CONFIDENTIAL

GEOCHEMICAL FINAL WELL REPORT

ARCO EXPLORATION COMPANY

NORTH ALEUTIAN SHELF C.O.S.T. WELL NO. 1

SEPTEMBER 1982 - JANUARY 1983

EXPLORATION LOGGING INC. OF USA

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SUMMARY

The North Aleutian Shelf C.O.S.T. Well No. 1 was drilled in the southern Bering Sea of Alaska from September 13, 1982 to January 5, 1983. Geochemical evaluation was performed on 60 ft composite samples beginning at 1440 ft and continuing to 17155 ft (TD). Rock Eval pyrolysis and total organic carbon analysis were performed. Data turn-around time was typically 24 hours.

Wet, canned geochemical samples were washed, cleaned of contamination, and crushed to a fine powder prior to analysis. Coal cavings encountered virtually throughout the well presented the only contamination problem. Samples were generally analysed before the coal was removed and also after removal of the coal by flotation.

Due mainly to numerous coal seams, this well encountered many carbon-rich intervals. Most of this source material is gas prone with interspersed gas and oil prone intervals within the oil window. There is one short interval from 10530 ft to 10590 ft which contains good source material that appears to be oil prone, although slightly immature.

From 13380 ft to TD the geochemical parameters indicate that generation of hydrocarbons is occurring.

No significant accumulation of generated or free hydrocarbons were encountered in the samples analyzed from this well.

CONTENTS

1. INTRODUCTION

1.1 Well & Rig Data

COMPANY:	ARCO Exploration Company
WELL NAME:	North Aleutian Shelf C.O.S.T. #1
FIELD:	C.O.S.T. Well
LOCATION:	Bering Sea, Alaska
POSITION:	56° 16' 27.59" 161° 58' 32.99"
RIG/TYPE:	Sedco 708/Semi-Sub
CONTRACTORS:	Sedco Maritime
TOTAL DEPTH:	17155 ft.
DATE AT T.D.:	1/5/83

EXPLORATION LOGGING (USA) INC.

GEOCHEMICAL LABORATORY

EVALUATION BY: Tony Russ
Joe Roche
Debra Ayers

EVALUATION INTERVAL: 1440 ft to 17155 ft

EVALUATION DATES: September 20, 1982 to January 14, 1983

1.2 General

The North Aleutian Shelf C.O.S.T. Well No. 1 was drilled by ARCO Exploration Company in the Southern Bering Sea of Alaska from September 13, 1982 to January 5, 1983. Geochemical evaluation was performed on sample material received from the wellsite by Exploration Logging Inc. of USA at EXLOG's Geochemical Laboratory in Anchorage, Alaska.

1.3 Sampling Intervals

Canned, wet samples were collected at 60 ft intervals throughout the well beginning at 1390 ft and continuing to 17155 ft (TD). The 60 ft samples were a composite of six samples collected every 10 ft.

A total of 420 samples were analyzed. These consisted of 326 cuttings samples, 18 mud samples, 64 conventional core samples, and 12 sidewall core samples. All 420 samples underwent pyrolysis and total organic carbon analysis.

2. ANALYTICAL PROCEDURE

2.1 Sample Preparation

Wet canned samples were received from the wellsite at 60 ft intervals. The samples were sieve-washed with cold, clean water on a 100 mesh sieve to remove drilling mud and water-soluble mud additives. At this point, those insoluble contaminants which were easily separated from wet cuttings were removed. The samples were then air-dried at room temperature. Each sample was passed through an 8 mesh sieve to remove larger cavings. The samples were once again inspected for contamination under a binocular microscope and all visible contaminants removed. The samples were then crushed to a fine powder and placed in sealed plastic bags. At this stage, the samples were ready for pyrolysis.

To complete sample preparation for total carbon analysis, one gram of the crushed sample was heated at 60 C in approximately 50 ml of 3M hydrochloric acid to remove any carbonates (inorganic carbon source). When all carbonates were decomposed, the mixture was vacuum-filtered onto a glass fiber mat. The solid residue and the mat were washed with approximately 50 ml of clean water to remove any excess acid and then completely dried in a warm (80 C) oven. The dried material was then ready for total organic carbon analysis.

2.2 Contamination

Inorganic contaminants encountered in this well consisted of cement, iron filings, aluminum filings, and mica. Organic contaminants included lubra beads, rubber, paint, wood, pipe dope, rope fibers, and walnut shells. These contaminants generally were easily removed and therefore did not hinder geochemical analysis.

Coal and/or coal cavings were present in varying quantities in a large percentage of the samples from this well. The majority of samples from approximately 10080 ft to 17155 ft (TD) contained coal. Samples containing coal were generally analyzed twice. Analyses were first performed on these samples with the coal still present. The coal was then removed as much as possible by flotation in water and a second analysis performed. The data from the second analysis, with the coal removed, was generally used for the geochemical log. However, in several intervals (8370 - 8430, 8910 - 8970, 10590 - 10650, 12450 - 12510 and 17070 - 17130), the sudden appearance or increase in coal strongly suggested coal seams. In these intervals the first analyses, before the removal of the coal, were plotted on the geochemical log. These intervals are identified with a double asterik (**) in Section 4.2. Section 4.2 contains a tabulation of all analyses performed on samples before removal of the coal. The data from the second set of analyses, after removal of the coal, is included in the main body of data (Section 4.1).

2.3 Analytical Equipment

The EXLOG Geochemical Laboratory is equipped with a Leco CR12 Carbon Determinator and a Geocom Rock Eval II Source Rock Analyzer.

The oven temperature of the Leco CR12 was set at 2500°F. For most samples Leco's 12% standard was used for calibration. For coal samples and other rich samples Leco's 42% standard was used. Standard checks were run every 10 samples.

The following analytical cycle was used by the Rock Eval II:

Carrier Gas	Helium
Initial Isothermal Temperature	300° C
Isothermal Hold	3 Minutes
Temperature Ramp	25° C / minute
Final Isothermal Temperature	55°C
Final Isothermal Hold	1 minute
CO Trap Close	390°C

The Rock Eval was calibrated using EXLOG's EL-2 standard. Standard and blank calibration were run every 10 samples.

3. DISCUSSION OF GEOCHEMICAL PARAMETERS

The TOC data in section 4.1 is expressed in weight percent and represents the total organic carbon content of the samples.

The pyrolysis data is expressed in terms of:

S1	Free low temperature hydrocarbon yield (mg hydrocarbon/g rock)
S2	High temperature kerogen hydrocarbon yield (mg hydrocarbon/g rock)
S3	Organic CO_2 - Kerogen derived (mg CO_2/g rock)
Tmax	Temperature at which maximum emission of high temperature hydrocarbons (S2) occurs.
$\frac{S1}{S1+S2}$	Productivity Ratio
S2/S3	Hydrogen/Oxygen ratio (Kerogen type)
HI	Hydrogen Index (Kerogen type) $(\frac{S2}{TOC}) \times 100$
OI	Oxygen Index (Kerogen type) $(\frac{S3}{TOC}) \times 100$

The Rock Eval II pyrolysis instrument has a tendency to give less reliable Tmax values when the high temperature hydrocarbon yield (S2) is lower than approximately 0.20 mg/g. When the S2 values drop below approximately 0.10 mg/g there is often no recognizable peak in the emission of hydrocarbons generated during the S2 cycle. A tmax value of 0^{o} C is given when this occurs.

Several Tmax values for this well are in fact $0^{o}C$ and invariably the low S2 values corresponding to these samples are responsible for this 0^{o} C value. $0^{o}C$ is simply the default value given by the Rock Eval II when no S2 peak is recognized.

4. RESULTS

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4.1 Total Organic Carbon & Pyrolysis Data

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
1440			CEMENT CONTAMINATION						
1500	0.46	0.08	0.20	1.10	414	0.29	0.18	43	239
1560	0.20	0.05	0.05	0.54	*0	0.50	0.09	25	270
1620	0.26	0.07	0.07	0.44	413	0.50	0.16	27	169
1680	0.30	0.04	0.12	0.27	405	0.25	0.44	40	90
1740	0.15	0.08	0.02	0.44	*0	0.80	0.05	13	293
1800	0.28	0.11	0.07	0.50	420	0.61	0.14	25	179
1860	0.28	0.09	0.07	0.28	414	0.56	0.25	25	100
1920	0.27	0.08	0.07	0.17	416	0.53	0.41	26	63
1980	0.23	0.09	0.07	0.24	407	0.56	0.29	30	104
2000 (mud)	0.66	0.27	0.54	5.93	414	0.33	0.09	82	898
2040	0.50	0.12	0.16	0.51	427	0.43	0.31	32	102
2100	0.61	0.12	0.27	0.52	426	0.31	0.52	44	85
2160	0.60	0.12	0.24	0.92	411	0.33	0.26	40	153
2220	0.52	0.14	0.17	1.10	418	0.45	0.15	33	216
2280	0.12	0.09	0.00	0.00	*0	1.00	- -	0	0
2340	0.12	0.09	0.00	0.10	*0	1.00	0.00	0	83
2400	0.16	0.07	0.03	0.08	*0	0.70	0.38	21	50

* These Tmax values are 0 because with very low S2 values the pyrolysis instrument does not detect a peak and therefore does not provide a Tmax

4.1 Coal removed 16

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DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC}$ X 100 ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC}$ X 100 ($\frac{mg\ CO2}{g\ TOC}$)
2460	0.28	0.08	0.07	0.26	414	0.53	0.27	25	93
2520	0.26	0.09	0.08	0.63	418	0.53	0.13	31	242
2580	0.63	0.12	0.32	1.26	424	0.27	0.25	51	200
2640	0.74	0.09	0.31	1.42	425	0.23	0.22	42	192
2700	1.62	0.13	0.73	2.03	425	0.15	0.36	45	125
2760	1.40	0.13	0.46	1.98	419	0.22	0.23	33	141
2820	0.86	0.12	0.35	1.96	415	0.26	0.18	41	228
2880	0.53	0.07	0.14	1.57	424	0.33	0.09	26	296
2940	1.64	0.10	0.70	3.97	424	0.13	0.18	43	242
3000	1.61	0.16	0.86	7.19	418	0.16	0.12	53	447
3000 (mud)	0.74	0.19	0.48	4.44	416	0.28	0.11	65	600
3060	1.71	0.20	0.94	5.49	422	0.18	0.17	55	321
3120	2.11	0.17	1.23	4.08	420	0.12	0.30	58	193
3180	1.49	0.14	0.98	4.26	418	0.13	0.23	66	286
3240	1.39	0.29	0.81	3.74	412	0.26	0.22	258	269
3300	1.96	0.24	1.47	4.10	423	0.14	0.36	75	209
3360	2.98	0.25	2.69	4.53	424	0.09	0.59	90	152
3420	1.27	0.17	0.76	3.62	427	0.18	0.21	60	285
3480 ✓	1.72	0.20	1.22	7.56	423	0.14	0.16	71	440
3540 ✓	1.29	0.14	0.81	6.53	422	0.15	0.12	63	506

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4.1: Coal removed

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LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
3600	1.18	0.12	0.75	3.09	426	0.14	0.24	64	262
3660	1.91	0.16	1.46	5.50	423	0.10	0.27	76	288
3720	3.46	0.16	2.28	8.18	420	0.07	0.28	66	236
3780	1.70	0.14	1.05	5.24	425	0.12	0.20	62	308
3840	2.00	0.14	1.35	5.91	423	0.09	0.23	68	296
3900	0.78	0.09	0.32	2.68	429	0.22	0.12	41	344
3960	0.50	0.08	0.15	1.93	428	0.35	0.08	30	386
4000 (mud)	0.85	0.29	0.98	4.07	412	0.23	0.24	115	479
4020	0.87	0.10	0.38	2.50	429	0.21	0.15	44	287
4080	1.13	0.09	0.58	1.99	428	0.13	0.29	51	176
4140	0.98	0.13	0.47	2.13	418	0.22	0.18	48	217
4200	0.43	0.07	0.14	0.93	404	0.33	0.15	33	216
4260	0.21	0.05	0.01	0.42	*0	0.83	0.02	5	200
4320	0.09	0.04	0.00	0.24	*0	1.00	0.00	0	267
4380	0.11	0.07	0.00	0.39	*0	1.00	0.00	0	355
4440	0.24	0.07	0.05	0.74	*0	0.58	0.06	21	308
4500	0.42	0.06	0.08	0.64	*0	0.43	0.13	19	152
4560	0.41	0.08	0.08	0.71	422	0.50	0.11	20	173
4620	0.43	0.05	0.08	0.73	424	0.38	0.11	19	170

4,1: Coal Removed

* These values are 0 because with very low S2 values the pyrolysis instrument does not detect a peak and therefore does not provide a Tmax.

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
4680	0.69	0.05	0.19	0.93	428	0.21	0.20	28	135
4740	0.77	0.07	0.17	1.13	427	0.29	0.15	22	147
4800	0.81	0.04	0.21	1.40	429	0.16	0.15	26	173
4860	0.76	0.13	0.40	1.57	431	0.25	0.25	53	207
4920	0.82	0.14	0.40	1.67	433	0.26	0.24	49	204
4980	0.53	0.11	0.25	1.57	431	0.31	0.16	47	296
5000 (mud)	1.06	0.43	0.71	8.30	422	0.38	0.09	67	783
5040	1.02	0.08	0.43	1.94	431	0.16	0.22	42	190
5100	1.24	0.10	0.50	1.78	437	0.17	0.28	40	144
5160	1.22	0.06	0.53	1.84	433	0.10	0.29	43	151
5220	1.31	0.07	0.50	1.84	432	0.12	0.27	38	140
5280	1.12	0.10	0.54	1.95	433	0.16	0.28	48	174
5340	0.67	0.07	0.26	1.44	422	0.21	0.18	39	215
5400	0.26	0.06	0.08	0.94	425	0.43	0.09	31	362
5460	0.35	0.06	0.11	0.96	429	0.35	0.11	31	274
5520	0.24	0.10	0.16	0.64	0	0.38	0.25	67	267
5580	0.12	0.10	0.00	0.27	0	1.00	0.00	0	225
5640	0.18	0.13	0.00	1.14	0	1.00	0.00	0	633
5700	0.18	0.18	0.00	0.43	0	1.00	0.00	0	239

4,1's Coal Removed

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DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
5760	0.08	0.08	0.00	0.25	0	1.00	0.00	0	313
5820	0.11	0.17	0.00	0.33	0	1.00	0.00	0	300
5880	0.06	0.12	0.00	0.76	0	1.00	0.00	0	1267
5940	0.08	0.09	0.00	0.36	0	1.00	0.00	0	450
6000	0.22	0.08	0.03	0.37	0	0.73	0.08	14	168
6000 (mud)	0.85	0.26	0.46	3.29	*408	0.36	0.14	54	387
6060	0.08	0.13	0.00	0.20	0	1.00	0.00	0	250
6120	0.07	0.17	0.00	0.32	0	1.00	0.00	0	457
6180	0.12	0.05	0.00	0.32	0	1.00	0.00	0	267
6240	0.11	0.07	0.00	0.38	0	1.00	0.00	0	345
6300	0.11	0.06	0.00	0.29	0	1.00	0.00	0	264
6360	0.05	0.12	0.00	0.35	0	1.00	0.00	0	700
6420	0.10	0.12	0.00	0.29	0	1.00	0.00	0	290
6480	0.14	0.04	0.00	0.50	0	1.00	0.00	0	357
6540	0.16	0.04	0.00	0.13	0	1.00	0.00	0	81
6600	0.09	0.06	0.00	0.10	0	1.00	0.00	0	111
6660	0.09	0.08	0.11	0.08	0	0.42	1.38	122	89
6720	0.09	0.06	0.00	0.13	0	1.00	0.00	0	144
6780	0.07	0.08	0.00	0.13	0	1.00	0.00	0	186
6840	0.07	0.08	0.00	0.11	0	1.00	0.00	0	157

*These samples had depressed Tmax values due to a contaminant we could not remove.

Coal Removed

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
6900	0.06	0.05	0.00	0.10	0	1.00	0.00	0	167
6960	0.16	0.08	0.00	0.20	0	1.00	0.00	0	125
7000 (mud)	0.51	0.09	0.18	0.71	*373	0.33	0.25	35	139
7020	0.10	0.07	0.00	0.07	0	1.00	0.00	0	70
7080	0.21	0.07	0.00	0.13	0	1.00	0.00	0	62
7140	0.45	0.06	0.12	0.33	431	0.33	0.36	27	73
7200	0.41	0.04	0.08	0.46	*412	0.33	0.17	20	112
7260	0.40	0.06	0.12	0.33	428	0.33	0.36	30	83
7320	0.09	0.05	0.00	0.11	0	1.00	1.00	0	122
7380	0.10	0.06	0.00	0.00	0	1.00	- -	0	0
7440	0.06	0.10	0.11	0.08	0	0.48	1.38	183	133
7500	0.15	0.06	0.00	0.03	0	1.00	0.00	0	20
7560	0.17	0.05	0.02	0.19	0	0.71	0.11	12	112
7620	0.11	0.08	0.03	0.11	0	0.73	0.27	27	100
7680	0.13	0.13	0.02	0.21	0	0.87	0.10	15	162
7740	0.15	0.16	0.05	0.49	429	0.76	0.10	33	327
7830	0.12	0.12	0.03	0.43	0	0.80	0.07	25	358
7890	0.13	0.09	0.03	0.28	0	0.75	0.11	23	215

*These samples had depressed Tmax values due to a contaminant we could not remove.

4,1: Coal Removed

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EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
7950	0.35	0.15	0.18	0.67	427	0.45	0.27	51	191
8000 (mud)	6.28	3.58	6.32	8.64	422	0.37	0.73	101	138
8010	0.78	0.09	0.49	0.88	431	0.16	0.56	63	113
8070	0.62	0.11	0.40	0.77	432	0.22	0.52	65	124
8130	0.81	0.15	0.54	1.00	434	0.22	0.54	67	123
8190	0.31	0.16	0.31	0.74	435	0.34	0.42	100	239
8250	0.48	0.04	0.34	0.55	428	0.11	0.62	71	115
8310	1.10	0.07	1.23	0.84	425	0.05	1.46	112	76
8370	2.52	0.10	3.34	0.94	428	0.03	3.55	133	37
8430	1.11	0.07	0.93	1.13	432	0.07	0.45	84	102
8490	1.23	0.08	1.01	1.37	432	0.07	0.74	82	111
8550	0.84	0.06	0.61	1.01	433	0.09	0.61	73	120
8610	0.80	0.07	0.60	1.08	432	0.10	0.56	75	135
8670	0.76	0.05	0.55	1.13	431	0.08	0.49	72	149
8730	0.72	0.07	0.55	0.78	430	0.11	0.71	76	108
8790	0.77	0.05	0.65	0.72	431	0.07	0.90	84	94
8850	0.55	0.06	0.41	0.63	432	0.13	0.65	75	115
8910	0.74	0.07	0.62	0.86	429	0.10	0.72	84	116
8970	0.69	0.10	0.70	0.74	429	0.13	0.95	101	107

4.1; Coal Removed

4.1

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EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
9000 (mud)	1.40	0.40	1.25	3.60	424	0.24	0.35	89	257
9030	0.30	0.08	0.26	0.68	427	0.24	0.38	87	227
9090	0.62	0.11	0.62	1.35	429	0.15	0.46	100	218
9150	0.41	0.14	0.31	0.88	430	0.31	0.35	76	215
9210	0.45	0.13	0.37	1.19	430	0.26	0.31	82	264
9270	0.69	0.10	0.69	1.22	429	0.13	0.57	100	177
9330	0.77	0.17	0.76	1.02	432	0.18	0.75	99	132
9390	0.49	0.14	0.43	0.99	431	0.25	0.43	88	202
9450	0.32	0.14	0.21	0.69	429	0.40	0.30	66	216
9500 (mud)	0.55	0.17	0.45	0.85	429	0.27	0.53	82	155
9510	0.32	0.11	0.20	0.58	430	0.35	0.34	63	181
9570	0.60	0.08	0.49	0.50	433	0.14	0.98	82	83
9630	0.68	0.12	0.44	0.72	433	0.21	0.61	65	106
9690	0.84	0.18	0.77	1.03	432	0.19	0.75	92	123
9750	0.56	0.13	0.29	0.71	432	0.31	0.41	52	127
9810	0.66	0.13	0.59	0.95	429	0.18	0.62	89	144
9870	0.52	0.19	0.34	0.63	430	0.36	0.54	65	121
9930	0.48	0.14	0.33	0.59	429	0.30	0.56	69	123
9990	0.69	0.11	0.51	0.88	432	0.18	0.58	74	128

4.1: Coal Removed

17

20

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
10000 (mud)	1.28	0.54	1.19	2.91	430	0.31	0.41	93	227
10050	0.55	0.13	0.29	0.78	427	0.31	0.37	53	142
10110	0.40	0.08	0.23	0.80	429	0.26	0.29	58	200
10170	0.40	0.11	0.22	0.70	432	0.33	0.31	55	175
10230	0.37	0.08	0.25	0.80	429	0.24	0.31	68	216
10290	0.30	0.09	0.17	0.66	430	0.35	0.26	57	220
10350	0.96	0.10	0.80	1.16	432	0.11	0.69	83	121
10410	0.24	0.08	0.12	0.39	429	0.40	0.31	50	163
10470	0.88	0.21	0.82	0.87	434	0.20	0.94	93	99
10500 (mud)	1.17	0.21	1.87	1.00	436	0.10	1.87	160	85
10530	1.09	0.12	1.73	0.73	433	0.06	2.37	159	67
10590	0.90	0.15	4.05	0.76	430	0.04	5.33	450	84
10650	0.76	0.09	1.51	0.42	435	0.06	3.60	199	55
10710	0.40	0.11	0.60	0.67	434	0.15	0.90	150	168
10770	0.46	0.15	0.49	0.81	435	0.23	0.60	107	176
10830	0.80	0.14	1.37	0.81	437	0.09	1.69	171	101
10890	1.19	0.10	1.72	1.06	437	0.05	1.62	145	89
10950	3.14	0.08	2.81	3.60	436	0.03	0.78	89	115
11000 (mud)	2.50	0.84	1.75	9.34	428	0.32	0.19	70	374

4.1' Coal Removed

16

21

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
11010	0.87	0.07	0.78	0.97	438	0.08	0.80	90	111
11070	1.52	0.08	1.41	2.12	438	0.05	0.67	93	139
11130	1.49	0.08	1.32	1.13	438	0.06	1.17	89	76
11190	2.89	0.10	3.58	1.59	436	0.03	2.25	124	55
11250	4.24	0.17	8.52	1.59	433	0.02	5.36	201	38
11310	3.32	0.14	5.81	1.63	434	0.02	3.56	175	49
11370	1.49	0.08	1.93	1.20	438	0.04	1.61	130	81
11430	0.65	0.12	0.61	1.04	437	0.16	0.59	94	160
11490	1.32	0.20	1.47	1.20	436	0.12	1.23	111	91
11550	1.17	0.15	1.53	0.93	436	0.09	1.65	131	79
11610	0.99	0.19	1.26	0.99	437	0.13	1.27	127	100
11670	1.13	0.09	1.01	0.85	436	0.08	1.19	89	75
11730	1.30	0.16	1.50	0.67	438	0.10	2.24	115	52
11790	0.97	0.14	0.80	0.69	439	0.15	1.16	82	71
11850	1.08	0.16	1.13	1.03	439	0.12	1.10	105	95
11910	1.70	0.18	2.53	1.09	435	0.07	2.32	149	64
11970	2.41	0.26	4.04	0.72	436	0.06	5.61	168	30
12000 (mud)	2.91	2.69	4.84	8.95	430	0.36	0.54	166	308
12030	1.95	0.21	3.00	0.64	438	0.07	4.69	154	33
12090	1.15	0.10	1.24	0.50	437	0.07	2.48	108	43

4,11 Coal Removed.

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
12150	1.01	0.12	1.25	0.64	436	0.09	1.95	124	63
12210	0.69	0.14	0.94	0.55	437	0.13	1.71	136	80
12270	1.21	0.11	1.42	0.68	439	0.07	2.09	117	56
12330	0.89	0.08	0.71	0.78	440	0.10	0.91	80	88
12390	1.03	0.16	1.10	0.87	440	0.13	1.26	107	84
12450	1.80	0.17	2.42	1.16	437	0.07	2.09	134	64
12500 (mud)	2.75	2.59	4.83	7.34	433	0.35	0.66	176	267
12510	0.60	0.15	0.57	0.67	437	0.21	0.85	95	112
12570	0.87	0.15	1.20	0.60	437	0.11	2.00	138	69
12630	2.15	0.18	3.64	0.70	436	0.05	5.20	169	33
12690	1.36	0.13	1.64	0.92	437	0.07	1.78	121	68
12750	1.65	0.19	2.37	0.88	437	0.07	2.69	144	53
12810	1.49	0.14	1.87	0.67	439	0.07	2.79	126	45
12870	1.45	0.15	1.79	0.95	438	0.08	1.88	123	66
12930	1.84	0.23	3.60	0.57	438	0.06	6.32	196	31
12990	1.56	0.18	2.35	0.90	436	0.07	2.61	151	58
13050	0.92	0.15	0.75	1.08	438	0.17	0.69	82	117
13110	1.51	0.18	2.02	1.06	439	0.08	1.91	134	70
13170	1.43	0.18	1.89	0.98	439	0.09	1.93	132	69
13230	1.43	0.14	2.42	0.52	438	0.05	4.65	169	36
13290	1.33	0.15	2.10	0.59	438	0.07	3.56	158	44

4.1: Coal Removed

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
13350	2.88	0.42	6.01	0.62	436	0.07	9.69	209	22
13410	4.34	0.67	11.67	0.99	434	0.05	11.79	269	23
13470	2.46	0.45	6.41	0.55	436	0.07	11.65	261	22
13530	2.67	0.48	6.24	0.37	436	0.07	16.86	234	14
13590	1.79	0.21	2.61	0.44	435	0.07	5.93	146	25
13650	2.86	0.34	5.18	0.39	439	0.06	13.28	181	14
13710	1.59	0.18	2.10	0.43	438	0.08	4.88	132	27
13770	1.30	0.14	1.53	0.47	440	0.08	3.26	118	36
13830	4.22	0.64	7.83	1.14	437	0.08	6.87	186	27
13890	1.26	0.16	1.59	0.56	438	0.09	2.84	126	44
13950	2.22	0.44	3.95	0.75	442	0.10	5.27	178	34
14000 (mud)	3.38	2.32	6.58	6.59	433	0.26	1.00	195	195
14010	2.39	0.51	4.63	0.48	442	0.10	9.65	194	20
14070	3.14	0.59	6.83	0.52	440	0.08	13.13	218	17
14130	1.90	0.33	3.21	0.46	443	0.09	6.98	169	24
14190	2.93	0.49	6.04	0.43	441	0.08	14.05	206	15
14250	2.92	0.70	7.23	0.28	435	0.09	25.82	248	10
14310	3.12	0.83	7.92	0.27	438	0.09	29.33	254	9
14370	1.11	0.30	1.70	0.36	442	0.15	4.72	153	32
14430	3.05	0.58	5.46	0.57	438	0.10	9.58	179	19
14490	3.69	0.75	8.29	0.68	440	0.08	12.19	225	18

4.1 = Coal Removed

24

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
14550	3.32	0.63	6.34	0.50	442	0.09	12.68	191	15
14610	1.47	0.31	2.09	0.38	442	0.13	5.50	142	26
14670	4.90	1.04	11.20	0.51	440	0.08	21.96	229	10
14730	6.15	1.40	15.17	0.76	440	0.08	19.96	247	12
14790	2.61	0.65	5.12	0.48	443	0.11	10.67	196	18
14850	1.48	0.34	2.38	0.47	444	0.13	5.06	161	32
14910	2.63	0.52	5.12	0.54	444	0.09	9.48	195	21
14970	3.40	0.73	7.67	0.40	443	0.09	19.18	226	12
15000 (mud)	3.61	2.32	6.58	7.05	435	0.26	0.93	182	195
15030	2.38	0.55	4.54	0.25	443	0.11	18.16	191	11
15090	1.90	0.46	3.38	0.25	446	0.12	13.52	178	13
15150	2.45	0.61	5.20	0.25	444	0.10	20.80	212	10
15210	1.89	0.45	3.56	0.21	445	0.11	16.95	188	11
15270	3.16	0.78	5.50	0.42	438	0.12	13.10	174	13
15330	2.21	0.52	3.09	0.40	440	0.14	7.73	140	18
15390	1.29	0.33	1.39	0.38	442	0.19	3.66	108	29
15450	1.49	0.35	1.70	0.35	444	0.17	4.86	114	23
15510	1.65	0.48	1.94	0.30	439	0.20	6.47	118	18
15570	1.55	0.43	1.83	0.32	441	0.19	5.72	118	21
15630	2.52	0.61	3.71	0.33	441	0.14	11.24	147	13
15690	2.64	0.58	3.49	0.41	442	0.14	8.51	132	16

4.1: Coal Removed

25

EXLOG
GEOCHEMICAL
LABORATORY

DATE: _____

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
15750	1.81	0.42	1.96	0.34	442	0.18	5.76	108	19
15810	1.05	0.27	0.76	0.57	447	0.26	1.33	72	54
15870	1.05	0.28	0.84	0.38	447	0.25	2.21	80	36
15930	0.95	0.26	0.64	0.33	449	0.29	1.94	67	35
15990	1.50	0.39	1.56	0.30	445	0.20	5.20	104	20
16000 (mud)	3.15	2.42	5.35	5.32	431	0.31	1.01	170	169
16050	1.01	0.33	1.09	0.52	453	0.23	2.10	108	51
16110	1.35	0.51	1.55	0.93	452	0.25	1.67	115	69
16170	1.39	0.56	1.46	1.15	454	0.28	1.27	105	83
16230	1.50	0.73	1.53	1.56	457	0.32	0.98	102	104
16290	1.73	0.88	1.86	1.12	458	0.32	1.66	108	65
16350	1.68	1.02	1.98	1.17	457	0.34	1.69	118	70
16410	1.37	0.96	1.56	0.92	456	0.38	1.70	114	67
16470	1.07	0.68	1.22	0.78	456	0.36	1.56	114	73
16530	1.44	0.94	1.60	1.28	456	0.37	1.25	111	89
16590	1.57	0.99	1.78	1.45	458	0.36	1.21	112	92
16650	1.75	1.43	2.11	1.00	457	0.40	2.11	121	57
16710	1.30	0.44	1.01	1.07	452	0.30	0.94	78	82
16770	1.31	0.46	1.16	0.82	460	0.28	1.41	89	63
16830	2.60	0.82	2.29	1.01	460	0.26	2.27	88	39

4.1% Coal Removed

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
16890	2.07	0.54	1.69	1.79	460	0.24	0.94	82	86
16950	3.33	1.07	3.18	1.33	465	0.25	2.39	95	40
17010	2.65	1.15	2.98	1.24	462	0.28	2.40	112	47
17070	2.63	1.10	2.47	1.38	465	0.31	1.79	94	52
17130	5.09	1.93	5.62	1.61	464	0.26	3.49	110	32
17155	2.21	0.79	2.27	1.62	468	0.26	1.40	103	73
17155 (mud)	1.62	2.45	2.47	3.01	433	0.50	0.82	152	186

4,1: Coal Removed

4.2 Data From S s Containing Coal

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
3480	4.00	0.16	2.63	9.01	421	0.06	0.29	66	225
3450 3540?	2.35	0.13	1.56	7.38	419	0.08	0.21	66	314
3600	4.19	0.17	3.33	3.75	416	0.05	0.89	79	92
3660	3.68	0.17	3.07	5.05	427	0.05	0.61	83	137
3720	6.47	0.23	4.95	8.51	416	0.04	0.58	77	132
3780	4.87	0.18	3.43	7.12	416	0.05	0.48	70	146
3840	3.31	0.15	2.26	6.46	424	0.06	0.35	68	195
3900	2.05	0.10	1.05	4.52	427	0.09	0.23	51	220
3960	2.21	0.10	1.19	3.14	431	0.08	0.38	54	142
4020	2.07	0.10	0.96	3.05	430	0.09	0.31	46	147
4080	2.10	0.08	1.11	2.16	430	0.07	0.51	53	103
4140	1.65	0.14	0.90	2.76	429	0.13	0.33	55	167
4200	0.85	0.16	0.31	1.22	420	0.34	0.25	36	144
4260	0.67	0.26	0.31	1.03	423	0.46	0.30	46	154
4320	0.28	0.21	0.07	0.63	*0	0.75	0.11	25	225
4380	0.35	0.06	0.06	0.72	*0	0.50	0.08	17	206
4440	0.63	0.05	0.16	0.90	420	0.24	0.18	25	143
7560	2.96	0.20	3.24	0.87	425	0.06	3.72	109	29
7620	1.00	0.11	0.58	0.72	431	0.16	0.81	58	72
7680	0.81	0.14	0.48	0.46	433	0.23	1.04	59	57
7740	0.84	0.10	0.60	0.63	429	0.14	0.95	71	75

*These values are 0 because with very low S2 values the pyrolysis instrument does not detect a peak and therefore does not provide a Tmax.

4.2: Coal-Bearing Samples

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
7830	0.89	0.15	0.59	0.56	429	0.20	1.05	66	63
7890	1.20	0.15	0.87	0.68	430	0.15	1.28	73	57
8430**	2.18	0.12	2.32	1.71	430	0.05	1.36	106	78
8490	2.09	0.12	2.36	1.94	430	0.05	1.22	113	93
8550	1.21	0.07	1.08	1.44	431	0.06	0.75	89	119
8610	1.05	0.10	1.01	1.36	433	0.09	0.74	96	130
8670	1.89	0.14	2.21	1.51	431	0.06	1.46	117	80
8730	2.64	0.10	3.01	1.23	431	0.03	2.45	114	47
8790	1.55	0.12	1.62	1.06	434	0.07	1.53	105	68
8850	1.35	0.10	1.45	1.28	433	0.06	1.13	107	95
8910	3.03	0.15	3.08	1.33	430	0.05	2.32	102	44
8970**	22.77	0.85	50.50	2.90	412	0.02	17.41	222	13
9030	2.74	0.15	3.79	1.49	430	0.04	2.54	138	54
9090	1.43	0.10	1.54	1.27	432	0.06	1.21	108	89
9150	1.30	0.10	1.24	1.18	433	0.07	1.05	95	91
9210	0.91	0.10	0.83	1.01	432	0.11	0.82	91	111
9270	1.05	0.18	0.93	1.31	432	0.16	0.71	89	125
9330	1.41	0.17	1.38	1.11	429	0.11	1.24	98	79
9390	0.87	0.13	0.76	0.87	432	0.15	0.87	87	100
9450	0.68	0.16	0.50	0.62	432	0.24	0.81	74	91
9510	0.63	0.13	0.47	0.86	429	0.22	0.55	75	137

** Plotted on geochemical log

4.2 ± Cacl-Barite Samples

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
10650**	2.76	0.20	5.93	0.70	430	0.03	8.47	215	25
10710	0.84	0.15	1.04	0.93	436	0.13	1.12	124	111
10770	0.78	0.10	0.88	0.95	435	0.10	0.93	113	122
10830	1.58	0.15	2.30	1.16	437	0.06	1.98	146	73
12510**	4.08	0.25	4.55	2.77	434	0.05	1.64	112	68
12570	6.04	0.66	15.82	1.39	426	0.04	11.38	262	23
12630	9.32	0.99	25.24	2.70	424	0.04	9.35	271	29
12810	5.31	0.41	11.70	0.93	431	0.03	12.58	220	18
12870	5.50	0.51	14.31	0.65	431	0.03	22.02	260	12
12930	6.97	0.77	22.71	0.62	429	0.03	36.63	326	9
12990	4.26	0.38	9.13	1.03	431	0.04	8.86	214	24
13110	5.71	0.55	13.10	2.42	429	0.04	5.41	229	42
13170	4.38	0.43	10.72	1.21	430	0.04	8.86	245	28
13230	6.24	0.62	17.93	0.64	428	0.03	28.02	287	10
13290	3.97	0.43	10.67	0.57	431	0.04	18.72	269	14
13410	9.96	2.01	35.45	1.01	432	0.05	35.10	356	10
13470	4.14	0.92	12.07	1.15	434	0.07	10.50	292	28
17130**	11.50	4.13	17.58	1.15	462	0.19	15.29	153	10

** Plotted on geochemical log

4.2% Coal-bearing samples

30

16

4.3 Data From Conventional Core Analysis

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf COST #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
Core #2									
4193.8	0.35	0.10	0.08	0.62	418	0.56	0.13	23	177
Core #7									
8060.5	4.29	0.25	5.44	1.57	432	0.04	3.46	127	37
8068.4	0.56	0.06	0.21	0.19	425	0.22	1.11	38	34
8078.2	1.06	0.08	0.81	0.54	432	0.09	1.50	76	51
8088.0	0.81	0.07	0.42	0.23	426	0.14	1.83	52	28
8092.7	1.67	0.10	1.85	0.66	435	0.05	2.80	111	40
Core #8									
8630.8	1.10	0.08	0.89	0.37	435	0.08	2.41	81	34
8633.0	0.86	0.11	0.75	0.64	429	0.13	1.17	87	74
8645.4	0.63	0.06	0.34	0.60	442	0.15	0.57	54	95
8654.3	0.75	0.11	0.74	0.67	430	0.13	1.10	99	89
Core #9									
9255.4	0.69	0.14	0.38	0.21	429	0.27	1.81	55	30
9257.8	0.92	0.24	0.51	0.41	429	0.32	1.24	55	45
9264.6	0.94	0.17	0.71	0.52	431	0.19	1.37	76	55
9266.0	0.82	0.09	0.53	0.23	432	0.15	2.30	65	28

4.3: Conventional Cores

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf COST #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
Core #10									
9959.4	0.30	0.10	0.11	0.23	425	0.48	0.48	37	77
9962.3	0.38	0.14	0.17	0.43	426	0.45	0.40	45	113
9977.0	0.46	0.14	0.18	0.73	426	0.44	0.25	39	159
9982.8	0.46	0.14	0.22	0.83	423	0.39	0.27	48	180
Core #11									
10326.0	0.18	0.12	0.07	0.39	423	0.63	0.18	39	217
10333.0	0.12	0.18	0.09	0.39	425	0.67	0.23	75	325
10335.9	0.06	0.06	0.03	0.13	0	0.67	0.23	50	217
Core #12									
10731.5	0.46	0.07	0.26	1.44	434	0.21	0.18	57	313
10733.0	0.27	0.08	0.24	1.99	430	0.25	0.12	89	737
10735.6	0.19	0.07	0.08	2.13	430	0.47	0.04	42	1121
10738.8	4.33	0.32	5.53	3.11	428	0.05	1.78	128	72
10740.2	0.82	0.15	0.61	6.07	433	0.20	0.10	74	740
Core #13									
11084.9	0.08	0.06	0.03	0.14	0	0.67	0.21	38	175
11088.0	0.44	0.07	0.17	0.61	435	0.29	0.28	39	139
11098.3	0.53	0.07	0.22	0.98	435	0.24	0.22	42	185
11103.6	0.17	0.08	0.07	0.75	436	0.53	0.09	41	441

4,3': Canvas Pond Core 32

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf COST #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
Core #14									
12250.8	3.40	0.18	5.33	0.69	440	0.03	7.72	157	20
12258.5	1.33	0.10	1.20	1.02	438	0.08	1.18	90	77
12262.2	1.12	0.14	1.41	1.03	433	0.09	1.37	126	92
12264.7	0.81	0.11	0.63	1.82	433	0.15	0.35	78	225
12266.0	1.30	0.12	1.02	2.99	437	0.11	0.34	78	230
12269.6	2.41	0.19	3.48	1.22	438	0.05	2.85	144	51
Core #15									
12632.0	0.57	0.12	0.72	1.73	434	0.14	0.42	126	304
12635.2	1.25	0.17	1.73	1.91	436	0.09	0.91	138	153
12638.2	0.09	0.07	0.06	1.34	424	0.54	0.04	67	1489
12640.4	0.37	0.11	0.23	1.24	434	0.32	0.19	62	335
12644.0	1.29	0.14	1.97	1.37	436	0.07	1.44	153	106
12635.4	4.72	0.53	15.23	0.66	433	0.03	23.08	323	14
Core #16									
14167.3	11.55	5.35	44.91	0.11	436	0.11	408.27	389	1
14168.0	10.45	4.44	33.24	0.16	433	0.12	207.75	318	2
14179.4	13.54	6.26	45.80	0.15	430	0.12	305.33	338	0.91 CLEM H/C 4
14183.8	6.68	2.08	20.32	0.24	435	0.09	84.67	304	
14186.5	5.61	1.71	19.91	0.18	434	0.08	110.61	355	3
14183.8	6.15	1.24	17.70	0.24	438	0.07	73.75	288	4

only 4 AMS

4, 3, 1 Conventional Cores

33

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North ALeutian Shelf COST #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
Core #17									
15366.2	1.20	0.23	1.24	0.24	447	0.16	5.17	103	20
15367.8	0.97	0.21	0.85	0.25	448	0.20	3.40	88	26
15368.5	0.83	0.19	0.73	0.20	449	0.21	3.65	88	24
15368.6	0.80	0.15	0.81	0.30	445	0.16	2.70	101	38
Core #18									
Rubble #1	1.44	0.29	1.08	0.15	454	0.21	7.20	75	10
Rubble #2	0.89	0.22	0.79	0.27	452	0.22	2.93	89	30
16006.9	1.34	0.46	1.67	0.11	451	0.22	15.18	125	8
16011.8	1.52	0.42	2.35	0.10	450	0.15	23.50	155	7
16017.4	2.27	0.62	3.20	0.09	453	0.16	35.56	141	4
16021.8	0.93	0.33	1.03	0.12	452	0.24	8.58	111	13
16025.4	2.58	0.86	3.69	0.19	450	0.19	19.42	143	7
16027.0	1.25	0.52	1.24	0.24	454	0.30	4.96	99	20
Core #19									
16703.7	2.54	0.79	3.13	0.61	458	0.20	5.13	123	24
16714.6	1.07	0.28	0.86	0.57	462	0.25	1.51	80	53
16716.2	2.07	0.59	1.94	0.73	463	0.23	2.66	94	35
16719.6	2.52	0.72	2.69	0.57	459	0.21	4.72	107	23

4.3; Conventional Core

4.4 Data from Small Core Analysis

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
SIDEWALL CORES									
4975	1.55	0.21	1.01	2.47	430	0.17	0.41	65	159
5781	0.24	0.14	0.03	0.23	0	0.82	0.13	13	96
6976	0.37	0.06	0.04	0.32	0	0.60	0.13	11	86
7947	0.77	0.12	0.59	1.58	432	0.17	0.37	77	205
8558	0.90	0.13	0.74	0.75	431	0.15	0.99	82	83
8980	0.52	0.12	0.30	0.50	428	0.29	0.60	58	96
9843	0.28	0.09	0.07	0.26	425	0.56	0.27	25	93
10557	0.51	0.12	0.39	1.22	426	0.24	0.32	76	239
10921	0.69	0.16	0.33	0.81	436	0.33	0.41	48	117
11974	0.12	0.09	0.06	1.03	0	0.60	0.06	50	858
12933	0.14	0.13	0.05	0.66	0	0.72	0.08	36	471
13269	0.10	0.12	0.13	1.01	0	0.48	0.13	130	1010

4.4c Sidewall Core

EXLOG
GEOCHEMICAL
LABORATORY

DATE:

WELL: North Aleutian Shelf #1

SAMPLE DEPTH	TOC %	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Tmax (°C)	$\frac{S1}{(S1+S2)}$	$\frac{S2}{S3}$	$\frac{S2}{TOC} \times 100$ ($\frac{mg\ HC}{g\ TOC}$)	$\frac{S3}{TOC} \times 100$ ($\frac{mg\ CO2}{g\ TOC}$)
	The following three analyses were performed on brown-to-black shales which were hand-picked from these samples due to their richness.								
12510	26.41	2.75	82.54	4.70	424	0.03	17.56	313	18
12570	29.93	6.15	134.41	0.64	425	0.04	210.02	449	2
12630	30.16	4.35	113.52	0.39	426	0.04	291.08	376	1

4.5: Special samples picked from cuttings

5. INTERPRETATION

5.1 Well Report Description

1140 ft - 10710 ft

The portion of the North Aleutian Shelf C.O.S.T. Well No. 1 from commencement of analysis at 1440 ft to approximately 10710 ft has T(max) values which indicate the source material is immature. There are several carbon-rich intervals in this immature portion of the well. From 2520 ft to 4260 ft the total organic carbon (TOC) values range from fair to excellent. The kerogen0 derived hydrocarbons (S2) in this interval indicate a poor source rock, however. The high organic carbon values are a result of lignite and a small amount of coal in this interval. The interval from 4620 ft to 5340 ft also has fair to good organic carbon values, but poor S2 values.

The interval from 8250 ft to 8970 ft has fair to excellent levels of organic carbon. The peak which occurs at 8370 ft has a fair S2 value and the peak at 8970 ft has an excellent S2 value. However, both peaks are a result of coal in the interval and their hydrogen indices indicate they are gas prone.

There is another carbon-rich interval from 10530 ft to 10650 ft which is also a result of coal in the sample. The S2 values are good and the hydrogen index from 10530 ft to 10590 ft suggests an oil-prone source rock. Except for this short apparent oil-prone interval, the source material in this well above 10710 ft is gas prone and immature.

The free hydrocarbon values (S1) for this well from 1440 ft to 10710 ft do not indicate significant hydrocarbon accumulations. Due to low S2 values the productivity ratios (S1/S1+S2) in this portion of the well are unexpectedly high and quite erratic. There are no hydrocarbon accumulations indicated by the productivity ratio in this portion of the well.

10710 ft - 17155 ft

The portion of the North Aleutian Shelf C.O.S.T. Well No. 1 from 10710 ft to 17155 ft (TD) has T(max) values which indicate the source material is in the mature zone of oil generation. The generally accepted mature zone of oil generation occurs at T(max) values between 435 C and 470 C.

The total organic carbon (TOC) values from 10710 ft to 17155 ft fluctuate considerably, but indicate at least fair levels of organic carbon throughout with numerous intervals having excellent levels of organic carbon. The kerogen-derived hydrocarbon (S2) values also fluctuate considerably in this interval, ranging from poor to very good. The intervals from 13350 ft to 13410 ft. and from 14610 ft to 14730 ft have very good S2 values as well as excellent organic carbon levels. The intervals from 11190 ft to 11310 ft, 13290 ft to 13530 ft, 13770 ft to 13830 ft, 14010 ft to 14070 ft, 14130 ft to 14310 ft, 14370 ft to 14550 ft, 14850 ft to 14970 ft, and 17070 ft to 17130 ft all have good S2 values and good levels of organic carbon. Most of these intervals contained coal, however, and the hydrogen indices suggest the source material is mostly gas prone. The intervals from 13290 ft to 13530 ft, 14010 ft to 14070 ft, 14130 ft to 14310, 14430 ft to 14490 ft, 14610 ft to 14730 ft, 14910 ft to 14970 ft, and 15090 ft to 15150 ft have hydrogen indices between 200 and 300 indicating they are gas and oil prone.

Generally the analyses performed on cores from this well were in agreement with cuttings analyses from the same depth, but coal sometimes caused discrepancies. Core #16, taken at approximately 14180 ft, gave values quite different from the cuttings analysis at this depth. Samples from Core #16 had excellent levels of organic carbon and very good S2 values. The hydrogen indices suggest the source material is oil prone and the Tmax values are bordering on the oil window.

There are no significant hydrocarbon accumulations indicated by the S1 values or the productivity ratios in the interval from 10710 ft to 17155 ft. However, from approximately 13380 ft to 17155 ft (TD) there is a gradually increasing trend in S1 values and productivity ratios which corresponds with a decreasing trend in TOC values, S2 values and hydrogen indices. This relationship reflects the continual conversion of kerogen to bitumen with increasing temperature and supports the theory of hydrocarbon generation. As maturity (indicated by Tmax) increases with increasing depth of burial, the quantity of source material (represented by TOC and S2) decreases as hydrocarbons are generated. The increase in hydrocarbons is reflected in the increase in both S1 values and the productivity ratios.

5.2 Conclusion

The North Aleutian Shelf C.O.S.T. Well No. 1 encountered coal seams throughout the entire well. From 10080 ft to 17155 (TD) the majority of samples contained coal. The source material in this well is immature for oil generation above approximately 10710 ft. The source material encountered from approximately 10710 ft to TD is in the oil window.

There are numerous intervals with good organic carbon levels and good kerogen-derived hydrocarbon (S2) values in this well, particularly below 10380 ft. The source materials around 8970 ft, 10650 ft, 11250 ft, 13410 ft, and 14370 ft have very good combinations of organic carbon and kerogen derived hydrocarbons. Additionally, these source materials are gas and oil prone, whereas most of the source material in this well is only gas prone. There is one interval from 10530 ft to 10590 ft which contains good source material (as indicated by the TOC level and S2 values) that appears to be oil prone, although it is slightly immature.

The free hydrocarbon values (S1) and the productivity ratios indicate this well did not encounter any significant hydrocarbon accumulations. However, from approximately 13380 ft to 17155 ft (TD) the S1 values and productivity ratios steadily increase. This corresponds with a steady decrease in TOC levels, S2 values, and hydrogen indices in this interval. These trends along with an accelerated increase in Tmax values indicate that hydrocarbon generation is occurring in this interval from 13380 ft to TD.