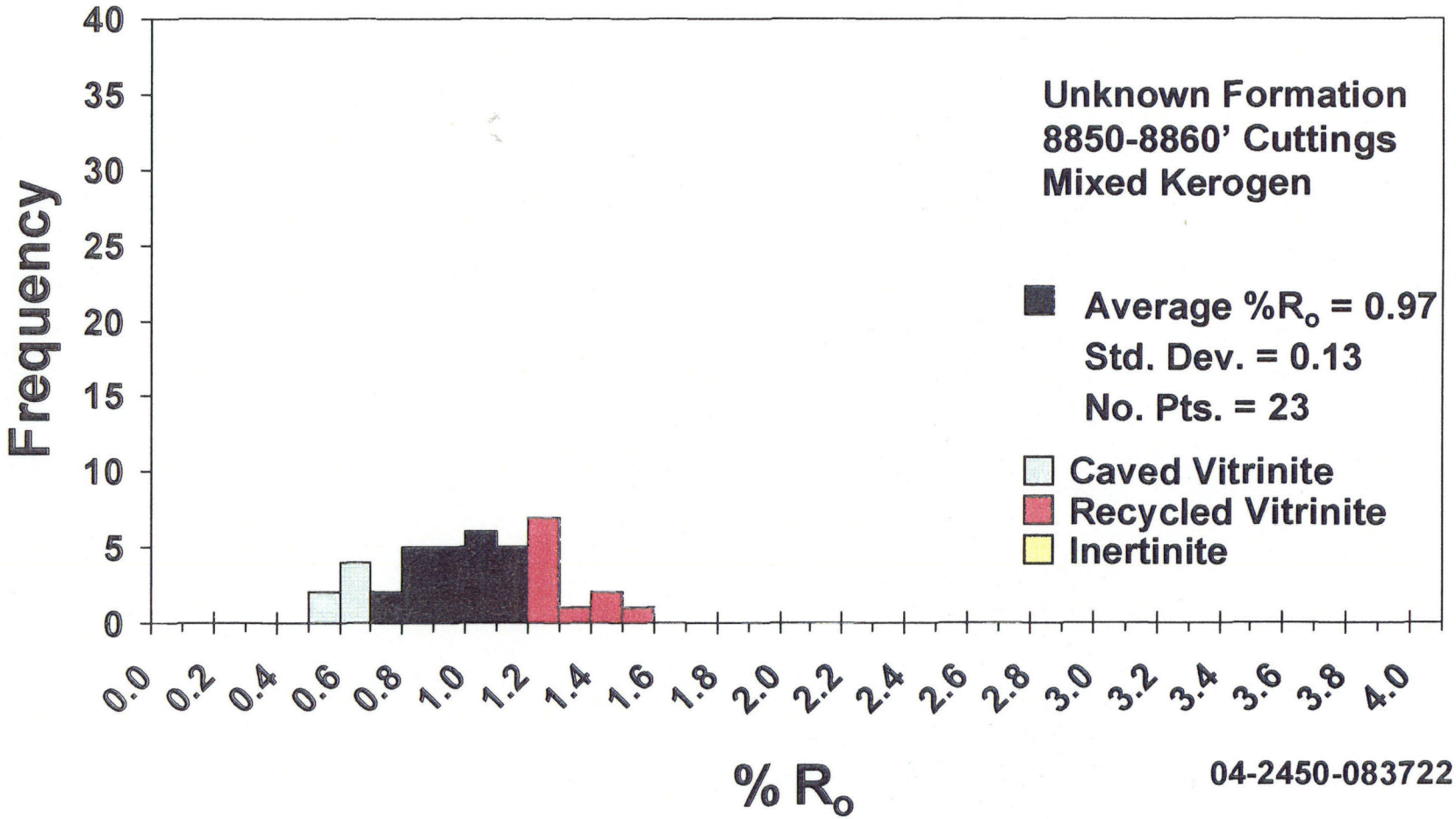
Crooks Creek #1-27



04-2450-083721

Humble Geochemical Services

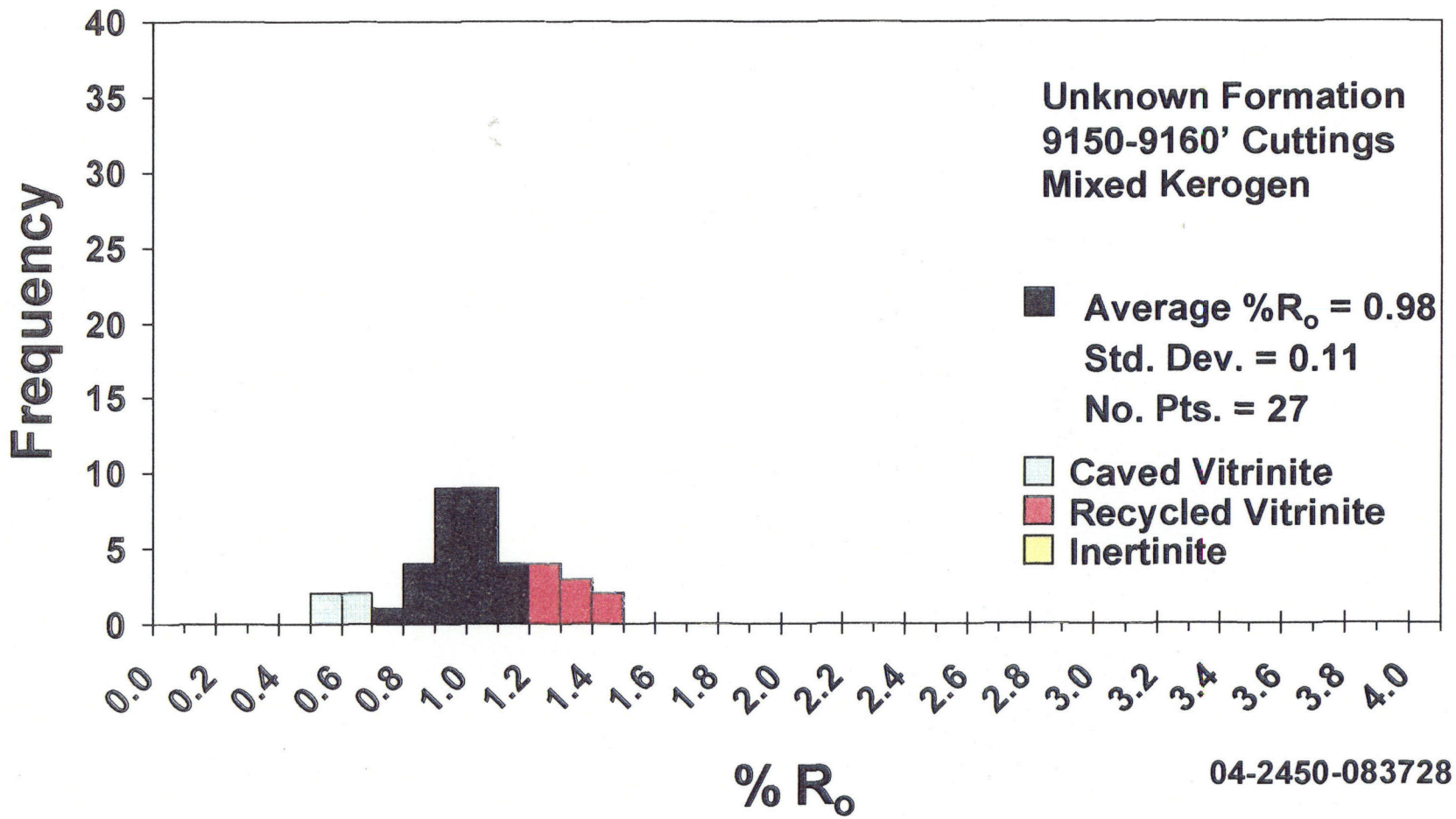
Lost Creek #1



04-2450-083722

Humble Geochemical Services

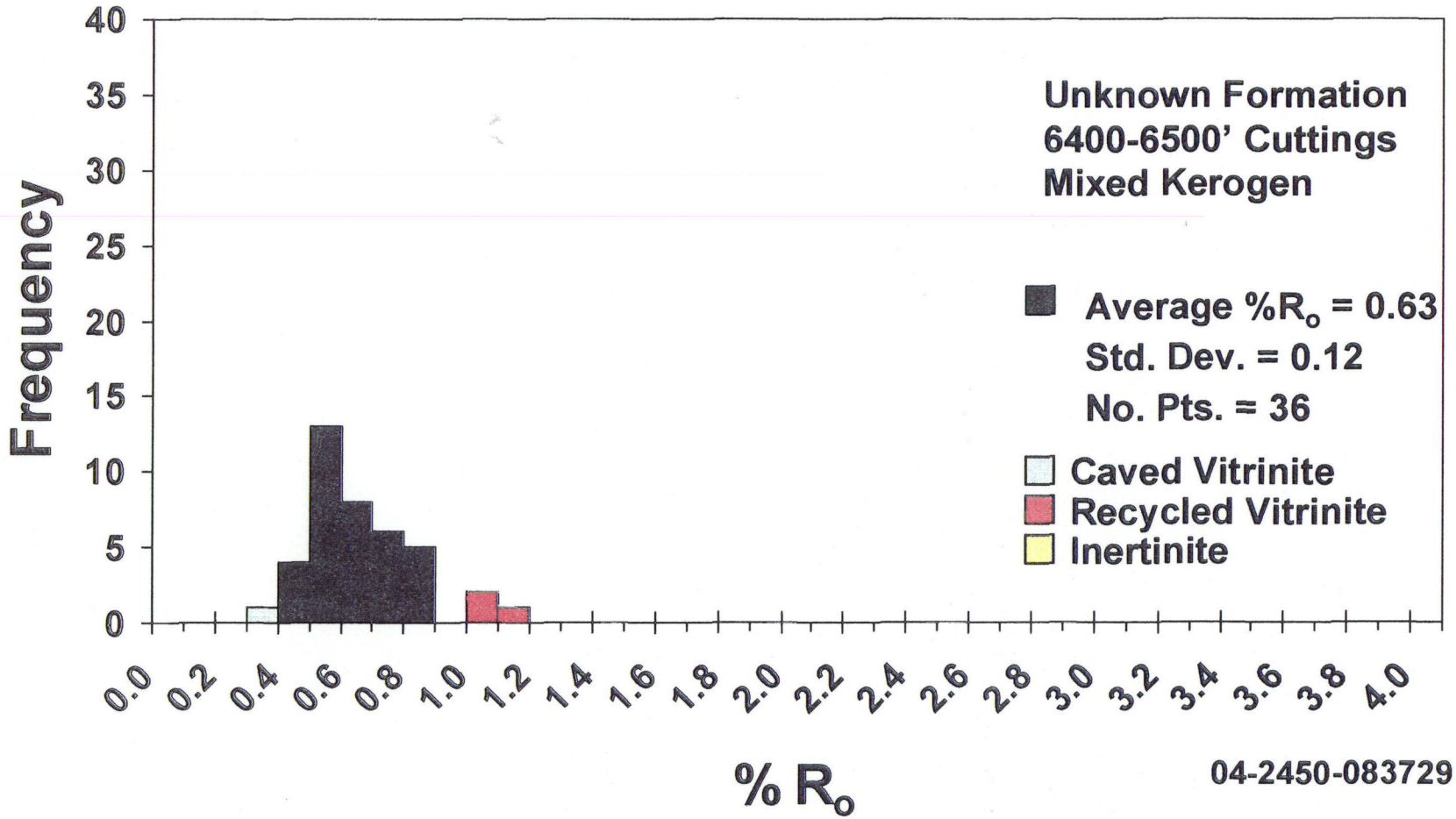
Lost Creek #1



04-2450-083728

Humble Geochemical Services

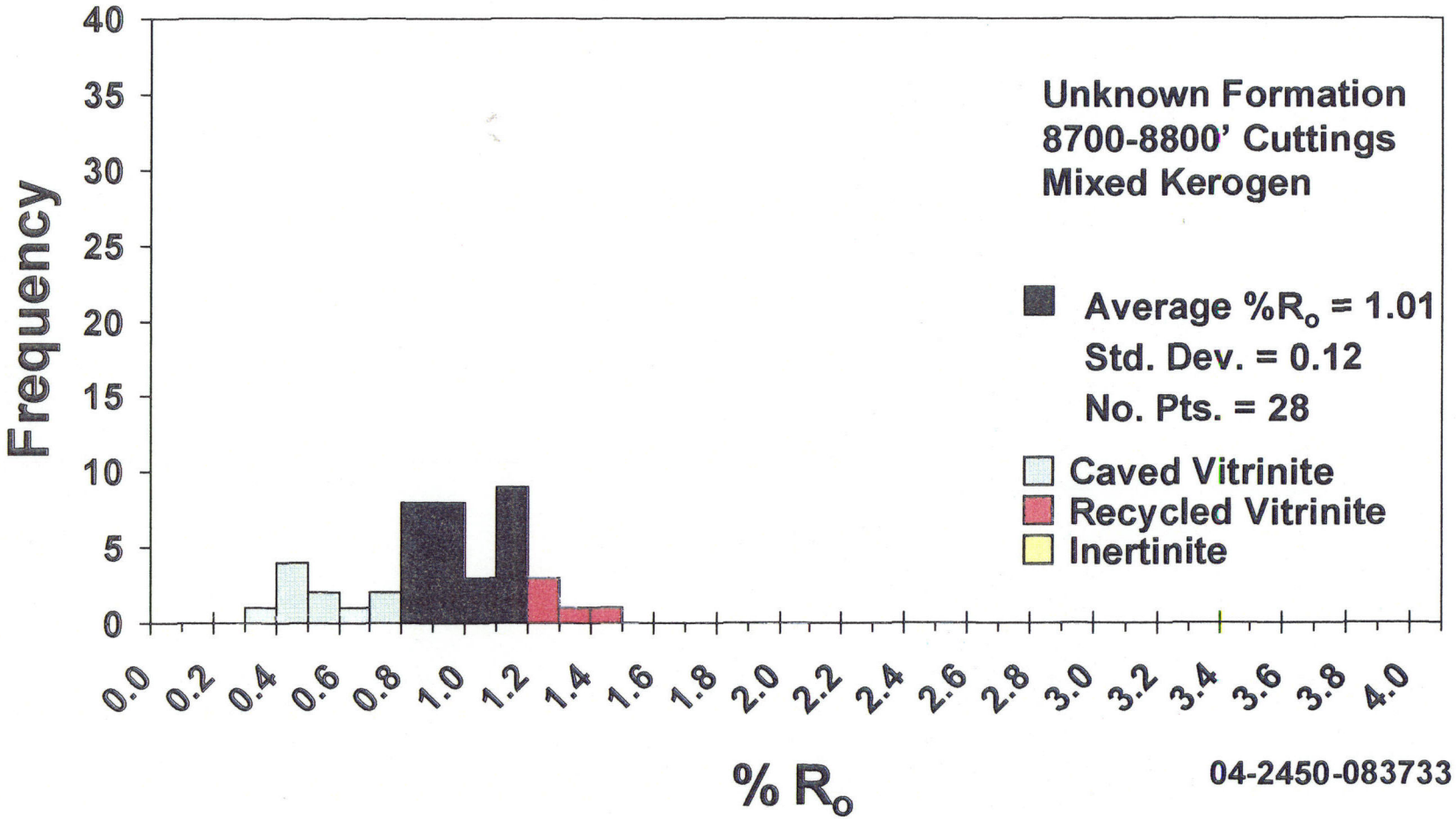
#45-25G



04-2450-083729

Humble Geochemical Services

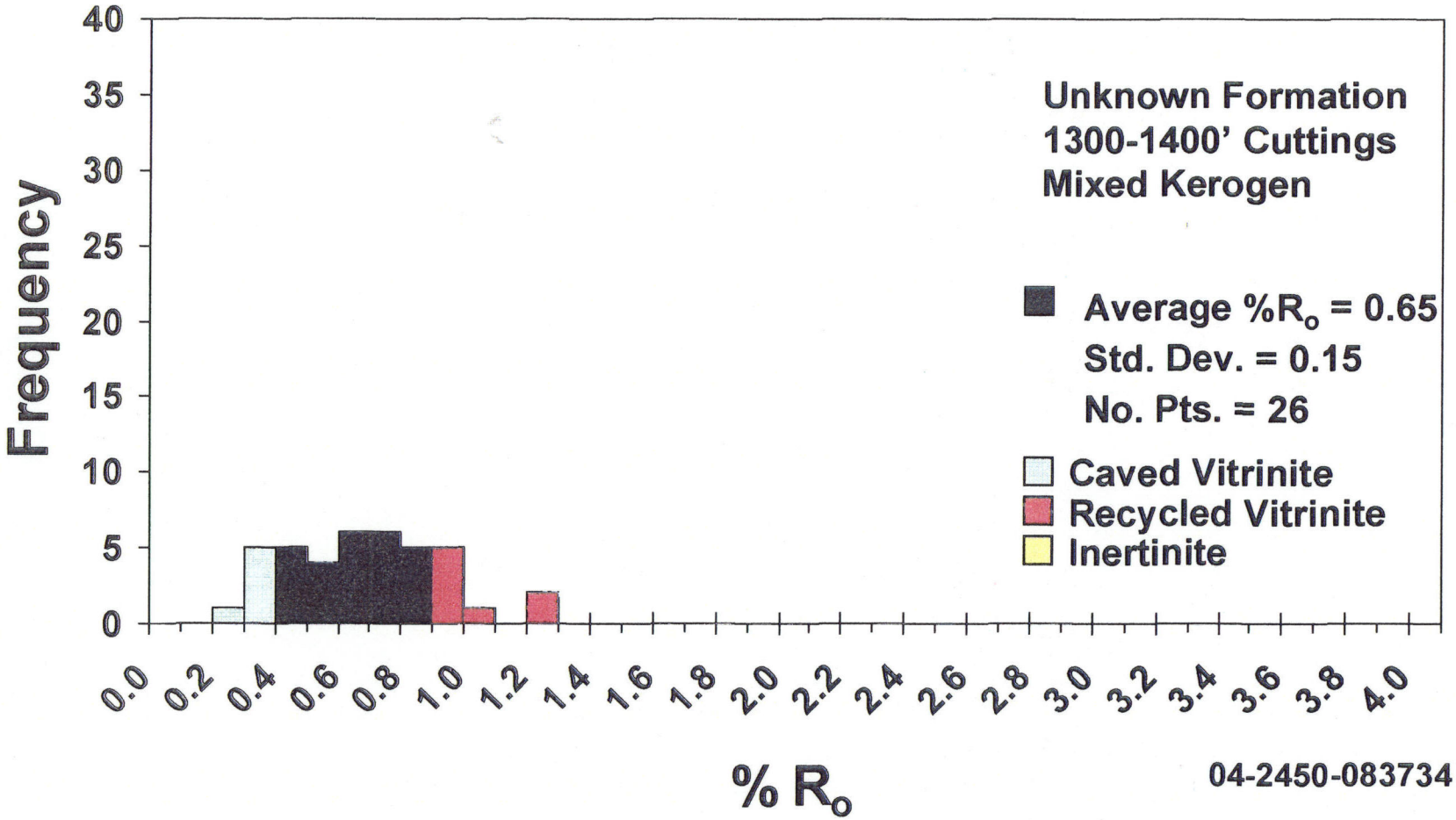
#45-25G



04-2450-083733

Humble Geochemical Services

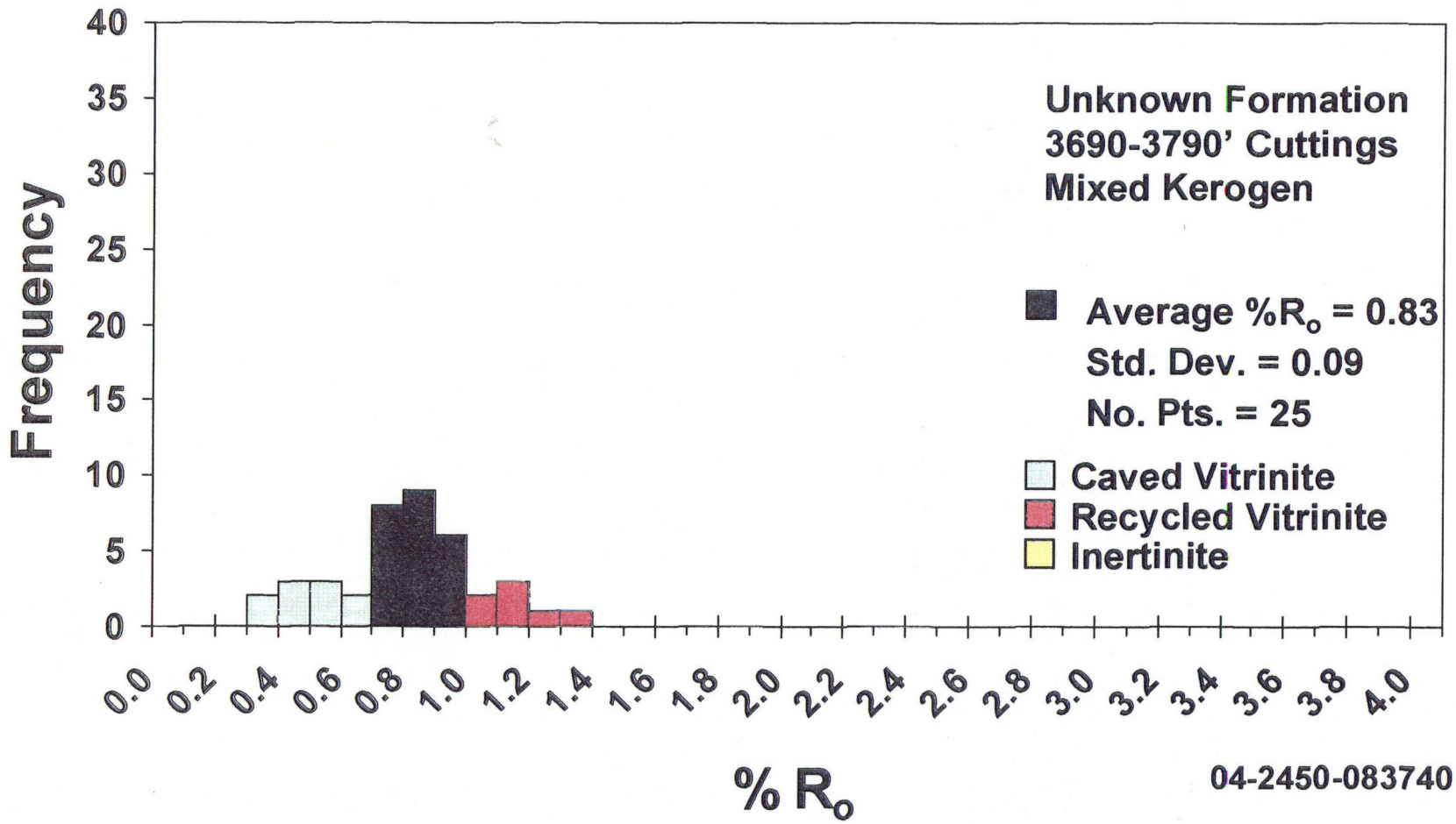
#32-27 Unit



04-2450-083734

Humble Geochemical Services

#32-27 Unit



04-2450-083740

Humble Geochemical Services

Encana Oil & Gas (USA), Inc. - Antelope Arch

HGS No.	Well Name	Top Depth (ft.)	Bottom Depth (ft.)	Median Depth (ft.)	Operator	Basin	Sample Type	Leco TOC	S1	S2	S3	Tmax (°C)	Cal. %Ro	Meas. %Ro	HI	OI	S2/S3	S1/TOC	PI	Notes Checks	Notes Pyrogram
04-2450-083707	#1-33 USA	11100	11110	11105	Mapco Inc.	Antelope Arch	cuttings	1.89	0.97	1.81	1.12	438	0.72	0.62	96	59	2	51	0.35	c	n;ltS2p
04-2450-083708	#1-33 USA	11350	11360	11355	Mapco Inc.	Antelope Arch	cuttings	0.81	0.17	0.08	0.18	452 *	0.98		10	22	0	21	0.68		n
04-2450-083709	#1-33 USA	11500	11510	11505	Mapco Inc.	Antelope Arch	cuttings	1.16	0.42	0.82	0.23	439	0.74		71	20	4	36	0.34		n
04-2450-083710	#1-33 USA	11600	11610	11605	Mapco Inc.	Antelope Arch	cuttings	1.13	0.38	0.50	0.25	453	0.99		44	22	2	34	0.43		n
04-2450-083711	#1-33 USA	11750	11760	11755	Mapco Inc.	Antelope Arch	cuttings	1.72	0.53	0.61	0.26	448	0.90		35	15	2	31	0.46		n
04-2450-083712	#1-33 USA	11810	11820	11815	Mapco Inc.	Antelope Arch	cuttings	1.04	0.57	0.46	0.32	444 *	0.83	0.80	44	31	1	55	0.55		n
04-2450-083713	Crooks Creek #1-27	10950	10960	10955	Texas Int'l	Antelope Arch	cuttings	1.42	1.25	1.22	0.61	411	0.24	0.70	86	43	2	88	0.51		n;ltS2p
04-2450-083714	Crooks Creek #1-27	11050	11060	11055	Texas Int'l	Antelope Arch	cuttings	1.61	2.08	1.41	0.56	445	0.85		87	35	3	129	0.60		n;ltS2p
04-2450-083715	Crooks Creek #1-27	12750	12760	12755	Texas Int'l	Antelope Arch	cuttings	1.50	1.57	0.86	0.34	375	-1.00		57	23	3	104	0.65	lc	n;ltS2p
04-2450-083716	Crooks Creek #1-27	12800	12810	12805	Texas Int'l	Antelope Arch	cuttings	1.58	2.29	1.09	0.47	386	-1.00		69	30	2	145	0.68		n;ltS2p
04-2450-083717	Crooks Creek #1-27	12850	12860	12855	Texas Int'l	Antelope Arch	cuttings	1.77	2.79	0.96	0.49	396	-1.00		54	28	2	158	0.74		n;ltS2p
04-2450-083718	Crooks Creek #1-27	12890	12900	12895	Texas Int'l	Antelope Arch	cuttings	1.59	2.70	1.03	0.47	368	-1.00		65	30	2	170	0.72		n;ltS2p
04-2450-083719	Crooks Creek #1-27	12950	13000	12975	Texas Int'l	Antelope Arch	cuttings	2.01	3.51	1.91	0.81	435	0.67		95	40	2	175	0.65		n;ltS2p
04-2450-083720	Crooks Creek #1-27	13000	13050	13025	Texas Int'l	Antelope Arch	cuttings	2.03	3.05	1.11	0.68	370	-1.00		55	33	2	150	0.73	c	n;ltS2p
04-2450-083721	Crooks Creek #1-27	13050	13200	13125	Texas Int'l	Antelope Arch	cuttings	1.60	1.64	1.08	0.52	421	0.42	1.94	67	32	2	102	0.60		n;ltS2p
04-2450-083722	Lost Creek #1	8850	8860	8855	Skelly	Antelope Arch	cuttings	1.31	0.43	0.90	0.28	444	0.83	0.97	69	21	3	33	0.32		n
04-2450-083723	Lost Creek #1	8900	8910	8905	Skelly	Antelope Arch	cuttings	1.46	0.33	0.69	0.21	442	0.80		47	14	3	23	0.32		n
04-2450-083724	Lost Creek #1	8950	8960	8955	Skelly	Antelope Arch	cuttings	1.95	0.67	1.91	0.42	447	0.89		98	22	5	34	0.26		n
04-2450-083725	Lost Creek #1	9000	9010	9005	Skelly	Antelope Arch	cuttings	2.12	0.85	2.02	0.34	446	0.87		95	16	6	40	0.30		n
04-2450-083726	Lost Creek #1	9050	9060	9055	Skelly	Antelope Arch	cuttings	3.14	1.33	3.54	0.53	446	0.87		113	17	7	42	0.27		n
04-2450-083727	Lost Creek #1	9100	9110	9105	Skelly	Antelope Arch	cuttings	2.09	0.67	1.69	0.38	447	0.89		81	18	4	32	0.28		n
04-2450-083728	Lost Creek #1	9150	9160	9155	Skelly	Antelope Arch	cuttings	1.41	0.38	0.81	0.25	447	0.89	0.98	57	18	3	27	0.32		n
04-2450-083729	#45-25G	6400	6500	6450	General Pet.	Antelope Arch	cuttings	1.87	0.49	1.87	0.57	433	0.63	0.63	100	31	3	26	0.21		n
04-2450-083730	#45-25G	7000	7100	7050	General Pet.	Antelope Arch	cuttings	0.97	0.30	0.68	0.30	430	0.58		70	31	2	31	0.31		n
04-2450-083731	#45-25G	8000	8100	8050	General Pet.	Antelope Arch	cuttings	1.32	0.34	0.93	0.26	436	0.69		70	20	4	26	0.27		n
04-2450-083732	#45-25G	8500	8600	8550	General Pet.	Antelope Arch	cuttings	1.34	0.35	1.06	0.26	439	0.74		79	19	4	26	0.25		n
04-2450-083733	#45-25G	8700	8800	8750	General Pet.	Antelope Arch	cuttings	1.53	0.49	1.59	0.30	440	0.76	1.01	104	20	5	32	0.24		n
04-2450-083734	#32-27 Unit	1300	1400	1350	Shell	Antelope Arch	cuttings	0.63	0.19	0.24	0.38	419 *	0.38	0.65	38	61	1	30	0.44	c	n
04-2450-083735	#32-27 Unit	2510	2610	2560	Shell	Antelope Arch	cuttings	0.36	0.16	0.21	0.34	426 *	0.51		59	95	1	45	0.43	c	n
04-2450-083736	#32-27 Unit	2950	3050	3000	Shell	Antelope Arch	cuttings	1.00	0.14	0.31	0.32	427 *	0.53		31	32	1	14	0.31		n
04-2450-083737	#32-27 Unit	3240	3340	3290	Shell	Antelope Arch	cuttings	0.87	0.17	0.40	0.48	428 *	0.54		46	55	1	20	0.30		n
04-2450-083738	#32-27 Unit	3490	3590	3540	Shell	Antelope Arch	cuttings	1.29	0.14	0.28	0.42	427 *	0.53		22	32	1	11	0.33		n
04-2450-083739	#32-27 Unit	3590	3690	3640	Shell	Antelope Arch	cuttings	2.72	0.34	5.30	0.89	422	0.44		195	33	6	13	0.06		n
04-2450-083740	#32-27 Unit	3690	3790	3740	Shell	Antelope Arch	cuttings	3.48	0.85	7.99	1.16	424	0.47	0.83	229	33	7	24	0.10	lc	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)
Cal. %Ro = calculated vitrinite reflectance based on Tmax
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

KEROGEN TYPE and MATURITY
Encana Oil & Gas (USA), Inc. - Antelope Arch

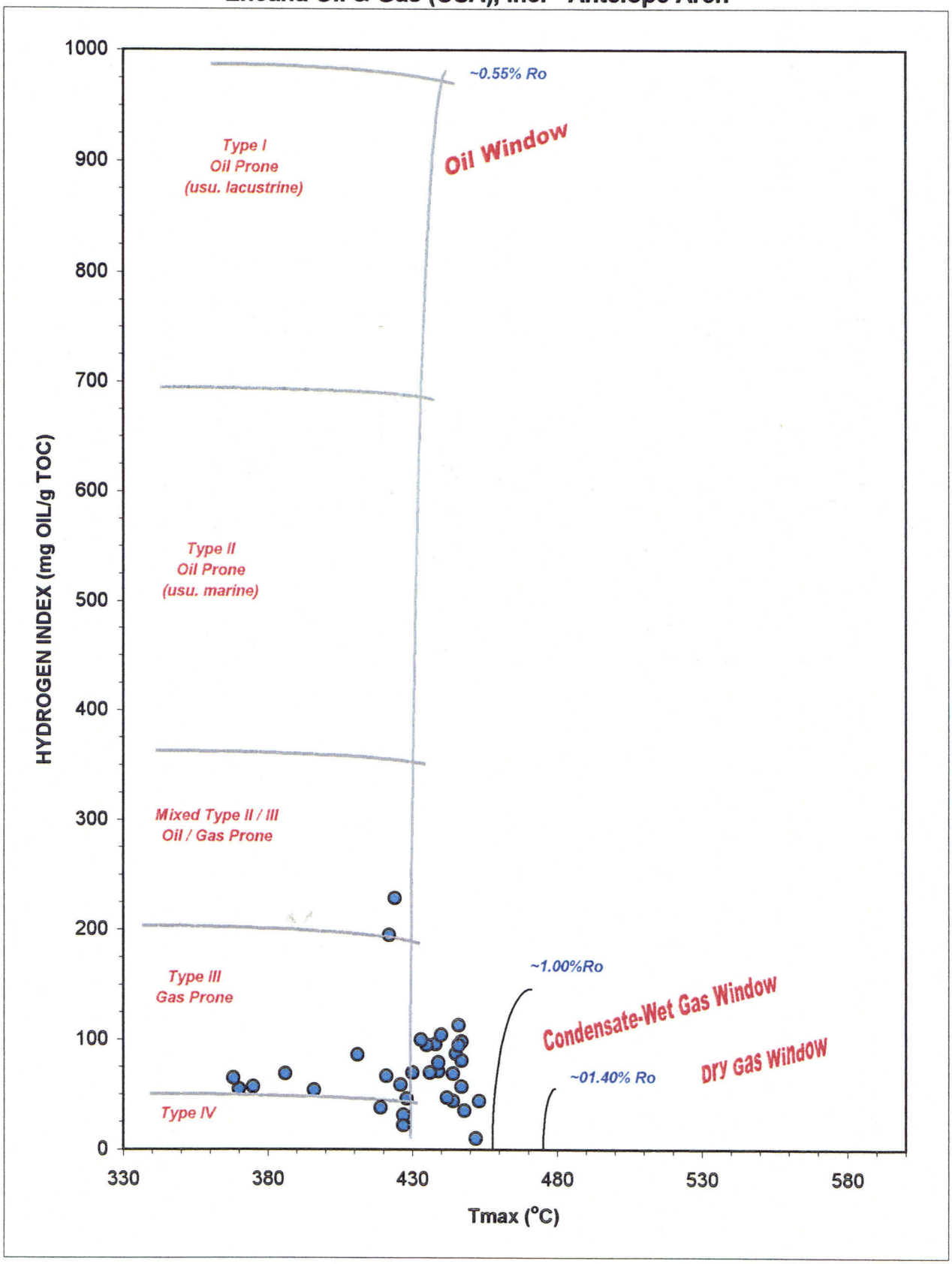


Figure 4a. Kerogen Type and Maturity (Tmax)

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KEROGEN TYPE and MATURITY
Encana Oil & Gas (USA), Inc. - Antelope Arch

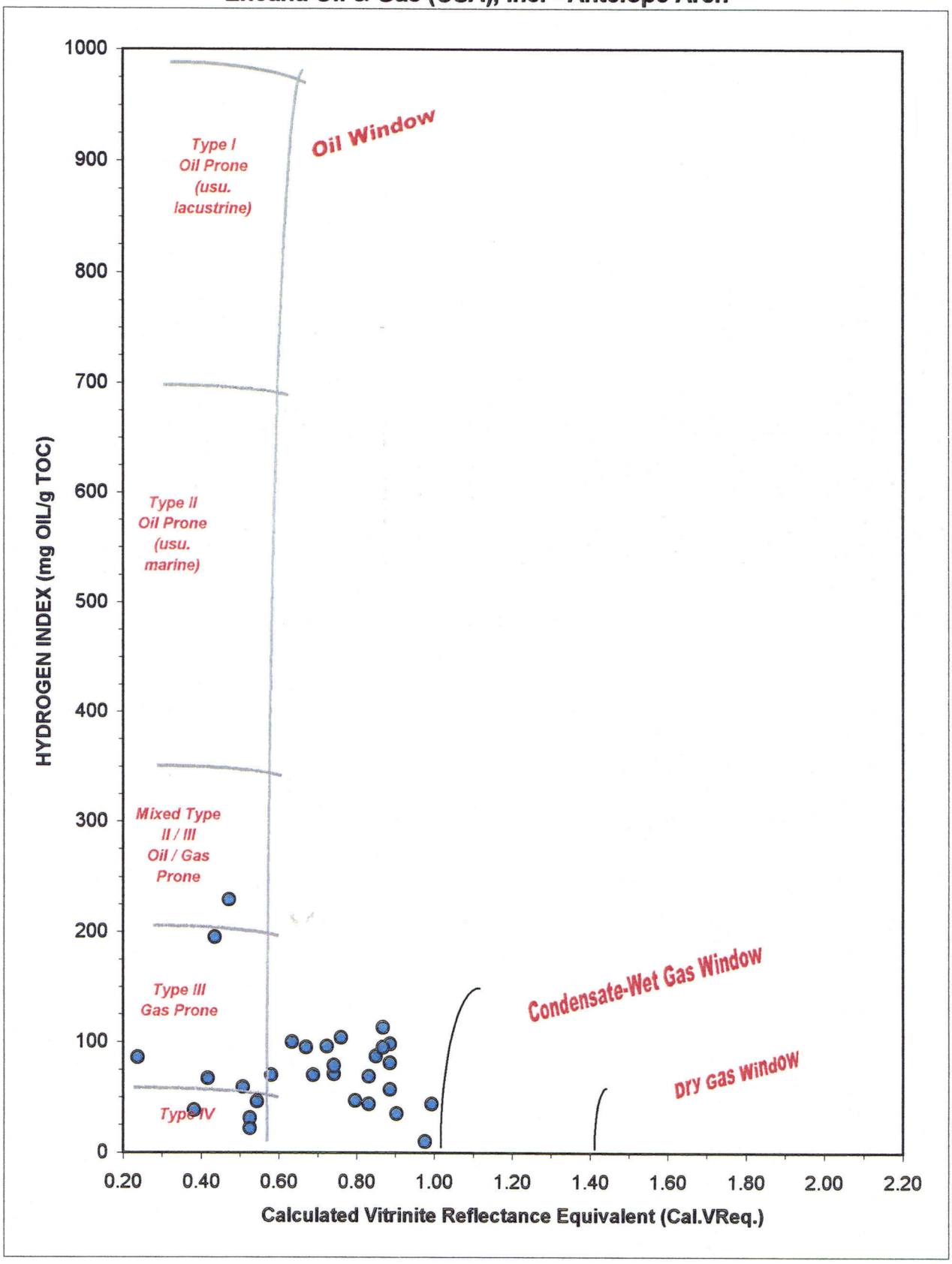

Figure 4b. Kerogen Type and Maturity (Tmax calculated %VRo)

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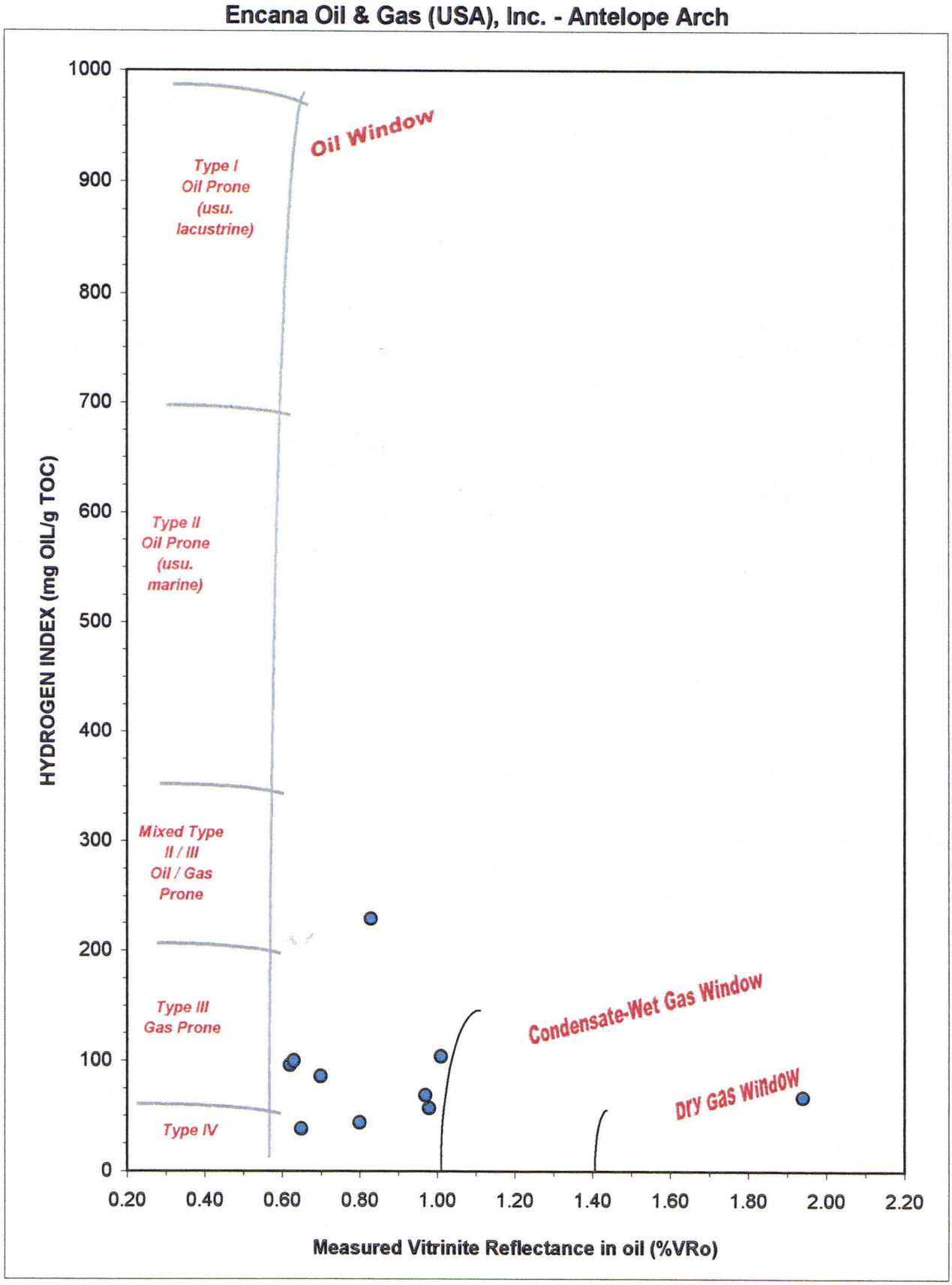

Figure 4c. Kerogen Type and Maturity (Measured vitrinite reflectance)

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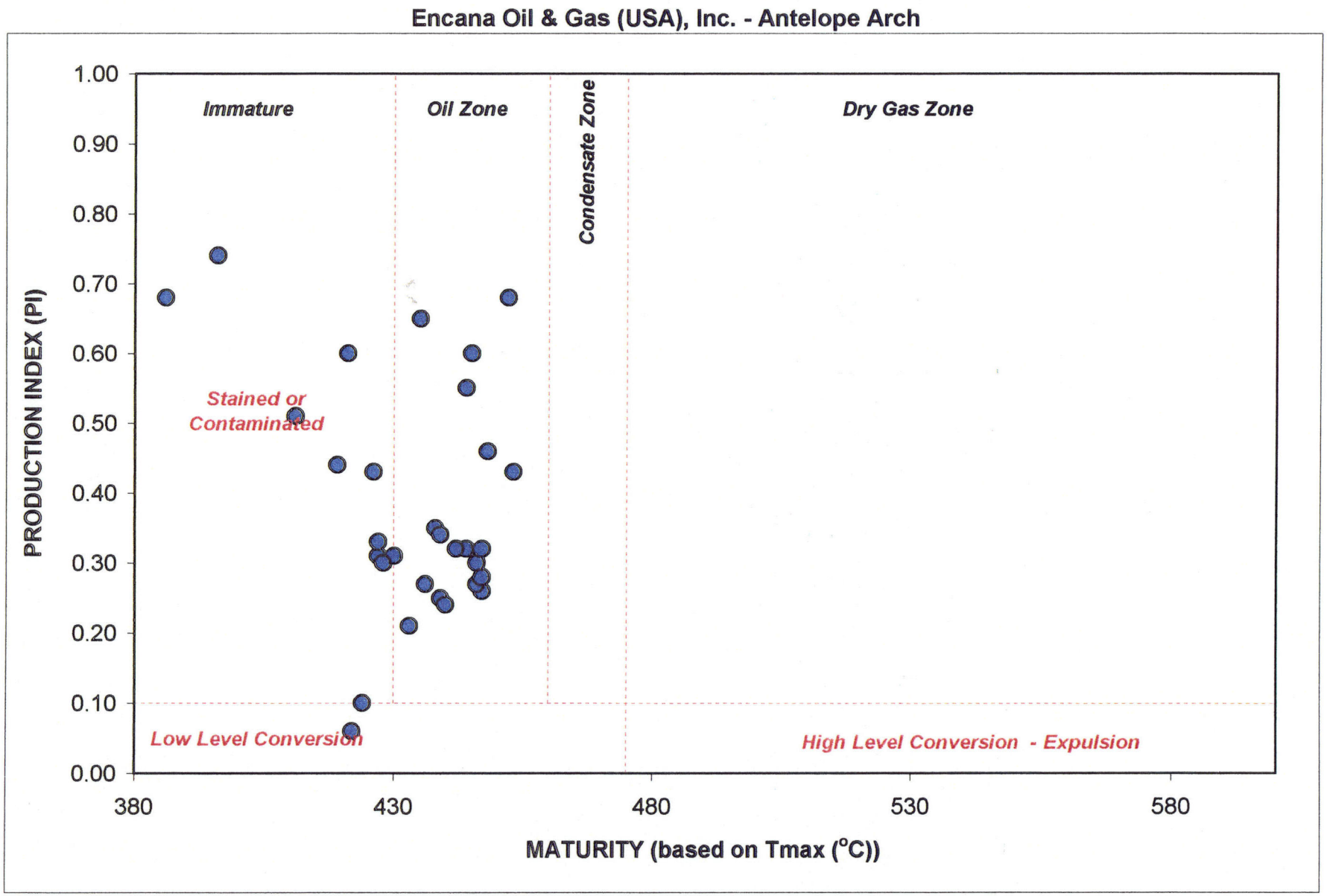

Figure 5a. Kerogen conversion and maturity (based on Tmax).

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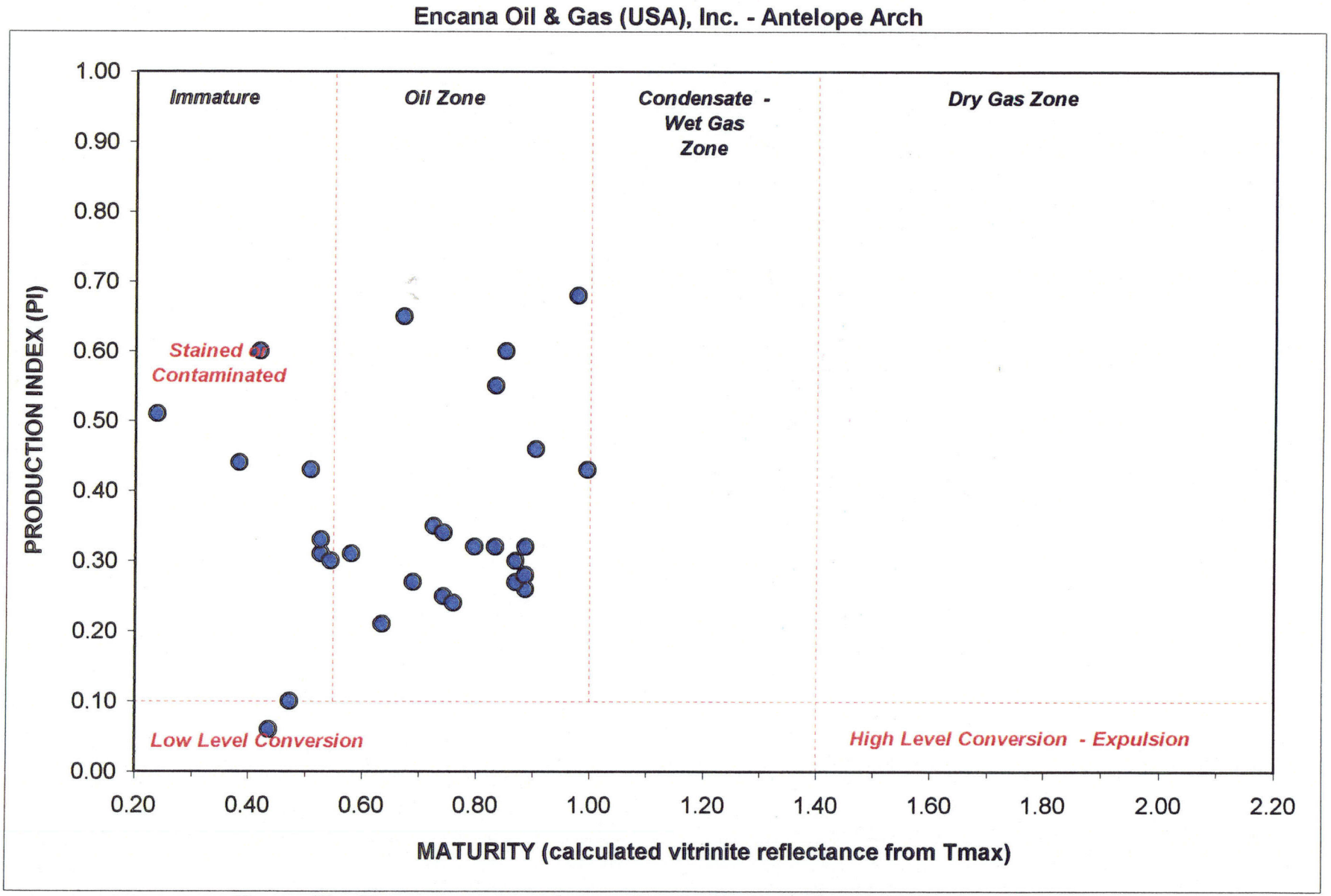

Figure 5b. Kerogen conversion and maturity (calculated %VRo from Tmax).

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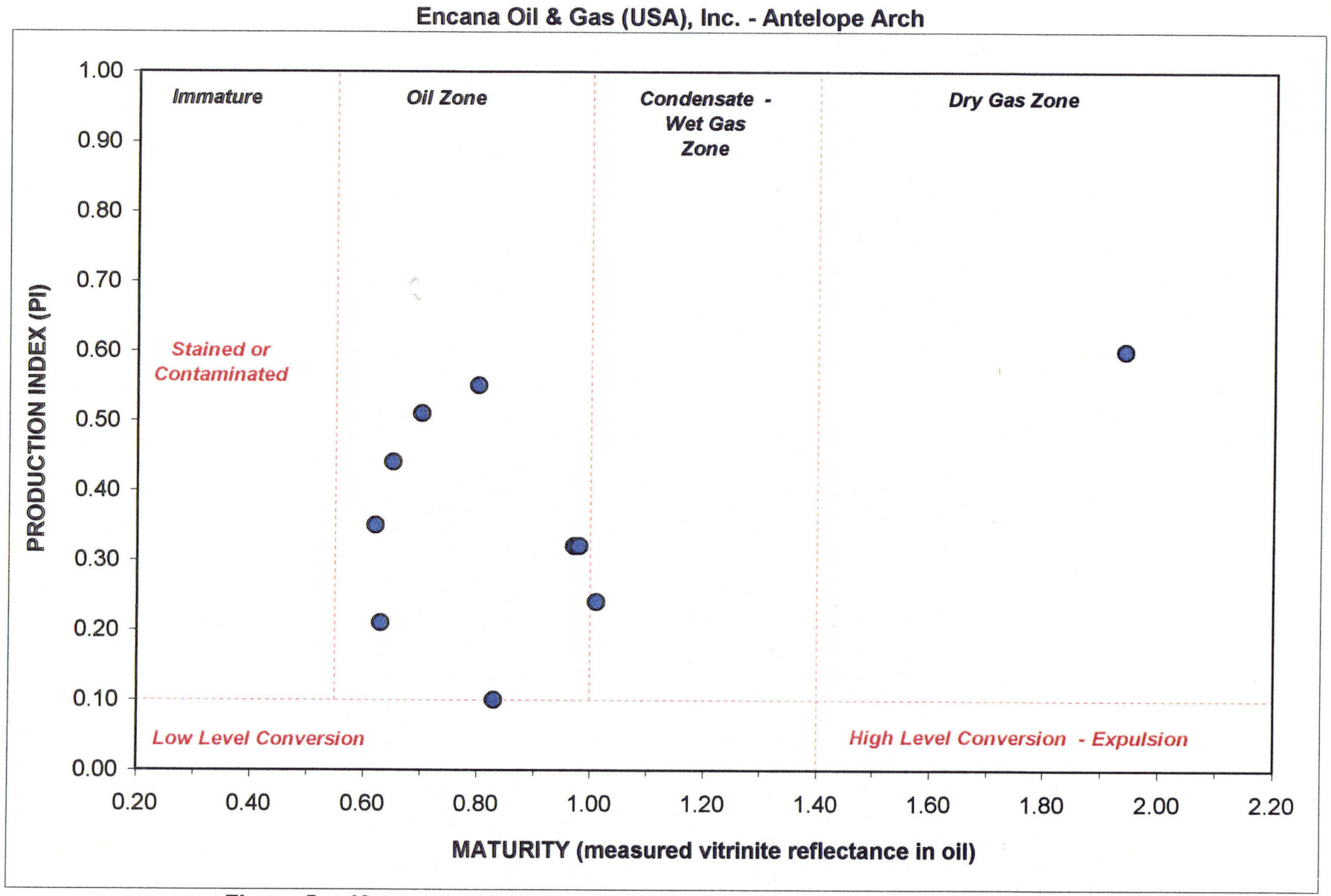

Figure 5c. Kerogen conversion and maturity (measured vitrinite reflectance).

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