



EXXONMOBIL (EXXON)
ORION NO. 1 (OCS-Y-0804)

API #55-231-00003

BEAUFORT SEA, ALASKA

Prepared by:

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BIOSTRATIGRAPHY REPORT

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INTEGRATED SUMMARY

356-480'

Tertiary
Probable Pliocene
Probable F-2A(1) to F-2A(2)

480-800'

Tertiary
Early to Middle Miocene
F-2B(1) to F-2B(2a)

800-2020'

Tertiary
Possible Paleocene to Eocene
F-3A(4)? to F-4(2)?

2020-3125'

Late Cretaceous
Santonian to Maestrichtian

3125-3785'

Late Cretaceous
Cenomanian to Coniacian

3785-6674'

Early Cretaceous
Middle to Late Albian

6674-6785'

Early Cretaceous
Aptian to Early Albian

6785-7015'

Early Cretaceous
Barremian
KE_B

7015-7030'

Early Cretaceous
Hauterivian
KE_H

7030-7300'T.D.

Indeterminate Age

Discussion. Argillite

FORAMINIFERA REPORT

Interpreted by:

Michael B. Mickey

FORAMINIFERA SUMMARY

356-460'

<u>Age.</u>	Tertiary Probable Pliocene
<u>Zones.</u>	Probable F-2A(1) to F-2A(2)
<u>Environment.</u>	Probable Nonmarine (Probable Alluvial Plain)

460-820'

<u>Age.</u>	Tertiary Early to Middle Miocene
<u>Zones.</u>	F-2B(1) to F-2B(2a)
<u>Environment.</u>	Inner Neritic (Inner Shelf)

820-2080'

<u>Age.</u>	Tertiary Undifferentiated
<u>Environment.</u>	Probable Nonmarine (Probable Alluvial Plain)

2080-3070'

<u>Age.</u>	Late Cretaceous Santonian to Maestrichtian
<u>Zones.</u>	F-5 to F-6
<u>Environment.</u>	Middle Neritic to Bathyal (Middle Shelf to Slope)

3070-3700'

<u>Age.</u>	Late Cretaceous Cenomanian to Coniacian
<u>Zones.</u>	F-7 to F-8
<u>Environment.</u>	Lower Bathyal - Distal (Lower Slope & Base of Slope - Starved Basin)

3700-6670'

<u>Age.</u>	Early Cretaceous Middle to Late Albian
<u>Zones.</u>	F-9 to F-11
<u>Environment.</u>	3700-4780': Middle to Outer Neritic (Middle to Outer Shelf) 4780-6130': Upper to Middle Bathyal (Upper to Middle Slope) 6130-6670': Middle to Lower Bathyal (Middle to Lower Slope)

6670-6790'

<u>Age.</u>	Early Cretaceous Aptian to Early Albian
<u>Zone.</u>	F-11
<u>Environment.</u>	Lower Bathyal - Distal (Lower Slope & Base of Slope - Starved Basin)

6790-7015'

<u>Age.</u>	Early Cretaceous Barremian
<u>Zone.</u>	F-12
<u>Environment.</u>	Upper to Lower Bathyal - Distal (Upper to Lower Slope - Starved Basin)

7015-7029'C

<u>Age.</u>	Early Cretaceous Hauterivian
<u>Zone.</u>	F-13a
<u>Environment.</u>	Middle Neritic to Upper Bathyal (Middle Shelf to Upper Slope)

7030C-7300T.D.

<u>Age.</u>	Indeterminate
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<u>Environment.</u>	Indeterminate
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<u>Discussion.</u>	Argillite
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INTRODUCTION

Scope

Micropaleo Consultants, Inc. processed, picked and analyzed for Foraminifera 91 ditch samples and 14 conventional core samples from the ExxonMobil (Exxon) Onion No. 1 (OCS-Y-0804) well. These samples covered the interval 356 to 7300 feet total depth. This report was done as part of M.C.I. Job No. 99-111.

Procedures

Standard techniques were used to process the material. All samples were boiled in Quaternary-O and washed over 20 and 200 mesh screens. Frequency symbols correspond to the following numerical values: very rare (1), rare (2 - 4), frequent (5 -25), common (26 - 100), abundant (101 - 999) and prolific (1000+). The picked foram slides and residues are reposited at the State of Alaska Geological Materials Center in Eagle River, Alaska.

Certain factors such as shelf widths, basin configuration and overall basin depths associated with Arctic Mesozoic basins are not completely understood at present. The paleoenvironments presented in this report reflect relative basinal position only and should not be tied to specific water depths. Generally, neritic corresponds to shelf or deltaic environments, while bathyal corresponds to slope or prodelta environments and bathyal (starved basin) corresponds to distal (far from the source) deposition. As an example, prodelta deposits could represent deposition as shallow as middle neritic or as deep as bathyal (slope) depending on the delta type and shelf width. With a narrow shelf, a river-dominated deltaic system could build across the shelf and the prodelta deposits would be in a bathyal (slope) depth. A tide-dominated deltaic system associated with a wide shelf could result in middle neritic prodelta deposition.

Format

A listing of the age, environment, fauna and occasional lithology comments for each biostratigraphic interval follows. A generalized summary of the well is presented in the Conclusions section at the end of the Foraminifera Report. A Foraminifera Distribution Chart (Figure F-1) and a High Resolution Biostratigraphy Plot (Figure B-1) containing foram diversity/abundance plots, a cumulative faunal plot and a graphic paleoenvironmental display are in pockets at the back of this report.

RESULTS

356-460'

<u>Age.</u>	Tertiary Probable Pliocene
<u>Zones.</u>	Probable F-2A(1) to F-2A(2)
<u>Environment.</u>	Probable Nonmarine (Probable Alluvial Plain)
<u>Fauna.</u>	Barren of Foraminifera.

460-820'

<u>Age.</u>	Tertiary Early to Middle Miocene
<u>Zones.</u>	F-2B(1) to F-2B(2a)
<u>Environment.</u>	Inner Neritic (Inner Shelf)
<u>Fauna.</u>	<i>Asterigerina guerichi</i> , <i>Angulogerina fluens</i> , <i>Elphidiella acutum</i> , <i>Elphidium clavatum</i> , <i>Cibicides perlucidus</i> , <i>Dentalina soluta</i> and pyrite.

820-2080'

<u>Age.</u>	Tertiary Undifferentiated
<u>Environment.</u>	Probable Nonmarine (Probable Alluvial Plain)
<u>Fauna.</u>	Barren of indigenous Foraminifera. Pyrite, pyrite sticks, and frequent to abundant oil staining below 1720 feet.

2080-3070'

<u>Age.</u>	Late Cretaceous Santonian to Maestrichtian
<u>Zones.</u>	F-5 to F-6
<u>Environment.</u>	Middle Neritic to Bathyal (Middle Shelf to Slope)
<u>Fauna.</u>	<i>Verneuilioides fischeri</i> , <i>Trochammina albertensis</i> , <i>Haplophragmoides bonanzaensis</i> , <i>H. rota</i> , <i>H. excavatus</i> , <i>Eoeponidella strombodes</i> , pyrite, frequent to common radiolaria, and frequent volcanic glass shards above 2350 feet.

3070-3700'

<u>Age.</u>	Late Cretaceous Cenomanian to Coniacian
<u>Zones.</u>	F-7 to F-8
<u>Environment.</u>	Lower Bathyal - Distal (Lower Slope & Base of Slope - Starved Basin)
<u>Fauna.</u>	<i>Haplophragmoides bonanzaensis</i> , <i>H. rota</i> , <i>Trochammina rutherfordi</i> , <i>T. ribstonensis</i> , <i>Inoceramus</i> prisms, fish debris, pyrite and rare to frequent radiolaria.

3700-6670'

<u>Age.</u>	Early Cretaceous Middle to Late Albian
<u>Zones.</u>	F-9 to F-11
<u>Environment.</u>	3700-4780': Middle to Outer Neritic (Middle to Outer Shelf) 4780-6130': Upper to Middle Bathyal (Upper to Middle Slope) 6130-6670': Middle to Lower Bathyal (Middle to Lower Slope)
<u>Fauna.</u>	<i>Lenticulina macrodisca</i> , <i>Haplophragmoides topagorukensis</i> , <i>H. gigas</i> , <i>H. linki</i> , <i>H. kirki</i> , <i>H. excavatus</i> , <i>Miliammina ischnia</i> , <i>M. manitobensis</i> , <i>Trochammina mcmurrayensis</i> , <i>T. rainwateri</i> , <i>Bathysiphon vitta</i> , <i>Ammobaculites wenonahae</i> , <i>A. fragmentarius</i> , <i>Verneulinoides borealis</i> , <i>Saccammina lathrami</i> , <i>Ditrupa cornu</i> , megaspores, <i>Inoceramus</i> prisms, fish debris, pelmatozoan fragments, shell fragments, pyrite sticks, pyrite, rare to frequent pyritized radiolaria below 4960 feet, and common to flood of coal between 4420 and 4780 feet.

6670-6790'

<u>Age.</u>	Early Cretaceous Aptian to Early Albian
<u>Zone.</u>	F-11
<u>Environment.</u>	Lower Bathyal - Distal (Lower Slope & Base of Slope - Starved Basin)
<u>Fauna.</u>	Probably barren of indigenous Foraminifera. Frequent to abundant pyritized radiolaria including <i>Lithocampe</i> N in the basal sample. Fish debris, <i>Inoceramus</i> prisms, megaspores, pyrite, and frequent paper shale below 6730 feet.

6790-7015'

<u>Age.</u>	Early Cretaceous Barremian
<u>Zone.</u>	F-12
<u>Environment.</u>	Upper to Lower Bathyal - Distal (Upper to Lower Slope - Starved Basin)
<u>Fauna.</u>	<i>Haplophragmoides coronis</i> , <i>Bathysiphon scintillata</i> , <i>Trochamminoides</i> sp. (small, thin-walled), <i>Thuramminoides</i> sp., <i>Gaudryina tailleuri</i> , <i>Gavelinella stictata</i> , megaspores, fish debris, pyrite, scattered frequent pyritized radiolaria, frequent to abundant paper shale and frequent to abundant rounded frosted quartz floating sand grains.

7015-7029'C

<u>Age.</u>	Early Cretaceous Hauterivian
<u>Zone.</u>	F-13a
<u>Environment.</u>	Middle Neritic to Upper Bathyal (Middle Shelf to Upper Slope)
<u>Fauna.</u>	<i>Thuramminoides</i> sp., <i>Bathysiphon</i> <i>scintillata</i> , <i>Haplophragmoides duoflatis</i> , <i>H. coronis</i> , <i>Trochamminoides</i> sp. (small, thin), arenaceous spp. (large, coarse), tar and frequent to abundant rounded frosted quartz floating sand grains.

7030C-7300'T.D.

<u>Age.</u>	Indeterminate
<u>Environment.</u>	Indeterminate
<u>Discussion.</u>	Argillite
<u>Fauna.</u>	Barren of indigenous Foraminifera. Argillite frequent to abundant.

CONCLUSIONS

The ExxonMobil (Exxon) Onion No. 1 (OCS-Y-0804) well penetrated the following biostratigraphic sequence based on foraminiferal analysis:

- 464+ feet (356-820') of Tertiary Early Miocene to probable Pliocene age (Late Brookian) nonmarine to inner shelf clastic deposition.
- 1260 feet (820-2080') of undifferentiated Tertiary age (probable Middle Brookian) alluvial plain clastics.
- 1620 feet (2080-3700') of Cenomanian to Maestrichtian age (Early Brookian) upward shallowing slope foresets to middle and outer shelf topsets.
- 3330 feet (3700-7030') of Hauterivian to Albian age (Early Brookian & Beaufortian - Rift Sequence) middle to outer shelf topsets, slope foresets and base of slope bottomsets.
- 270+ feet (7030-7300'T.D.) of indeterminate age (Franklinian) dark gray to black argillite basement rocks.

PALYNOLOGY REPORT

Interpreted by:

Hideyo Haga

PALYNOLOGY SUMMARY

356-2170'

<u>Age.</u>	Tertiary Undifferentiated
<u>Environment.</u>	Marginal Marine - Nonmarine?

2170-2980'

<u>Age.</u>	Late Cretaceous Santonian - Campanian
<u>Zones.</u>	P-M14 to P-M13
<u>Environment.</u>	Marine

2980-3790'?

<u>Age.</u>	Late Cretaceous Turonian - Coniacian
<u>Zone.</u>	P-M15
<u>Environment.</u>	Marine

3790?-6790'

<u>Age.</u>	Probable Early Cretaceous Probable Middle - Late Albian
<u>Zone.</u>	Probable P-M17
<u>Environment.</u>	Marine

6790-7030'C

<u>Age.</u>	Early Cretaceous Barremian - Early Albian
<u>Zone.</u>	P-M18a
<u>Environment.</u>	Marine

7030C-7040'C

<u>Age.</u>	Early Cretaceous Hauterivian
<u>Zone.</u>	P-M19
<u>Environment.</u>	Marine

7040C-7300'T.D.

<u>Age.</u>	Indeterminate
<u>Environment.</u>	Indeterminate
<u>Remarks.</u>	Argillite

INTRODUCTION

Purpose and Scope

Micropaleo Consultants, Inc. processed 103 samples from the ExxonMobil (Exxon) Onion No. 1 (OCS-Y-0804) well for palynological analysis. This total consisted of 89 ditch and 14 core samples. Where the core samples overlap the ditch sample intervals, the ditch sample palynomorph data have not been included.

In addition, ditch and core material was selected for determination of kerogen maturation. This resulted in the analysis of 29 T.A.I. slides and nine V.R. "plugs".

All of the above samples covered the section between 356 feet and the total depth of 7300 feet.

The State of Alaska, Geologic Materials Center at Eagle River, Alaska, made the well material available. The permanent slide mounts for the palynological and kerogen analyses are on deposit at that facility.

Procedures

The palynology samples were processed with standard techniques using hydrochloric, hydrofluoric and nitric acid treatments. Heavy liquid separation and a sieving/panning procedure further concentrated the resultant kerogen. Two permanent slide mounts were made for each sample with sufficient organic recoveries.

The kerogen maturation samples were processed similarly, but the oxidative nitric acid treatment was omitted.

For each sample, an abundance estimate for the identified palynomorph taxa was recorded in a microcomputer. These data form the basic elements of the species distribution chart (Figure P-1).

Based on the palynomorph assemblages observed, an age and generalized environment of deposition were interpreted for each palynostratigraphic subdivision. The environments, as interpreted from the palynological preparations, are simply categorized as nonmarine, marginal marine or marine. These categories are based on the absence or presence and diversity of microplankton.

RESULTS

The distribution chart (Figure P-1) is located in the pocket. This chart also displays curves for diversity and abundance of the spore-pollen and microplankton assemblages in each sample.

356-2170'

Age.

Tertiary
Undifferentiated

Environment.

Marine to Nonmarine?

Palynomorphs.

The spore-pollen assemblage includes long-ranging forms such as *Alnipollenites*, Betulaceae, *Laevigatosporites*, *Lycopodiumsporites*, Taxodiaceae and *Ulmipollenites*.

The marine forms appear in the upper part of the interval. These included the species *Nematosphaeropsis* sp. A, *Operculodinium centrocarpum* and *Palaeocystodinium golzowense*. This assemblage suggests that the top part of the interval is probably at least as old as Miocene.

2170-2980'

<u>Age.</u>	Late Cretaceous Santonian to Campanian
<u>Zones.</u>	P-M14 to P-M13
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	<p>This interval is marked by a rather diverse dinocyst assemblage. The forms include species of <i>Chatangiella</i>, <i>Hystrichosphaeridium difficile</i>, <i>Laciniadinium biconiculum</i> and <i>Odontochitina operculata</i>.</p> <p>A single specimen of the pollen <i>Aquilapollenites magnus</i> within this interval indicates that some Maestrichtian age strata may be present above 2170 feet, perhaps in the basal part of the overlying interval.</p>

2980-3790'?

<u>Age.</u>	Late Cretaceous Turonian to Coniacian
<u>Zone.</u>	P-M15
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	<p>The key form that separates the Turonian - Coniacian interval is the dinocyst <i>Isabelidinium globosum</i>. Most of the other species seen above continue into this section.</p>

3790?-6790'

<u>Age.</u>	Early Cretaceous Middle to Late Albian
<u>Zone.</u>	P-M17
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	The Albian section is marked by the appearance of the dinocyst <i>Ovoidinium verrucosum</i> . Other key species occur in the lower part of the interval; these are <i>Luxadinium propatulum</i> and <i>Muderongia asymmetrica</i> .
<u>Discussion.</u>	The upper boundary is questioned because the pick is based on a single specimen. The more consistent occurrences of marker species do not begin until 5500 feet.

6790-7030'C

<u>Age.</u>	Early Cretaceous Barremian to Early Albian
<u>Zone.</u>	P-M18a
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	This interval is characterized by a dramatic increase in dinocyst abundances. The assemblage includes <i>Cyclonephelium distinctum</i> , <i>Gardodinium trabeculosum</i> , <i>Michrhystridium</i> sp. A, <i>Odontochitina operculata</i> , <i>Oligosphaeridium complex</i> and <i>Senoniasphaera microreticulata</i> .

7030C-7040'C

<u>Age.</u>	Early Cretaceous Hauterivian
<u>Zone.</u>	P-M19
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	Evidence for Hauterivian age was only recovered in one core sample. The ditch samples from within the cored intervals yielded no restrictive Hauterivian evidence. The important species are the dinocysts <i>Oligosphaeridium complex</i> (thick-wall) and <i>Florentinia cooksoniae</i> .

7041C-7300'T.D.

<u>Age.</u>	Indeterminate
<u>Environment.</u>	Indeterminate
<u>Palynomorphs.</u>	Barren of indigenous palynomorphs.
<u>Discussion.</u>	The cores at the top of this section contained only black organic fragments. This suggests an argillite basement.

CONCLUSIONS

Palynological analysis of the ExxonMobil (Exxon) Onion No. 1 (OCS-Y-0804) well provides the following generalized palynostratigraphic succession:

- Marine to nonmarine? Tertiary strata occur from 356 feet to 2170 feet. The deposits in the upper part of the interval may be as old as Miocene.
- Marine Santonian - Campanian strata are identified between 2170 feet and 2980 feet. A single Maestrichtian pollen species was recorded in this interval. Perhaps some Maestrichtian age strata are present in the basal part of the interval above that has been designated as Tertiary.
- Turonian - Coniacian marine strata are present from 2980 feet to 3790? feet.
- Middle - Late Albian marine strata occur from 3790? feet to 6790 feet. The upper boundary is questioned on the basis of sparse evidence. More consistent Albian evidence is seen below 5500 feet.
- Barremian - Early Albian marine strata are identified in the interval from 6790 feet to 7030C feet.
- Hauterivian marine strata are seen in a single core sample composite of 7030C feet to 7040C feet.
- The bottom interval from 7041C feet to the total depth of 7300 feet is barren of indigenous palynomorphs. Argillite lithology is indicated.

KEROGEN MATURATION REPORT

Interpreted by:

Hideyo Haga

KEROGEN MATURATION

The maturation levels of kerogen residues from the ExxonMobil (Exxon) Onion No. 1 (OCS-Y-0804) well were determined by visual means, Thermal Alteration Index (T.A.I.) and by vitrinite reflectance (V.R.) measurements. A chart correlating the two methods with hydrocarbon generation is given in Figure 1.

An unoxidized fraction of selected kerogen samples was used to make T.A.I. slides and V.R. resin mounts. The V.R. resin "plugs" were cut and polished in preparation for the reflectance measurements.

Thermal Alteration Index

The T.A.I. and percentage estimates for the major organic constituents are presented in Table 1. A generalized organic classification scheme is used and the terminology employed may be equated to the following categories:

■	Amorphous	=	Alginite	=	Type I
■	Herbaceous	=	Exinite	=	Type II
■	Woody	=	Vitrinite	=	Type III
■	Fusinitic	=	Inertinite	=	Type IV

The T.A.I. estimates suggest that the section down to about 1500 feet is within the immature range for hydrocarbon generation. Between the depths of approximately 1500 feet to 7000 feet a mature to immature transition level is suggested. By 7100 feet overmature argillite lithology is encountered.

Much of the well above the argillite, and up to about 3000 feet, appears to have oil prone kerogen.

Vitrinite Reflectance

A Leitz MPV-II photometer system and Leitz Orthoplan microscope were used to make the V.R. measurements. This equipment was integrated with an Epson desktop computer, using the DOS operating system, for data recording. The data were subsequently transferred to a Windows system for this report.

COALIFICATION (ASTM)	HYDROCARBON GENERATION		TRANSMITTED LIGHT		REFLECTED LIGHT VR (% Ro)
			SPORE-POLLEN COLORATION	TAI	
PEAT	IMMATURE	BIOGENIC GAS	GREENISH-YELLOW	1.4	
LIGNITE		EARLY DRY GAS			0.2
SOFT BROWN COAL					
	TRANSITION	WET GAS	PALE YELLOW	2.0	0.3
HARD					
SUBBITUMINOUS					0.4
	MATURE	OIL WINDOW	AMBER YELLOW	2.5	0.5
C					0.6
HIGH					0.8
B					
A				2.8	
	TRANSITION	CONDENSATE	RED BROWN - BROWN	3.0	1.3
MEDIUM					
	SUPRAMATURE	GAS ↓ --- ↓ DRY	DARK BROWN	3.5	1.5
LOW					
			BROWN BLACK- BLACK	3.7	2.0
SEMI-					
				4.0	2.5
					3.0
					4.0
				5.0	5.0
SEMI-GRAPHITE					

Figure 1. Correlation of Thermal Alteration Index (TAI) and Vitrinite Reflectance (VR) values to hydrocarbon generation. Modified from Heroux, Y., Chagnou, A. and Bertrand, R., (1979).

EXXON OCS-Y-0804 #1 (Orion)

	SAMPLE (Feet)	TAI	KEROGEN TYPES (%)			VR (Avg Ro)	REMARKS
			A	H	W-F		
1	356-640	2.0		30	70		
2	640-910	2.0		30	70		
3	910-1180	2.0	T	20	80	0.32	
4	1180-1450	2.0	T	20	80		
5	1450-1720	2.3		10	90	0.33	
6	1720-1990	2.5?		60	40		
7	1990-2260	2.3	T	60	40		
8	2260-2530	2.3	30	40	30		
9	2530-2800	2.3	30	40	30	0.36	
10	2800-3070	2.3	20	40	40		
11	3070-3340	2.0-2.3	50	30	20	0.39	
12	3340-3610	2.3	80	10	10		
13	3610-3880	2.3	70	20	10		
14	3880-4150	2.3	80	10	10		
15	4150-4420	2.3	50	20	30	0.36	
16	4420-4690	2.3	10	10	80		
17	4690-4960	2.3	20	10	70		
18	4960-5230	2.3	80	10	10		
19	5230-5500	2.3	70	10	20	0.39	
20	5500-5770	2.3	70	10	20		
21	5770-6040	2.3	70	10	20		
22	6040-6310	2.3	80	10	10		
23	6310-6580	2.3	70	10	20	0.42	
24	6580-6730	2.3	80	T	20		
25	6730-6820	2.3	70	10	20		
26	6899-6950C	2.3	80	10	10	0.46	
27	6951-7029C	2.3-2.5	40	T	60	0.58/1.10	Reworked black fragments
28	7030-7063C	2.5	85	5	10		Mixed with argillite
29	7150-7300TD	4.0	10	T	90		In argillite lith
30							

A = amorphous, H = herbaceous (includes palynomorphs), W-F = woody-fusinitic, T = trace

Table 1 Thermal Alteration Index (TAI), percent of kerogen types, and Vitrinite Reflectance (VR).

The V.R. measurements for each sample are given in Appendix A, and the calculated average V.R. (R_o) is also listed in Table 1.

Figure 2 displays the average V.R. for each sample in a semi-log plot. This plot indicates that the well section down to 7000 feet is within the immature to transition facies for organic maturation with V.R. ranges of 0.32 to 0.46. Below 7000 feet measurements jump up to the mature range with V.R. values of 0.58 and 1.10. The highest readings are associated with argillitic lithologies in core samples below 7041 feet.

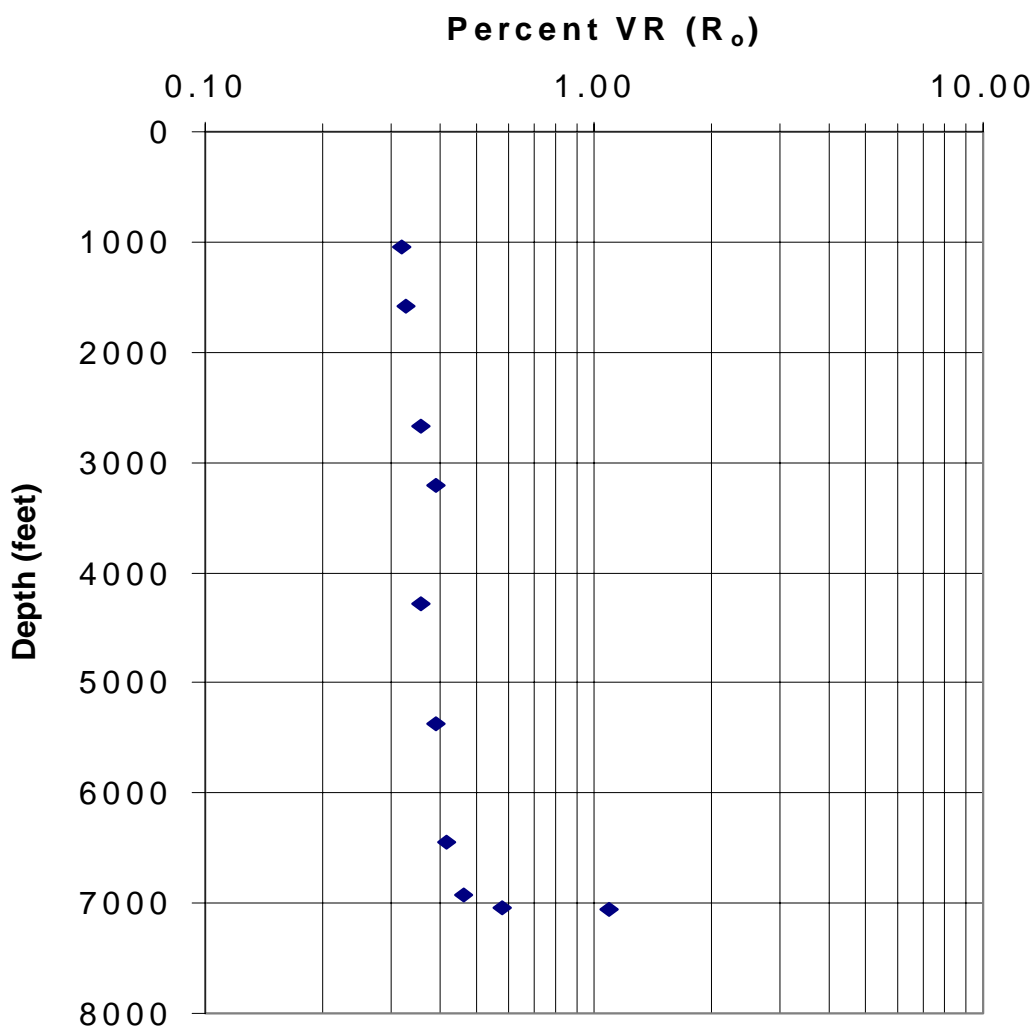


Figure 2. Plot of average R_o (%) versus depth, EXXON OCS-Y-0804 No. 1 (Orion) well.

REFERENCE

Heroux, Y., Chagnou, A. and Bertrand, R., 1979. Compilation and correlation of major thermal maturation indicators: Bull. Am. Assoc. Petr. Geol., 63: pp. 2128-2144.

APPENDIX

VITRINITE REFLECTANCE DATA

EXXON OCS-Y-0804 #1 (Orion)

Sample Depth: 910-1180' Ditch

VR Measurements:

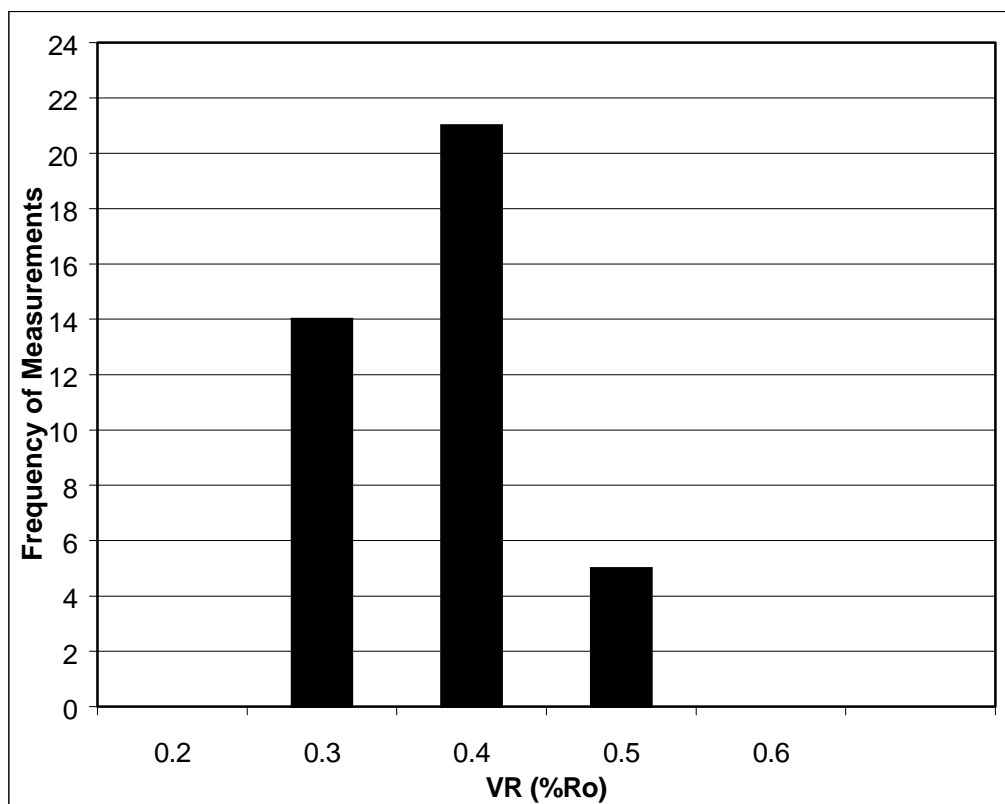
0.21	0.28	0.32	0.39		
0.23	0.28	0.32	0.39		
0.23	0.29	0.33	0.39		
0.24	0.29	0.33	0.39		
0.24	0.30	0.35	0.39		
0.25	0.30	0.36	0.40		
0.26	0.31	0.37	0.40		
0.26	0.31	0.37	0.41		
0.27	0.31	0.38	0.42		
0.27	0.32	0.38	0.43		

Number of meas: 40

Median: 0.32

Average: 0.32

Stand. Dev: 0.06



EXXON OCS-Y-0804 #1 (Orion)

Sample Depth: 1450-1720' Ditch

VR Measurements:

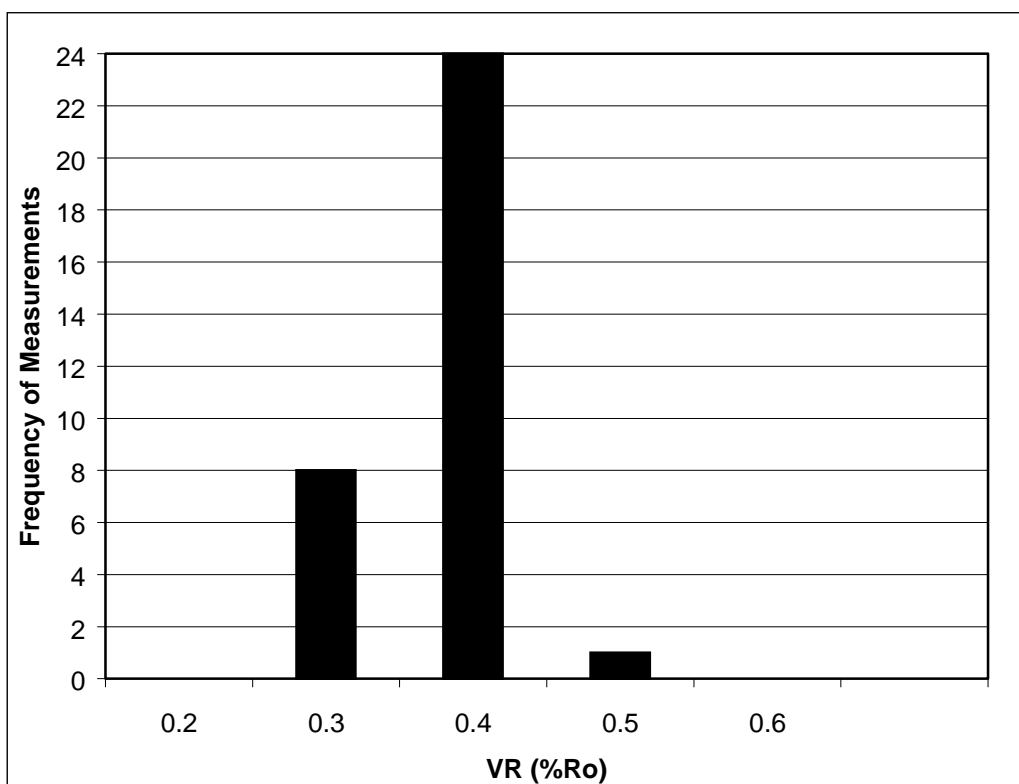
0.26	0.31	0.33	0.39		
0.26	0.31	0.34	0.39		
0.27	0.31	0.34	0.42		
0.28	0.31	0.35			
0.28	0.31	0.35			
0.29	0.31	0.35			
0.29	0.32	0.36			
0.29	0.32	0.36			
0.30	0.33	0.37			
0.31	0.33	0.39			

Number of meas: 33

Median: 0.32

Average: 0.33

Stand. Dev: 0.04



EXXON OCS-Y-0804 #1 (Orion)

Sample Depth: 2530-2800' Ditch

VR Measurements:

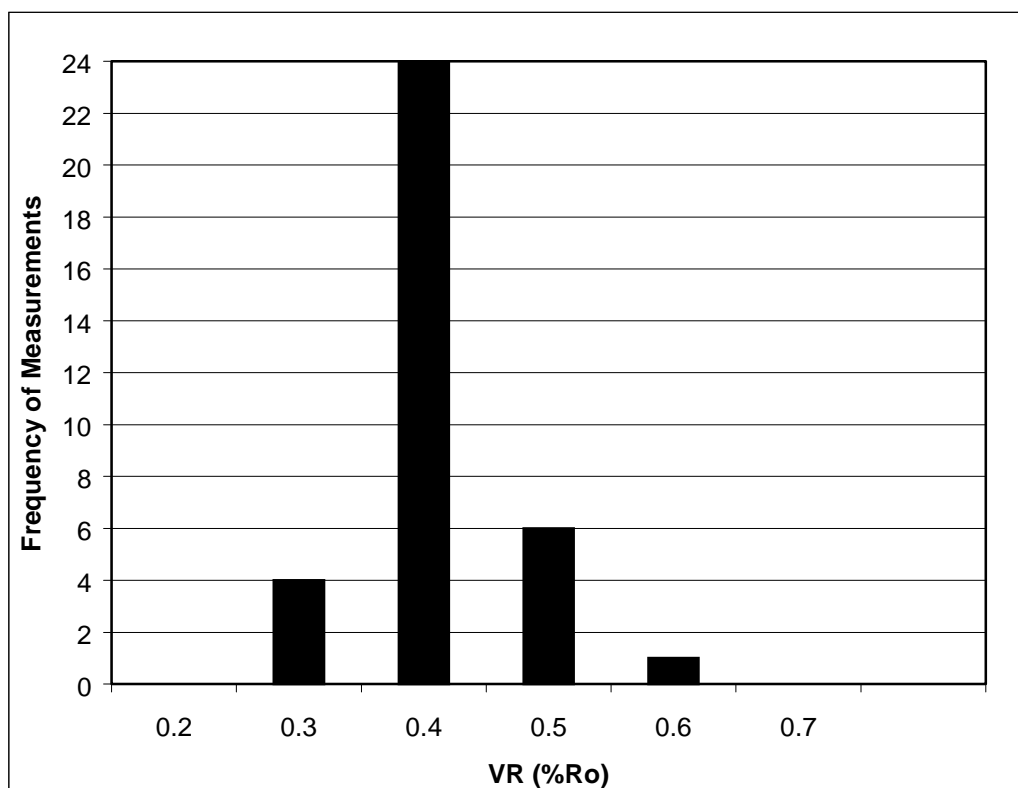
0.27	0.32	0.36	0.42		
0.27	0.33	0.36	0.42		
0.28	0.33	0.37	0.44		
0.28	0.33	0.38	0.49		
0.31	0.33	0.38	0.50		
0.31	0.34	0.39			
0.31	0.34	0.39			
0.31	0.35	0.39			
0.32	0.35	0.41			
0.32	0.35	0.42			

Number of meas: 35

Median: 0.35

Average: 0.36

Stand. Dev: 0.06



EXXON OCS-Y-0804 #1 (Orion)

Sample Depth: 3070-3340' Ditch

VR Measurements:

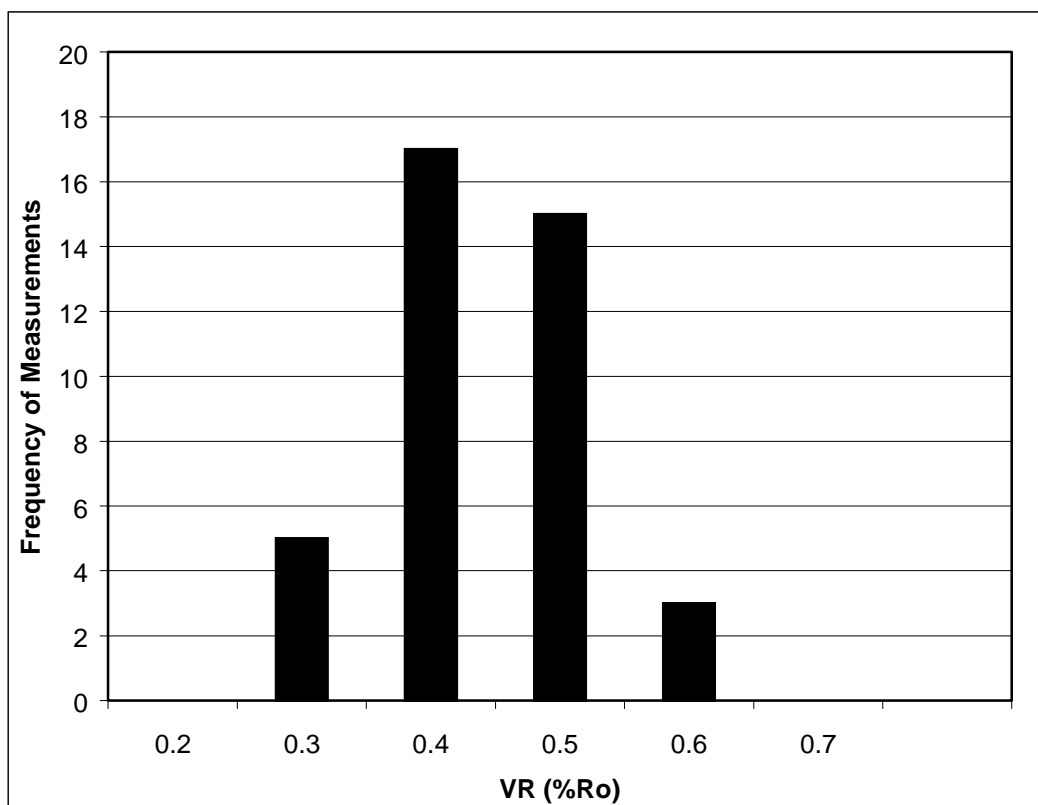
0.26	0.34	0.39	0.44		
0.26	0.34	0.39	0.44		
0.28	0.35	0.40	0.45		
0.28	0.35	0.40	0.49		
0.29	0.35	0.40	0.49		
0.30	0.35	0.41	0.49		
0.31	0.37	0.42	0.49		
0.32	0.37	0.43	0.52		
0.33	0.37	0.43	0.52		
0.34	0.39	0.43	0.52		

Number of meas: 40

Median: 0.39

Average: 0.39

Stand. Dev: 0.07



EXXON OCS-Y-0804 #1 (Orion)

Sample Depth: 4150-4420' Ditch

VR Measurements:

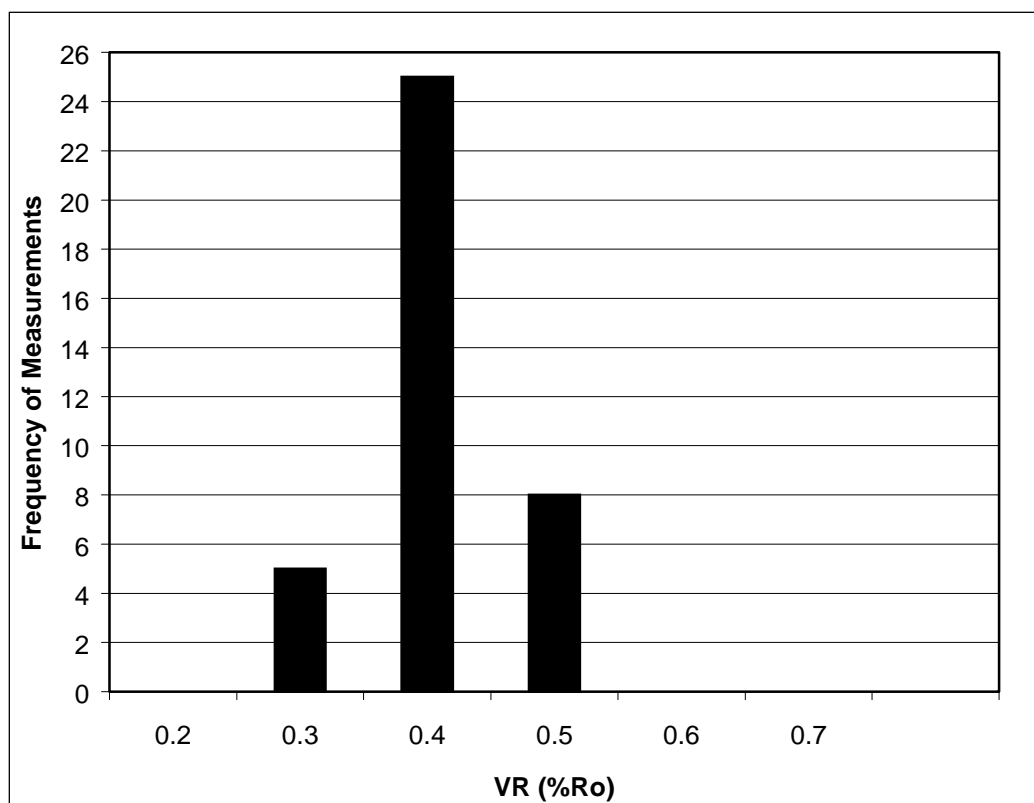
0.23	0.32	0.36	0.41		
0.27	0.32	0.36	0.42		
0.28	0.33	0.37	0.44		
0.29	0.33	0.37	0.44		
0.29	0.33	0.38	0.44		
0.30	0.35	0.38	0.44		
0.31	0.35	0.38	0.47		
0.31	0.35	0.39	0.49		
0.31	0.36	0.39			
0.31	0.36	0.39			

Number of meas: 38

Median: 0.36

Average: 0.36

Stand. Dev: 0.06



EXXON OCS-Y-0804 #1 (Orion)

Sample Depth: 5230-5500' Ditch

VR Measurements:

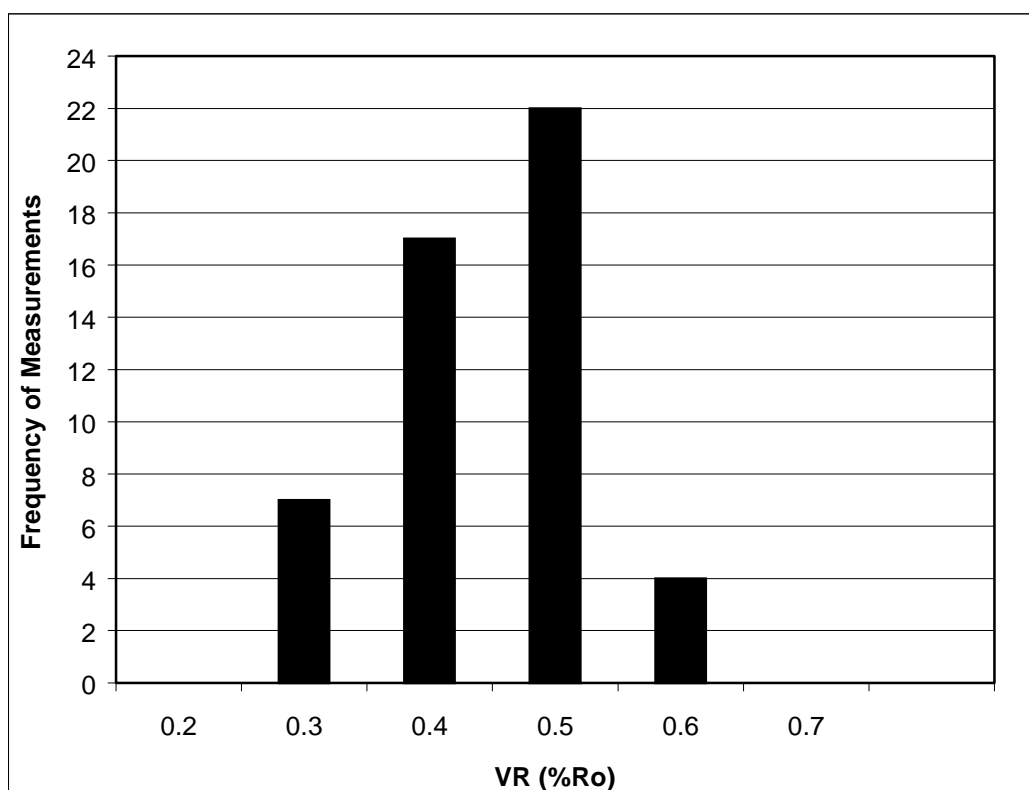
0.21	0.31	0.38	0.41	0.46	
0.24	0.32	0.38	0.41	0.46	
0.25	0.34	0.39	0.41	0.46	
0.27	0.35	0.39	0.43	0.47	
0.28	0.35	0.40	0.43	0.47	
0.29	0.36	0.40	0.43	0.49	
0.29	0.36	0.40	0.43	0.50	
0.30	0.37	0.41	0.44	0.51	
0.30	0.37	0.41	0.44	0.52	
0.30	0.38	0.41	0.45	0.56	

Number of meas: 50

Median: 0.40

Average: 0.39

Stand. Dev: 0.08



EXXON OCS-Y-0804 #1 (Orion)

Sample Depth: 6310-6580' Ditch

VR Measurements:

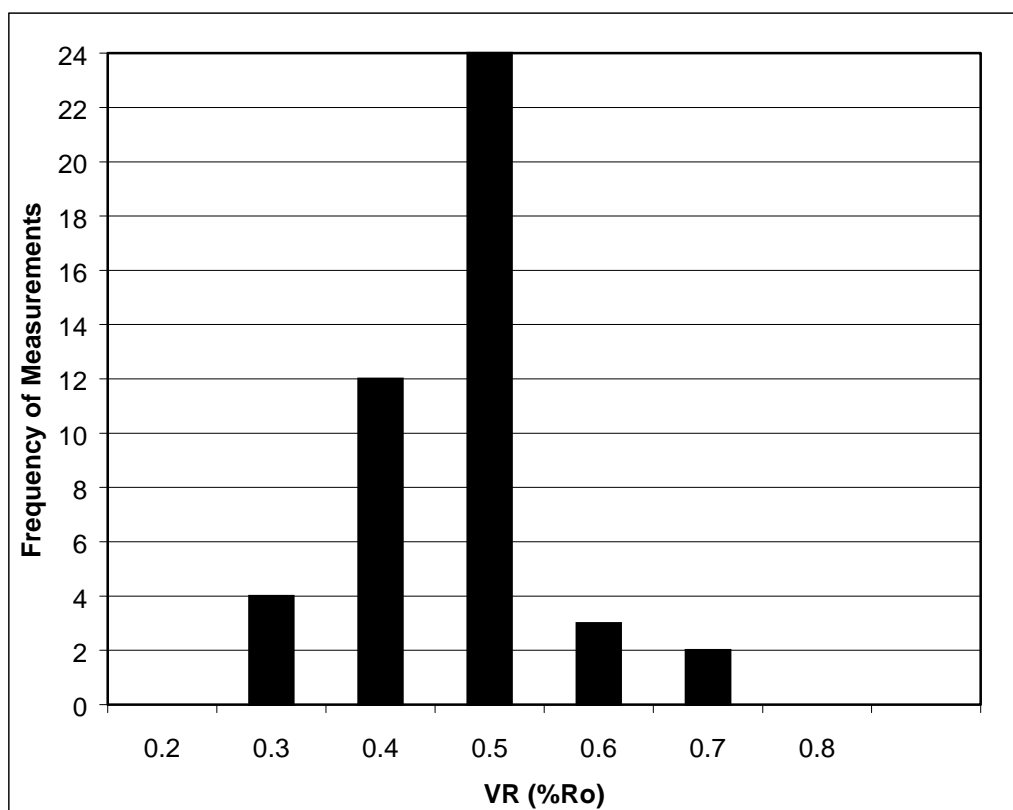
0.26	0.36	0.42	0.46	0.53	
0.28	0.38	0.42	0.46	0.55	
0.28	0.38	0.42	0.46	0.59	
0.29	0.38	0.43	0.47	0.64	
0.30	0.38	0.43	0.47	0.65	
0.30	0.39	0.43	0.49		
0.32	0.40	0.44	0.49		
0.34	0.40	0.44	0.49		
0.35	0.40	0.45	0.49		
0.36	0.41	0.45	0.49		

Number of meas: 45

Median: 0.42

Average: 0.42

Stand. Dev: 0.09



EXXON OCS-Y-0804 #1 (Orion)

Sample Depth: 6899-6950' Core

VR Measurements:

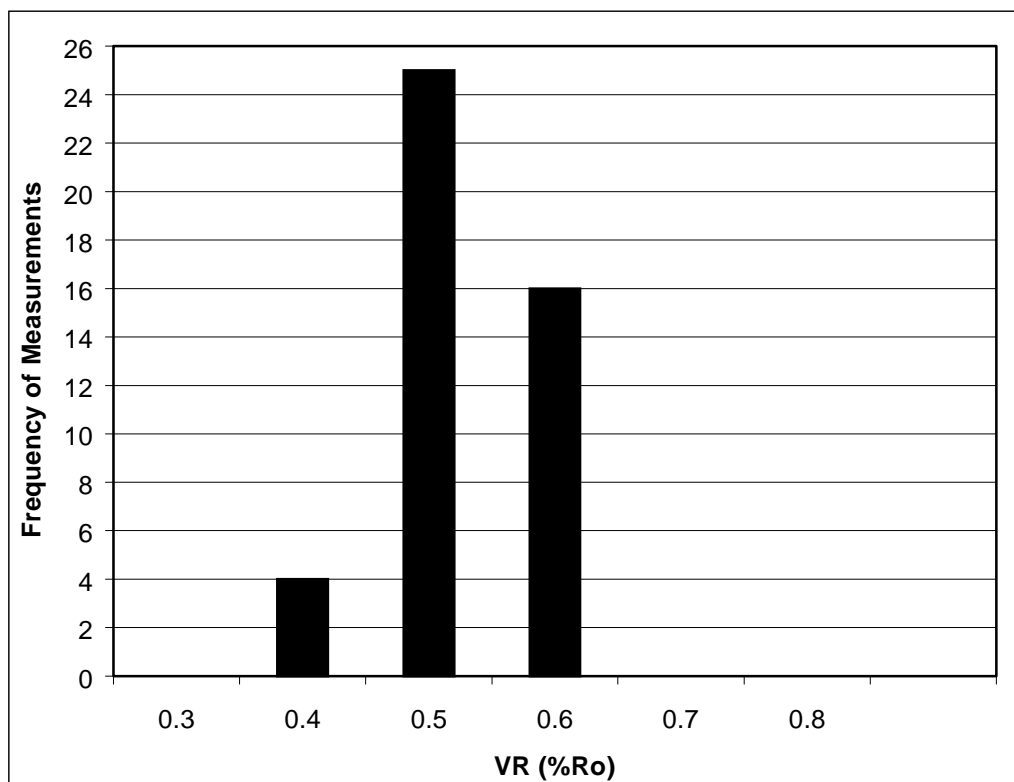
0.33	0.41	0.45	0.51	0.55	
0.37	0.41	0.46	0.51	0.55	
0.37	0.41	0.46	0.51	0.55	
0.39	0.42	0.46	0.52	0.55	
0.40	0.42	0.47	0.52	0.59	
0.40	0.43	0.48	0.52		
0.40	0.44	0.48	0.53		
0.40	0.44	0.48	0.54		
0.40	0.44	0.49	0.54		
0.41	0.45	0.50	0.54		

Number of meas: 45

Median: 0.46

Average: 0.46

Stand. Dev: 0.06



EXXON OCS-Y-0804 #1 (Orion)

Sample Depth: 7030-7063'Core

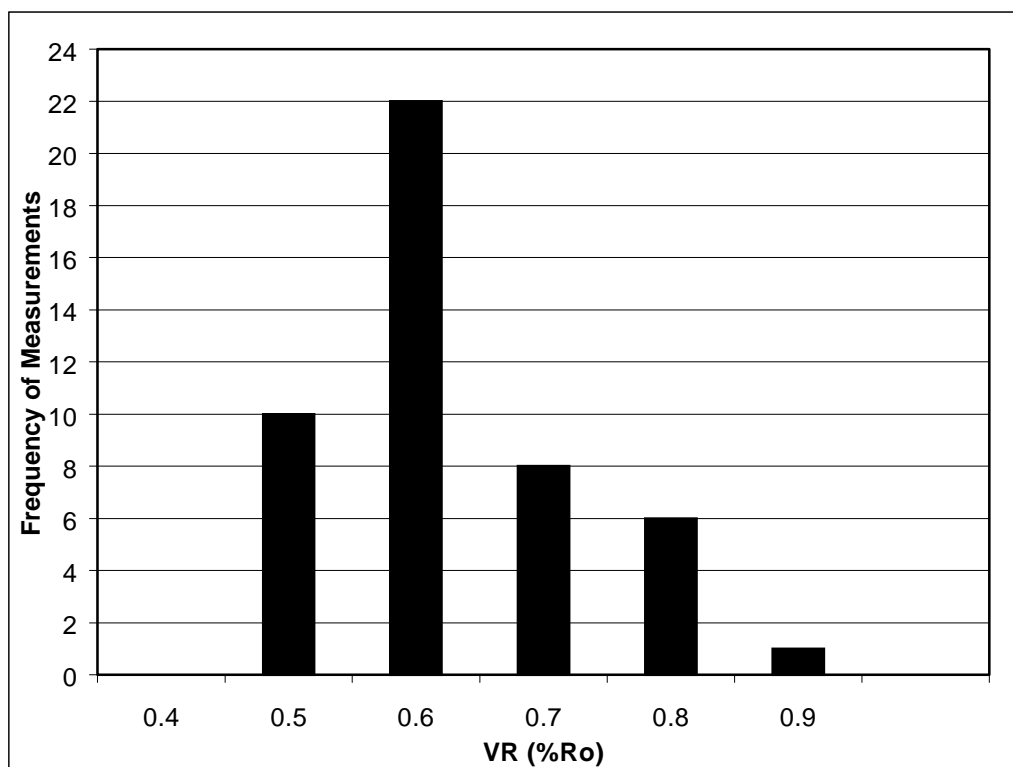
VR Measurements:

0.41	0.51	0.54	0.57	0.71	
0.41	0.52	0.54	0.58	0.73	
0.46	0.52	0.55	0.62	0.78	
0.47	0.52	0.56	0.64	0.78	
0.48	0.52	0.56	0.65	0.78	
0.48	0.53	0.57	0.66	0.79	
0.48	0.53	0.57	0.66	0.80	
0.49	0.53	0.57	0.67		
0.49	0.54	0.57	0.67		
0.49	0.54	0.57	0.68		

Number of meas: 47 **Median:** 0.56

Average: 0.58 **Stand. Dev:** 0.10

NOTE: This population is from Hauterivian interval (7030-40'C) in core composite.



EXXON OCS-Y-0804 #1 (Orion)

Sample Depth: 7030-7063' Core composite

VR Measurements:

0.81	0.97	1.01	1.11	1.22	1.42
0.82	0.97	1.02	1.11	1.23	1.46
0.90	0.97	1.03	1.12	1.25	1.47
0.91	0.98	1.04	1.12	1.26	
0.91	0.98	1.04	1.15	1.26	
0.92	0.98	1.07	1.15	1.32	
0.93	1.00	1.08	1.17	1.33	
0.94	1.00	1.09	1.17	1.36	
0.95	1.01	1.09	1.19	1.37	
0.97	1.01	1.10	1.21	1.38	

Number of meas: 53 **Median:** 1.08

Average: 1.10 **Stand. Dev:** 0.16

NOTE: This population is from argillitic interval (7041-63'C) in core composite.

