Enclosure 4: Source rock, porosity, permeability and lithology summaries, in Connelly, William, and Amoco Oil Co., Data compilation and preliminary summary of the 1977 Alaska Peninsula field project

Connelly, William, and Amoco Oil Co.

GMC DATA REPORT 461B

This GMC data report from the Amoco Heritage collection has been made available through funding from the FY2018 USGS National Geological and Geophysical Data Preservation Program, Grant Number G18AP00054. This project report is presented in its original format and has not been reviewed for technical content or for conformity to the editorial standards of DGGS. It should not be used or cited as reviewed data.

2019
State of Alaska
Department of Natural Resources
Division of Geological & Geophysical Surveys
GEOLOGIC MATERIALS CENTER

Enclosure 4
Source Rock and
Lithology Data

Amoco Production Company
Security Life Building
Denver, Colorado 80202

[redacted]

Denver Region
Frontier Division

Geological Report FR-02-79

Enclosure 4 Source Rock and
Lithology

First Class Mail
Form 1070 2-71

AMOCO PRODUCTION COMPANY
REEARCH CENTER

SOURCE ROCK EVALUATION

Five Alaska Peninsula Outcrops

PETROSERVICES GROUP

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AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.L. CAIN
TECHNICAL SERVICE NUMBER 9509-77

SOURCE ROCK SUMMARY
TABLE 1.
DATE 06/29/77

SAMPLE NUMBER		SMPL				DEPTH FEET	PETROLEUM GENERATION	KEROGEN TYPE	PRESENT STATE OF	
LAB NO.	FLD NO.	TYPE	FORMATION	AGE	LITHOLOGY	TOP***BASE	CAPABILITY	(OIL/GAS)	DIAGENESIS	REMARKS
STATE ALASKA COUNTY PENINSULA					WELL LOCATION					
WELL NAME					LEASE ALASKAN PENINSULA OUTCROPS					
R-1134	AP 3006	OT	Bathgate Sand	"	CARB-SH	4-58S-85W	POOR	Gas	Advanced	Dzikofski, Soggy Sunny Peak
R-1135	AP 4004	OT	"	"	SH	16,17-57S-85W	VERY GOOD	Gas	Advanced	" Bold Creek
R-1136	AP 4006	OT	"	"	SH	21-57S-85W	NON SOURCE		"	" "
R-1137	AP 5006	OT	"	"	SH	14-57S-85W	NON SOURCE		"	Bedrock Mtn
R-1138	AP 5013	OT	"	"	SH	11,12-58S-85W	NON SOURCE		"	" "

INTRODUCTION

Outcrop samples from the Alaska Peninsula are being sent directly from the field for analysis in order to facilitate the return of data. Consequently, formation, age, and location information is not yet available, but will be obtained after the field party returns.

SOURCE ROCK EVALUATION

One of these samples has a very good petroleum generation rating on the basis of organic carbon content, one is poor, and the other three samples are petroleum nonsources. Gas-type kerogen in a high stage of diagenesis is present in the very good and poor samples according to visual data. Atomic H/C ratios from the elemental analyses for these samples indicate advanced diagenesis. Bitumen amounts in these samples are very small. However, weathering could have reduced both the organic carbon and bitumen quantities.

Robert J. Forwood

Table 1

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 9509-77

SOURCE ROCK DATA
TABLE 2.
DATE 08/29/77

SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	INSOL RESIDX	BIT-FREE ORG C WT%	BITUMEN BBL/AF	BITUMEN PPM	SAT HC BBL/AF	SAT HC PPM	SAT HC/ BITUMEN	BITUMEN/ TL ORG C	REMARKS
											BBL/AF = (PPM X .0180)
STATE ALASKA COUNTY PENINSULA					WELL LOCATION						
WELL NAME					LEASE ALASKAN PENINSULA OUTCROPS						
R-1134		Cret-U	93	.4	.7	43	<.1	5	.12	.01	
R-1135		"	88	2.0	1.0	59	.2	11	.20	<.01	
R-1136		"	87	<.1	.1	8	<.1	1	.15	.02	
R-1137		"	71	.1	.2	11	<.1	3	.33	.01	
R-1138		"	84	<.1	.8	46	<.1	2	.06	.23	

Table 2

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 5509-77

KEROGEN DATA
TABLE 3.
DATE 07/12/77

LAB SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	NORM. ELEMENTAL ANALYSIS, WT. % CARBON	HYDROGEN	OXYGEN	NITROGEN	ATOMIC RATIO H/C	PERCENT UNSTRU. KEROGEN	PERCENT STRU. KEROGEN	CARBNZ. SCALE	VIT REFLECT %RO
STATE ALASKA COUNTY PENINSULA			WELL LOCATION								
WELL NAME			LEASE ALASKAN PENINSULA OUTCROPS								
R-1134			90.4	2.5	4.7	2.2	.34	1	99	7	
R-1135			91.9	2.1	6.4	.4	.28	1	99	7	

Table 3

MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name: Alaska Peninsula Outcrops
Location:
State or Country:
Geol. Province:

SRA No.	Field No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1134	3006	OTCP	Belkofski Soggy Foggy Peak		Black	7	Gas	90% Finely divided struct mtl 10% Charcoal frag Barren of palyno
R-1135	4004	OTCP	" Bold Cape		Black	7	Gas	100% Black struct looking mtl Barren of palyno

COLOR	CARBONIZATION SCALE	WEIGHT % CARBON
LIGHT YELLOW	1	65%
YELLOW	2	70%
LIGHT BROWN	3	75%
MEDIUM BROWN	4	78%
DARK BROWN	5	81%
BLACK	6	84% 86%
ALL ORGANIC MATTER BLACK	7	90%

T.S. 9509CR-77

Table 4

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AMOCO PRODUCTION COMPANY
RESEARCH CENTER

SOURCE ROCK EVALUATION

Alaska Peninsula Outcrops

Petroservices Group

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Distribution: R. H. Calvert/Attn: W. R. Connelly - Denver
D. F. Work - Denver
D. L. Boyne/J. L. Severson

Technical Service 779536CR
Job 9536
Requested by D. J. Hartmann
Denver Division

D L Boyne Div HDW 11/8/77

R. J. Harwood
1536

TECHNICAL SERVICE 779536CR

Subject: Alaska Peninsula Outcrops (Figure 1)

INTRODUCTION

Twenty-two outcrop samples from the Eocene Stepovak and Tolstoi formations on the Alaska Peninsula were submitted for source rock evaluation.

SOURCE ROCK EVALUATION

1. Petroleum generation ratings based on organic carbon contents (Table 1, 2) for these samples are: Stepovak 5 nonsource, 6 poor, 3 fair, and 4 very good; Tolstoi 3 nonsource and 1 poor. Similar organic carbon values were found in Stepovak samples in the David River well, but Tolstoi samples from this well have much higher organic carbon values than these few Tolstoi outcrop samples.

2. Kerogen types based on visual and elemental analyses (Table 1, 3, 4) are gas and wet gas types. Stages of diagenesis are pregeneration to peak gas generation. Much higher stages of diagenesis are present in Eocene outcrop samples 25 miles west (T.S. 779509CR), but similar stages of diagenesis occur in Eocene samples from the David River well (T.S. 9485 CJ).

3. Bitumen contents (Table 2) are moderate to small in comparison to organic carbon contents due to the gas-generating character of the kerogens.

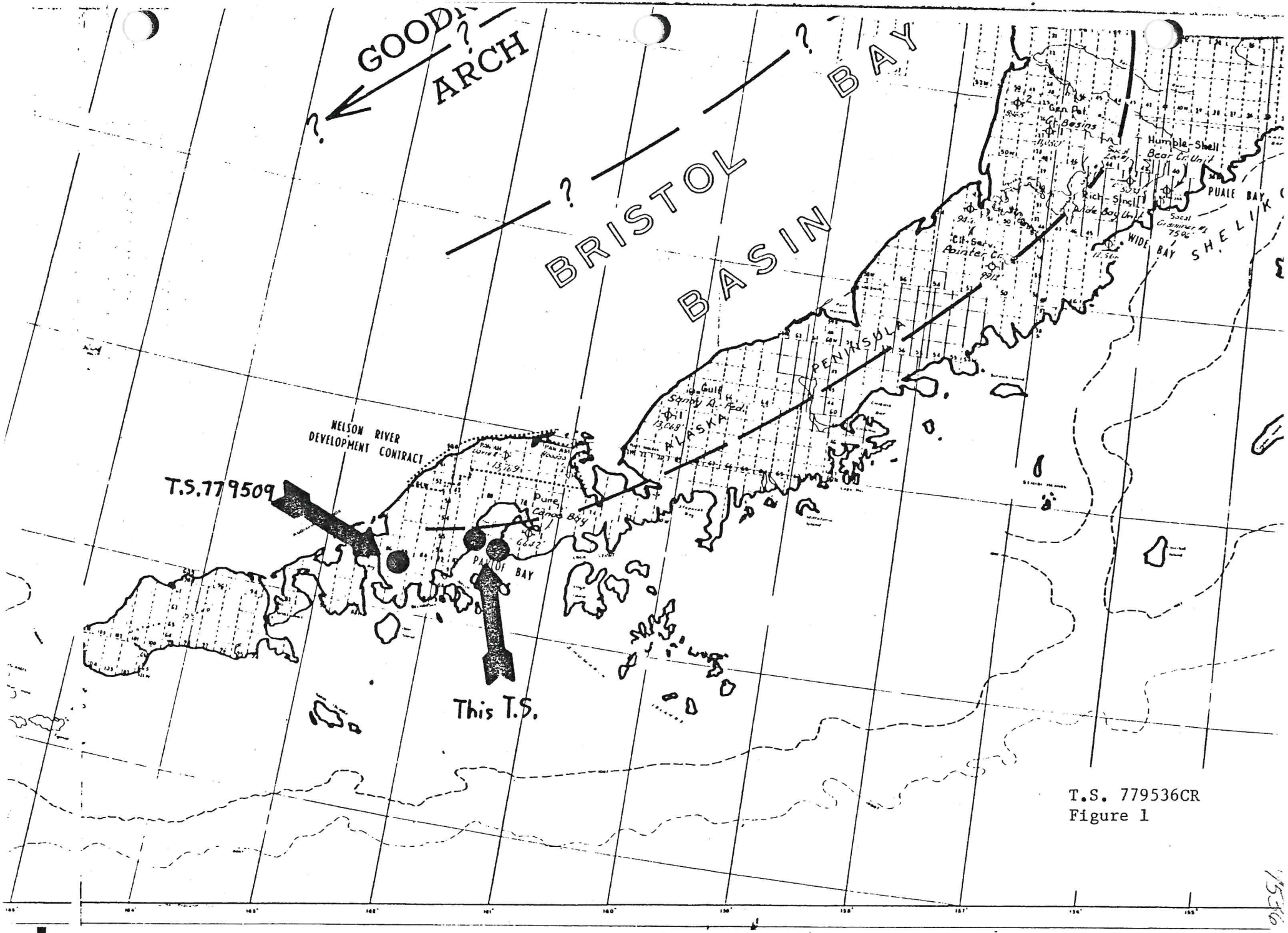
4. Odd-carbon predominance on the saturate fraction chromatograms (Figure 2a, b) for most samples supports an interpretation of thermal immaturity. An exception is a mature chromatogram for sample 5073, which is interpreted at peak gas generation from the kerogen data.

5. No evidence of migrated oil or major liquid generation abilities is seen in these samples. However, with sufficient thickness and areal extent these beds probably would generate some condensate plus much larger amounts of gas.

Robert J. Harwood

R. J. Harwood

RJH:km
33597



T.S. 779536CR
Figure 1

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.R. PIERCE
TECHNICAL SERVICE NUMBER 779536

SOURCE ROCK SUMMARY
TABLE 1a
DATE 08/19/77

SAMPLE NUMBER		SMPL				DEPTH FEET		PETROLEUM GENERATION	KEROGEN TYPE	STAGE OF	
LAB NO.	FLD NO.	TYPE	FORMATION	AGE	LITHOLOGY	TOP	BASE	CAPABILITY	(OIL/GAS)	DIAGENESIS	REMARKS
STATE ALASKA COUNTY					WELL LOCATION 26, 27, 32, 33-55S-79W						
WELL NAME					LEASE ALASKA PENINSULA OUTCROPS						
R-1153	AP 5035	OT	Stepovak	Eocene	SHALE	Stepovak, Cape Bay		NON SOURCE			
R-1154	AP 5040	OT	"	"	SHALE	//	//	POOR	Gas	Pregeneration	
R-1155	AP 5043	OT	"	"	SHALE	//	//	NON SOURCE			
R-1156	AP 5048	OT	"	"	SHALE	//	//	POOR	"	"	
R-1157	AP 5056	OT	"	"	SHALE	//	//	POOR	"	Early peak gas	
R-1158	AP 5061	OT	"	"	SHALE	//	//	FAIR	"	"	
R-1159	AP 5067	OT	"	"	SHALE	//	//	VERY GOOD	"	"	
R-1160	AP 5069	OT	"	"	SHALE	//	//	VERY GOOD	"	Peak gas*	
R-1161	AP 5073	OT	"	"	SHALE	//	//	FAIR	"	Peak gas?*	
R-1162	AP 5079	OT	"	"	SHALE	//	//	NON SOURCE			
R-1163	AP 5082	OT	"	"	SHALE	//	//	VERY GOOD	"	Early peak gas	
R-1164	AP 5085	OT	"	"	SHALE	//	//	FAIR	"	Early gen. gas	
R-1165	AP 5090	OT	"	"	SHALE	//	//	NON SOURCE			
R-1166	AP 5094	OT	"	"	SHALE	//	//	POOR	"	"	
R-1167	AP 5098	OT	"	"	SHALE	//	//	VERY GOOD	"	"	
R-1168	AP 5100	OT	"	"	SHALE	//	//	NON SOURCE			
R-1169	AP 5103	OT	"	"	SHALE	//	//	POOR	Wet gas	Pregeneration	
R-1170	AP 5106	OT	"	"	SHALE	//	//	POOR	Gas	Early gen. gas	

*Adjacent to diorite intrusion

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AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.R. PIERCE
TECHNICAL SERVICE NUMBER 779536

SOURCE ROCK SUMMARY
TABLE 1b
DATE 08/19/77

SAMPLE NUMBER		SMPL				DEPTH FEET		PETROLEUM GENERATION	KEROGEN TYPE	STAGE OF	
LAB NO.	FLD NO.	TYPE	FORMATION	AGE	LITHOLOGY	TOP	BASE	CAPABILITY	(OIL/GAS)	DIAGENESIS	REMARKS
STATE ALASKA COUNTY					WELL LOCATION 2, 11, 14, 23-55S-80W						
WELL NAME					LEASE ALASKA PENINSULA OUTCROPS						
R-1171	AP 4045	OT	Tolstoi	Eocene	SHALE	Tolstoi, Pavlof Bay		NON SOURCE			
R-1172	AP 4061	OT	"	"	SHALE	//	//	POOR	Gas	Early peak gas	
R-1173	AP 4066	OT	"	"	SHALE	//	//	NON SOURCE			
R-1174	AP 4068	OT	"	"	SHALE	//	//	NON SOURCE			

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AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 779536

SOURCE ROCK DATA
TABLE 2a
DATE 08/19/77

SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	INSOL RESID%	HIT-FREE ORG C WT%	BITUMEN BBL/AF	BITUMEN PPM	SAT HC BBL/AF	SAT HC PPM	SAT HC/ BITUMEN	BITUMEN/ TL ORG C	REMARKS
											BBL/AF = (PPM X .0180)
STATE ALASKA COUNTY				WELL LOCATION							
WELL NAME				LEASE ALASKA PENINSULA OUTCROPS							
R-1153		Eocene	80	.3		NOT ANALYZED					
R-1154		"	76	.4	3	139	1	49	.36	.03	
R-1155		"	78	.4	2	89	1	31	.35	.02	
R-1156		"	78	.5	4	221	2	100	.46	.04	
R-1157		"	66	.5	5	267	1	42	.16	.05	
R-1158		"	76	.7	4	203	2	98	.48	.03	
R-1159		"	74	4.1	38	2086	27	1524	.73	.05	
R-1160		"	77	4.1	10	566	1	38	.07	.01	
R-1161		"	69	.8	3	159	1	63	.40	.02	
R-1162		"	72	.4	3	181	1	43	.24	.05	
R-1163		"	74	4.3	27	1526	9	493	.32	.03	
R-1164		"	71	.8	6	305	2	100	.33	.04	
R-1165		"	76	.4	2	135	1	59	.44	.04	
R-1166		"	78	.5	3	149	1	54	.37	.03	
R-1167		"	87	4.?	21	1150	7	374	.33	.03	
R-1168		"	0	<.1		NOT ANALYZED					
R-1169		"	81	.5	4	213	3	145	.68	.05	
R-1170		"	74	.5	3	166	1	35	.21	.03	
R-1171		"	82	.3		NOT ANALYZED					

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 779536

SOURCE ROCK DATA
TABLE 2b
DATE 08/19/77

SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	INSOL RESID%	BIT-FREE ORG C WT%	BITUMEN BBL/AF	BITUMEN PPM	SAT HC BBL/AF	SAT HC PPM	SAT HC/ BITUMEN	BITUMEN/ TL ORG C	REMARKS
STATE ALASKA COUNTY				WELL LOCATION							BBL/AF = (PPM X .0180)
WELL NAME				LEASE ALASKA PENINSULA OUTCROPS							
R-1172		Eocene	77	.5	3	190	2	108	.57	.04	
R-1173		"	80	.3		NOT ANALYZED					
R-1174		"	64	.1		NOT ANALYZED					

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 779536

KEROGEN DATA
TABLE 3a
DATE 10/24/77

LAB SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	NORM. ELEMENTAL ANALYSIS, WT. % CARBON	HYDROGEN	OXYGEN	NITROGEN	ATOMIC RATIO H/C	PERCENT UNSTRU. KEROGEN	PERCENT STRU. KEROGEN	CARBNZ. SCALE	VIT REFLECT %RO
STATE ALASKA COUNTY			WELL LOCATION								
WELL NAME			LEASE ALASKA PENINSULA OUTCROPS								
R-1153		Eocene	NOT ANALYZED								
R-1154		"	77	4.7	16	2.2	.74	10	90	3	
R-1155		"	82	5.9	10	2.3	.87	20	80	3-4	
R-1156		"	76	5.1	17	1.5	.81	35	65	3-4	
R-1157		"	85	6.3	6	2.9	.89	20	80	4	
R-1158		"	82	5.6	10	2.5	.83	15	85	3-4	
R-1159		"	84	4.7	8	2.9	.67	5	95	5	
R-1160		"	88	4.1	5	2.8	.56	5	95	6*	
R-1161		"	80	4.2	12	2.9	.63	5	95	6*	
R-1162		"	77	5.0	15	2.8	.78	20	80	4	
R-1163		"	82	5.4	10	2.8	.79	10	90	4-5	
R-1164		"	79	6.0	13	2.7	.92	15	85	4	
R-1165		"	70	4.6	23	2.1	.79	50	50	4	
R-1166		"	80	5.9	11	2.7	.89	10	90	5	
R-1167		"	80	5.3	12	2.4	.80	10	90	4-5	
R-1168		"	NOT ANALYZED								
R-1169		"	67*	4.7	27	1.6	.85	50	50	4	
R-1170		"	69*	4.4	25	1.9	.76	15	85	4-5	
R-1171		"	NOT ANALYZED								

*Carbonization reduced by oxidation during weathering

**Adjacent to diorite intrusion

9536

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 779536

KEROGEN DATA
TABLE 3b
DATE 10/24/77

LAB SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	NORM. ELEMENTAL ANALYSIS. WT. % CARBON	HYDROGEN	OXYGEN	NITROGEN	ATOMIC RATIO H/C	PERCENT UNSTRU. KEROGEN	PERCENT STRU. KEROGEN	CARBNZ. SCALE	VIT REFLECT XRO
STATE ALASKA COUNTY			WELL LOCATION								
WELL NAME			LEASE ALASKA PENINSULA OUTCROPS								
R-1172		Eocene	63*	3.7	31	2.0	.71	15	85	5	
R-1173		"	NOT ANALYZED								
R-1174		"	"								

*Carbonization reduced by oxidation during weathering

MICROSCOPIC KEROGEN ANALYSIS

Division:
Well Name: Alaska Peninsula Outcrops
Location:
State or Country:
Geol. Province:

SRA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1154	5040	OTCP	Stepovak Coal Bay	Eocene	Lt Br	3	Gas	65% Wood and Cuticle 25% Charcoal frag 10% Unstruct Mtl Common palyno
R-1155	5043	"	"	"	Lt to Med Br	3-4	Gas	40% Wood and cuticle 40% Charcoal frag 20% Unstruct Mtl Common palyno
R-1156	5048	"	"	"	Lt to Med Br	3-4	Gas	40% Wood and cuticle 25% Charcoal frag 35% Unstruct Mtl Abundant palyno
R-1157	5056	"	"	"	Med Br	4	Gas	70% Wood and cuticle 10% Charcoal frag 20% Unstruct Mtl Common palyno
R-1158	5061	"	"	"	Lt to Med Br	3-4	Gas	75% Wood and cuticle 10% Charcoal frag 15% Unstruct Mtl Common palyno

COLOR	CARBONIZATION SCALE	WEIGHT % CARBON
LIGHT YELLOW	1	65%
YELLOW	2	70%
LIGHT BROWN	3	75%
MEDIUM BROWN	4	78%
DARK BROWN	5	81%
BLACK	6	84% 86%
ALL ORGANIC MATTER BLACK	7	90%

T.S. 779536CR

Table 4a

1956

MICROSCOPIC KEROGEN ANALYSIS

Division:
Well Name: Alaska Peninsula Outcrops
Location:
State or Country:
Geol. Province:

SRA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1159	5067	OTCP	Stepovak Coal Bay	Eocene	Dk Br	5	Gas	90% Wood and cuticle 5% Charcoal frag 5% Unstruct Mtl Common palyno
R-1160	5069	"	"	"	Blk	6	Gas	95% Wood and charcoal 5% Unstruct Mtl Rare palyno
R-1161	5073	"	"	"	Blk	6	Gas	80% Wood and charcoal 15% Cuticular Mtl 5% Unstruct Mtl Occasional palyno
R-1162	5079	"	"	"	Med Br	4	Gas	70% Wood and cuticle 10% Charcoal frag 20% Amorphous Mtl. Common palyno
R-1163	5082	"	"	"	Med to Dr Br	4-5	Gas	80% Wood and cuticle 10% Charcoal frag 10% Unstruct Mtl Occasional palyno
R-1164	5085	"	"	"	Med Br	4	Gas	75% Wood and cuticle 10% Charcoal frag 15% Unstruct Mtl Common palyno
R-1165	5090	"	"	"	Med Br	4	Wet Gas	50% Unstruct Looking Mtl 40% Wood and cuticle 10% Charcoal frag Abundant palyno

T.S. 779536CR

Table 4b

MICROSCOPIC KEROGEN ANALYSIS

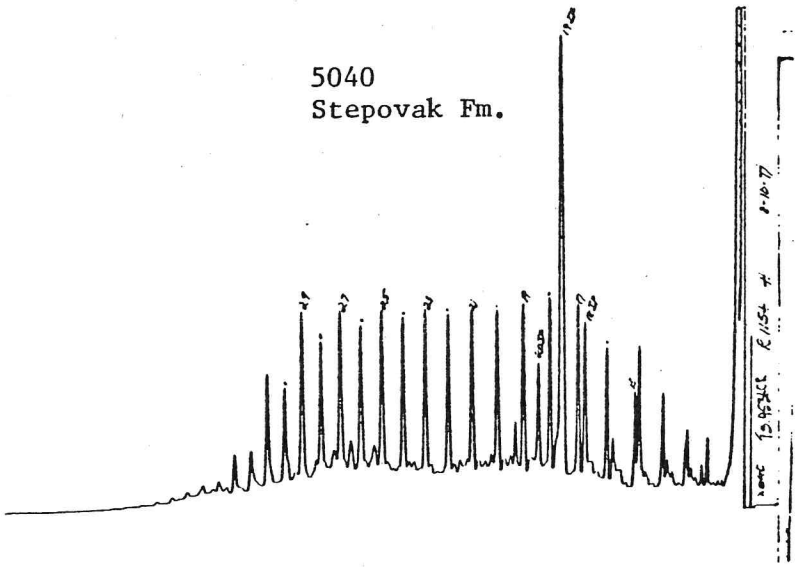
Division:
Well Name: Alaska Peninsula Outcrops
Location:
State or Country:
Geol. Province:

SRA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1166	5094	OTCP	Stepovak Coal Bay	Eocene	Dk Br	5	Gas	80% Wood and cuticle 10% Charcoal frag 10% Unstruct Mtl Common palyno
R-1167	5098	"	"	"	Med to Dk Br	4-5	Gas	70% Wood and charcoal 20% Cuticular Mtl 10% Unstruct Mtl Occasional palyno
R-1169	5103	"	"	"	Med Br	4	Wet Gas	50% Unstruct looking Mtl 45% Wood and cuticle 5% Charcoal frag Common palyno
R-1170	5106	"	"	"	Med to Dk Br	4-5	Gas	50% Wood and cuticle 35% Charcoal frag 15% Unstruct Mtl Common palyno
R-1172	4061	"	Tolstoi Port of Bay	"	Dk Br	5	Gas	60% Wood and charcoal 25% Cuticular Mtl 15% Unstruct Mtl Occasional palyno

T.S. 779536CR

Table 4c

9536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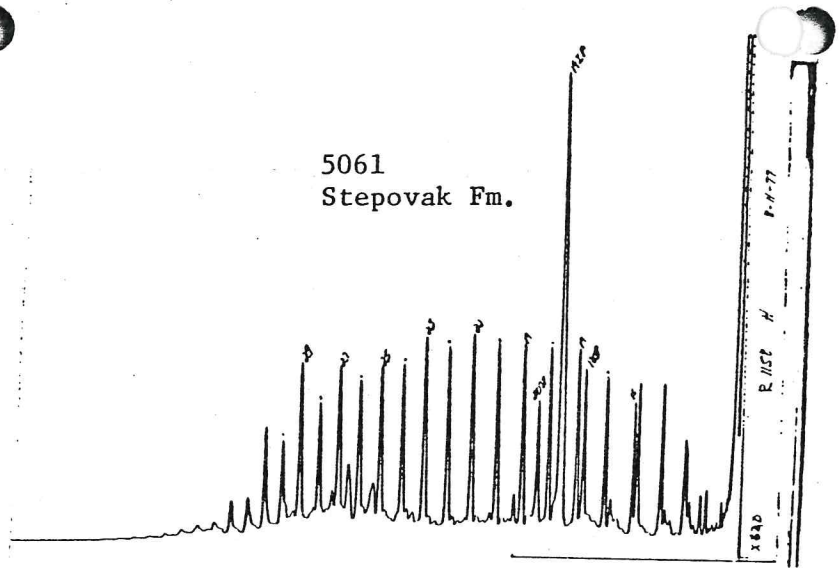
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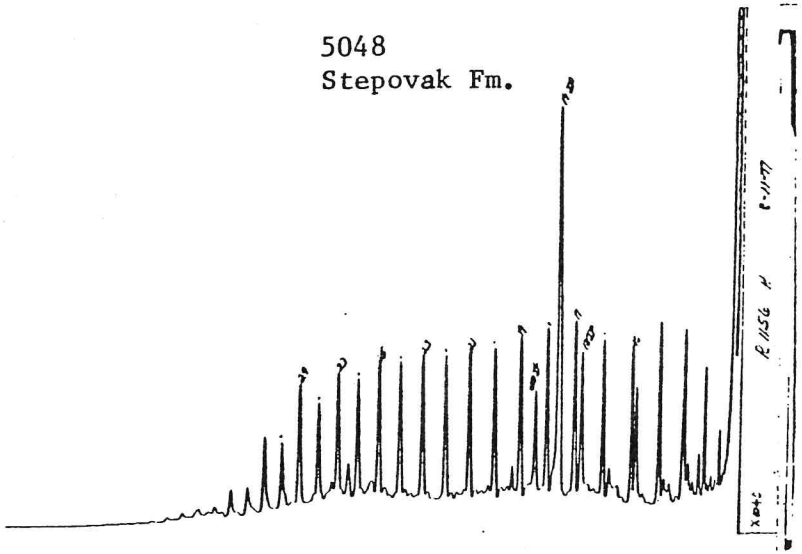
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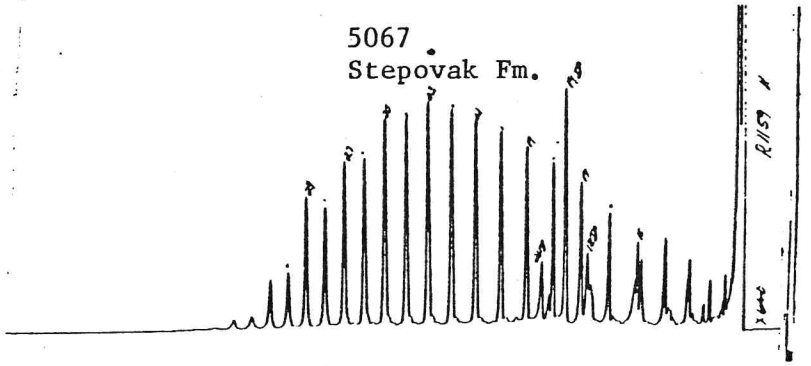
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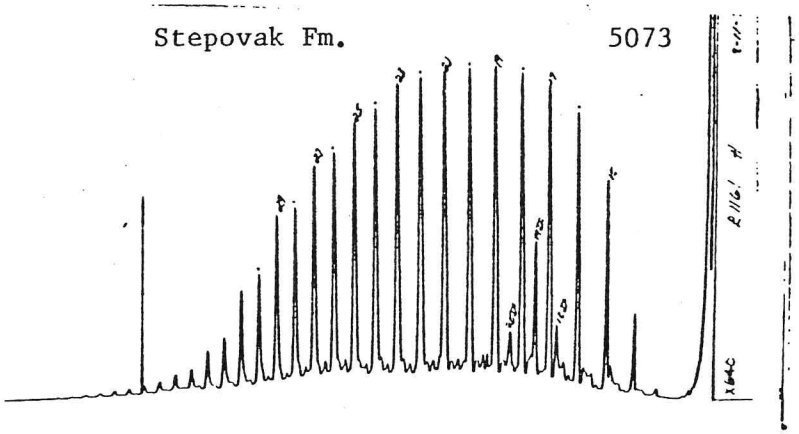
Stepovak Fm.
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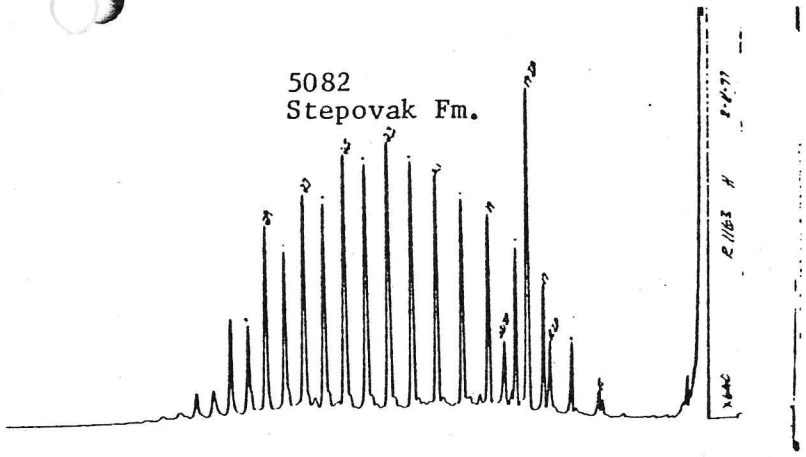
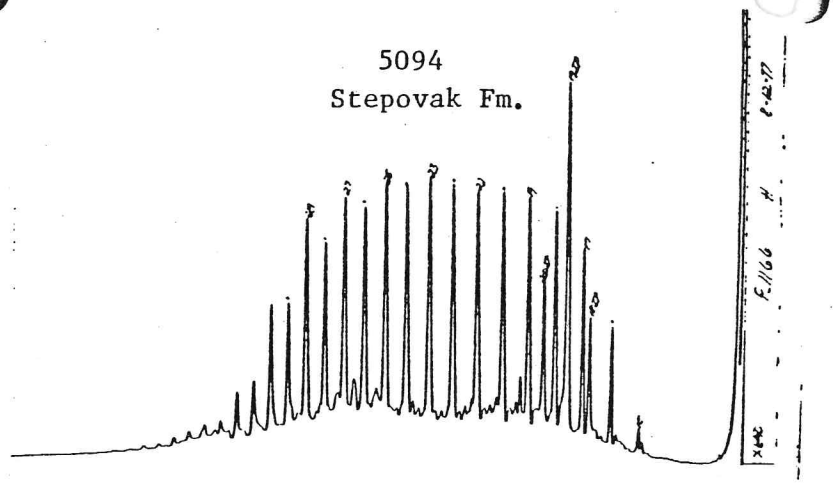
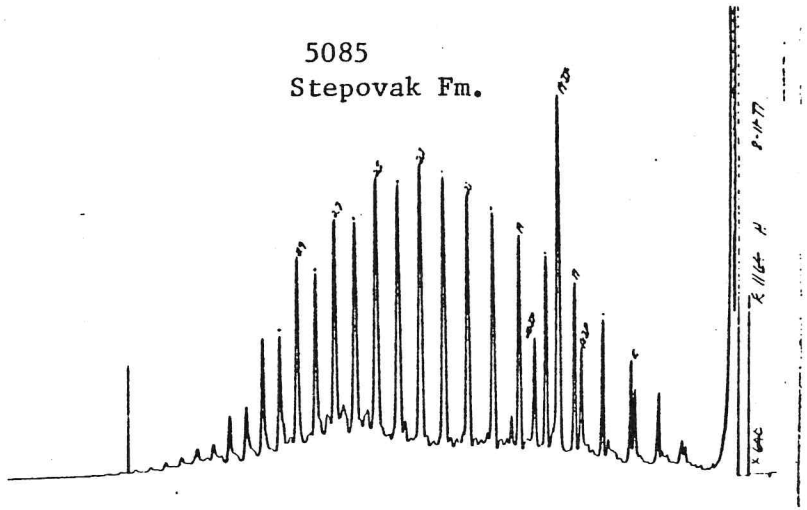
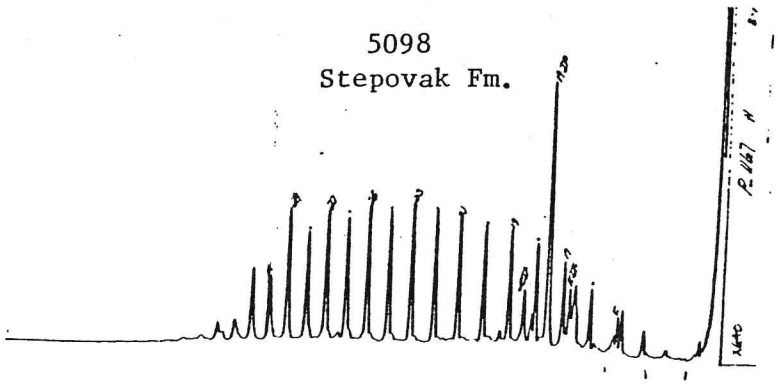
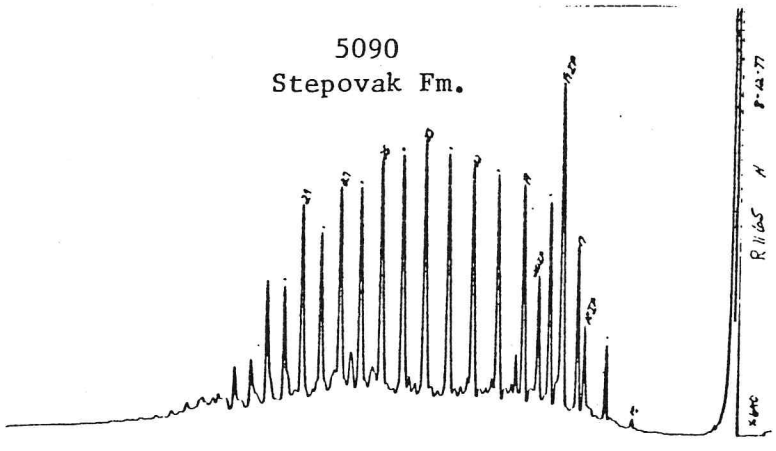
T.S. 779536CR

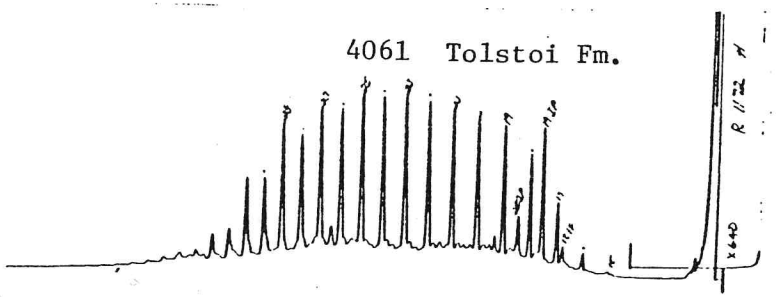












T.S. 779536CR
Figure 2b

AMOCO PRODUCTION COMPANY
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Source Rock Evaluation

Alaska Peninsula Outcrops

Petroservices Group

R. J. Harwood

R. H. Calvert, Attn - W. Connelly - Denver
D. F. Work - Denver
D. L. Boyne / J. L. Severson

Technical Service 779584CR
Job 9584
Requested by C. L. Cain
Denver Division

Roger Flemea (1-24-78)

R. J. Harwood
9584

TECHNICAL SERVICE 779584CR

Subject: Alaska Peninsula Outcrops (Figure 1)

INTRODUCTION

Thirty-one outcrop samples from the Eocene Stepovak and Tolstoi formations on the Alaska Peninsula were submitted for analysis as part of the study of the petroleum potential of this area.

CONCLUSIONS

1. Stepovak samples have up to good petroleum generation ratings; Tolstoi samples are rated up to very good in generating ability.

2. Kerogens in all samples are gas-type. Stepovak samples from the eastern location are at pregeneration; both Stepovak and Tolstoi samples from the western location have attained peak gas generation.

DISCUSSION

Based on organic carbon contents the petroleum generation ratings (Table 1, 2) of these two formations are: Stepovak-10 nonsource, 2 poor, 5 fair, 1 good; Tolstoi-3 nonsource, 1 poor, 5 fair, 1 good, 3 very good. All samples with significant organic carbon contents contain gas-generating kerogens, which are pregeneration in the east and have attained peak gas generation in the west according to elemental and visual analyses (Table 1, 3, 4). Only small amounts of bitumen are present in these samples because of the gas-type kerogens. Bitumens from the eastern location (3090, 3096) appear thermally immature from the saturate fraction chromatograms (Figure 2), whereas the one bitumen (5134) from the west is thermally mature. These bitumen characters are consistent with the kerogen analyses. These samples have source rock characteristics similar to previous samples submitted from this area.

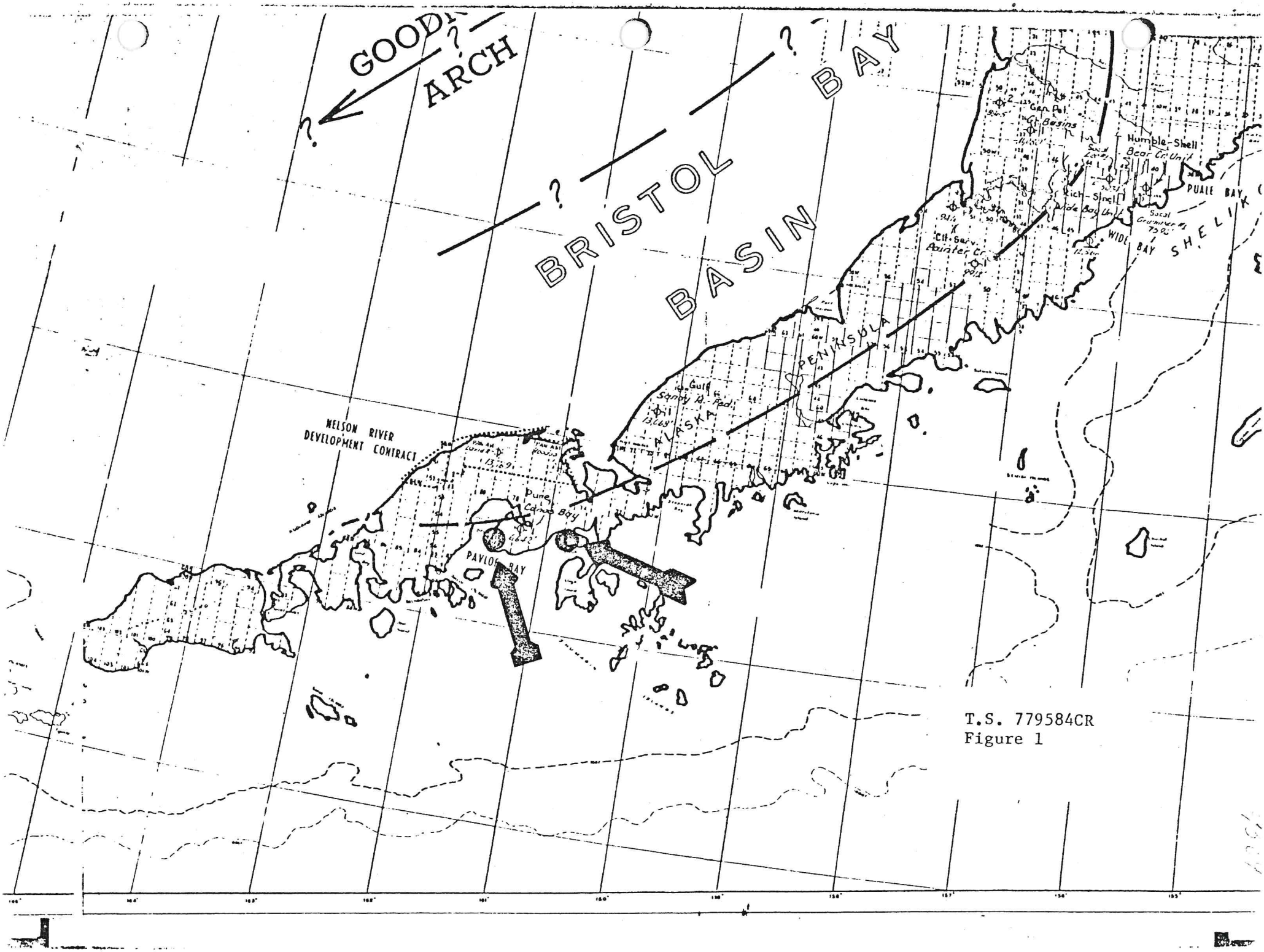
[redacted]

Weathering of these outcrop samples may have (1) reduced the organic carbon and bitumen contents and (2) affected the elemental analyses so as to reduce the apparent liquid generating abilities and cloud the diagenesis interpretations.

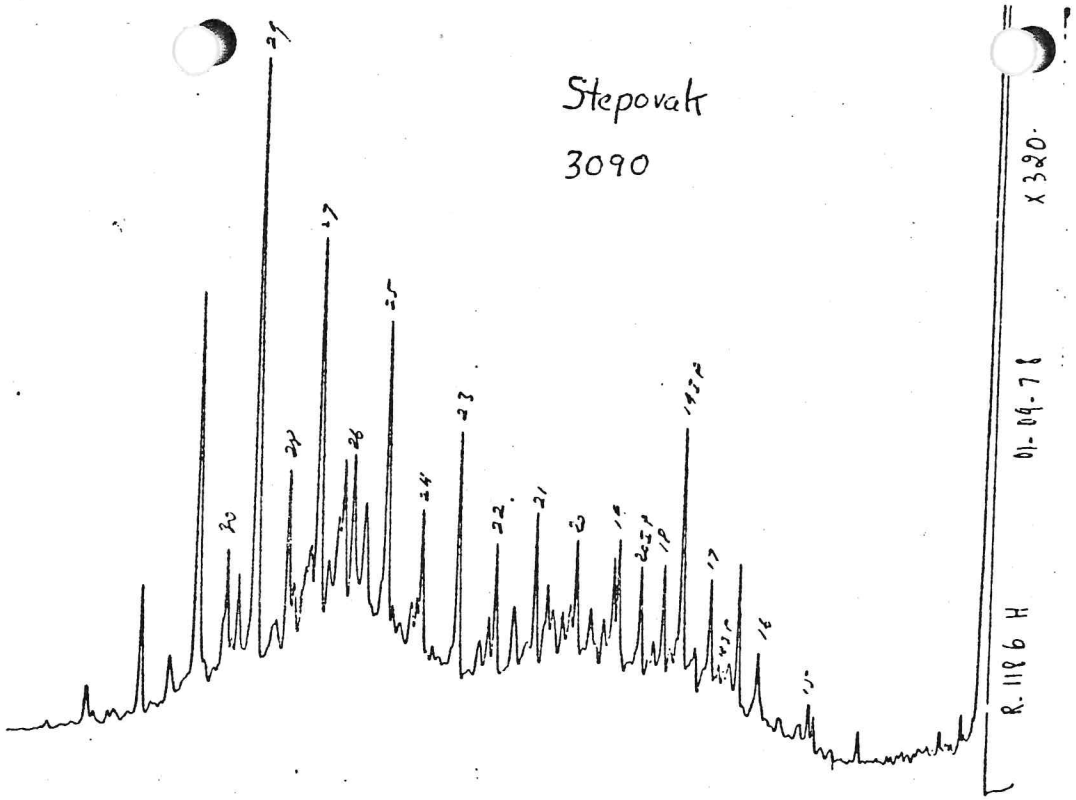
Robert J. Harwood

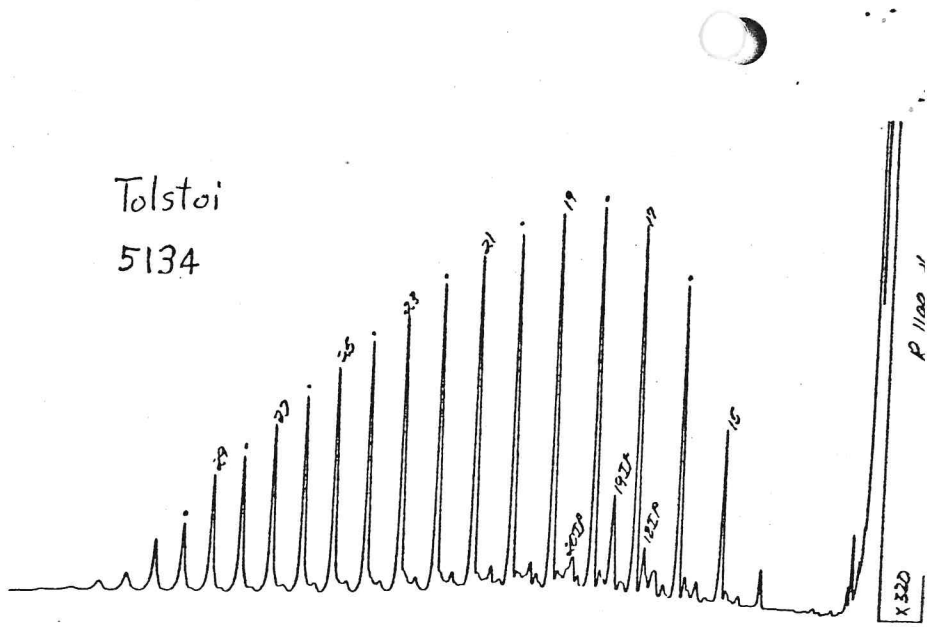
R. J. Harwood

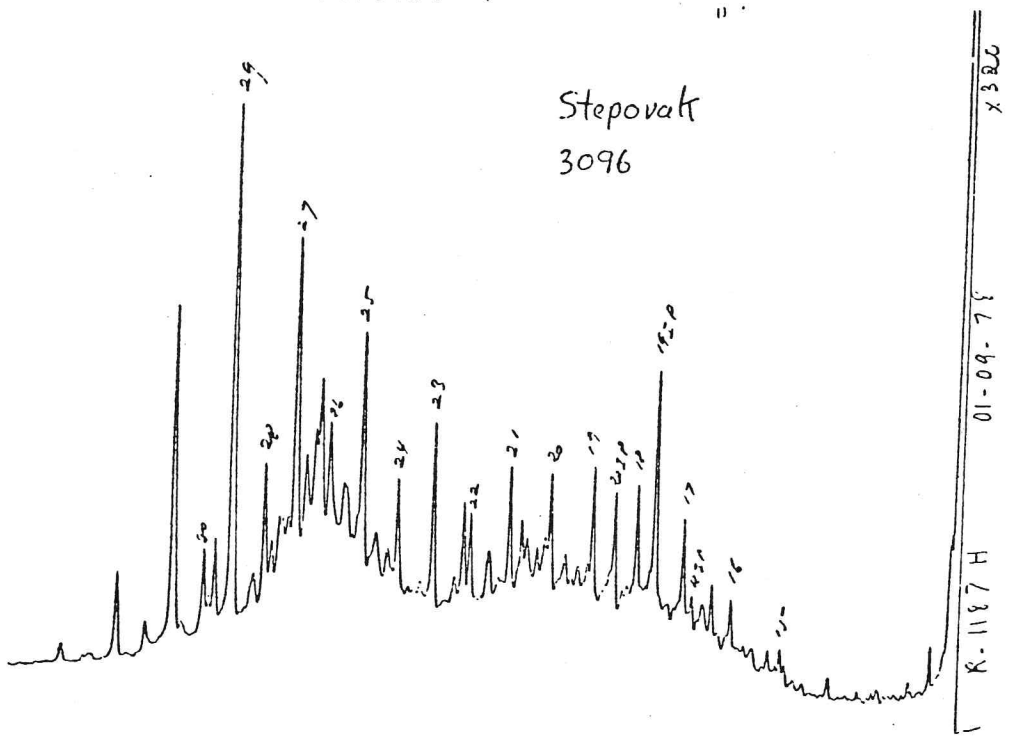
RJH:lp
0117



T.S. 779584CR
Figure 1







SATURATE FRACTION CHROMATOGRAMS

T.S. 779584CR
Figure 2

AMOCO PRODUCTION COMPANY
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OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.R. PILKCL
TECHNICAL SERVICE NUMBER 77-564

SOURCE ROCK SUMMARY
TABLE 1a
DATE 01/06/78

SAMPLE NUMBER						DEPTH FEET		PETROLEUM	KEROGEN	STAGE	
LAB NO.	FLD NO.	SMPL TYPE	FORMATION	AGE	LITHOLOGY	TOP	BASE	GENERATION CAPABILITY	TYPE (OIL/GAS)	OF DIAGENESIS	REMARKS

STATE ALASKA COUNTY WELL LOCATION 17,20,30,31-54S-79W
WELL NAME LEASE ALASKA PENINSULA

R-1175	AP773049	OT	STEPOVAK	EOC.	SHALE	Stepovak/McGinty Pt		NON SOURCE			
R-1176	AP773052	OT	STEPOVAK	EOC.	SHALE	//	//	NON SOURCE			
R-1177	AP773055	OT	STEPOVAK	EOC.	SHALE	//	//	NON SOURCE			
R-1178	AP773060	OT	STEPOVAK	EOC.	SHALE	//	//	NON SOURCE			
R-1179	AP773065	OT	STEPOVAK	EOC.	SHALE	//	//	NON SOURCE			
R-1180	AP773068	OT	STEPOVAK	EOC.	SHALE	//	//	NON SOURCE			
R-1181	AP773070	OT	STEPOVAK	EOC.	SHALE	//	//	POOR	Gas	Pregeneration	
R-1182	AP773073	OT	STEPOVAK	EOC.	SHALE	//	//	NON SOURCE			
R-1183	AP773078	OT	STEPOVAK	EOC.	SHALE	//	//	NON SOURCE			
R-1184	AP773080	OT	STEPOVAK	EOC.	SHALE	//	//	NON SOURCE			
R-1185	AP773083	OT	STEPOVAK	EOC.	SHALE	//	//	NON SOURCE			
R-1186	AP773090	OT	STEPOVAK	EOC.	SHALE	//	//	GOOD	"	"	
R-1187	AP773096	OT	STEPOVAK	EOC.	SHALE	//	//	FAIR	"	"	

STATE ALASKA COUNTY WELL LOCATION 13,24,25-55S-79W
WELL NAME LEASE ALASKA PENINSULA

R-1188	AP774072	OT	STEPOVAK	EOC.	SHALE	//	Mussey Ridge	FAIR	"	Peak gas	
R-1189	AP774077	OT	STEPOVAK	EOC.	SHALE	//	//	FAIR	"	"	
R-1190	AP774085	OT	STEPOVAK	EOC.	SHALE	//	//	POOR	"	"	
R-1191	AP774088	OT	STEPOVAK	EOC.	SHALE	//	//	FAIR	"	"	

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.R. PIERCE
TECHNICAL SERVICE NUMBER 77584

SOURCE ROCK SUMMARY
TABLE 1b
DATE 01/06/78

SAMPLE NUMBER LAB NO.	SAMPLE NUMBER FLD NO.	SMPL TYPE	FORMATION	AGE	LITHOLOGY	DEPTH FEET TOP***BASE	PETROLEUM GENERATION CAPABILITY	KEROGEN TYPE (OIL/GAS)	STAGE OF DIAGENESIS	REMARKS
STATE ALASKA COUNTY					WELL LOCATION 18-55S-78W					
WELL NAME					LEASE ALASKA PENINSULA					
R-1192	AP774102	OT	STEPOVAK	EOC.	SHALE		FAIR	Gas	Peak Gas	
STATE ALASKA COUNTY					WELL LOCATION 12,13-55S-79W					
WELL NAME					LEASE ALASKA PENINSULA					
R-1193	AP774107	OT	TOLSTOI	EOC.	SHALE	TOLSTOI / Misty Ridge	NON SOURCE			
R-1194	AP774110	OT	TOLSTOI	EOC.	SHALE	// //	FAIR	"	"	
R-1195	AP774128	OT	TOLSTOI	EOC.	SHALE	// //	FAIR	"	"	
R-1196	AP774133	OT	TOLSTOI	EOC.	SHALE	// //	POOR	"	"	
STATE ALASKA COUNTY					WELL LOCATION 1-55S-79W					
WELL NAME					LEASE ALASKA PENINSULA					
R-1197	AP775122	OT	TOLSTOI	EOC.	SHALE	// //	NON SOURCE			
STATE ALASKA COUNTY					WELL LOCATION 35-54S-79W					
WELL NAME					LEASE ALASKA PENINSULA					
R-1198	AP775126	OT	TOLSTOI	EOC.	SHALE	// //	FAIR	"	"	
R-1199	AP775134	OT	TOLSTOI	EOC.	SHALE	// //	VERY GOOD	"	"	
R-1200	AP775138	OT	TOLSTOI	EOC.	SHALE	// //	VERY GOOD	"	"	
R-1201	AP775144	OT	TOLSTOI	EOC.	SHALE	// //	FAIR	"	"	
STATE ALASKA COUNTY					WELL LOCATION 26,23-54S-79W					
WELL NAME					LEASE ALASKA PENINSULA					
R-1202	AP775147	OT	TOLSTOI	EOC.	SHALE	// //	NON SOURCE			
R-1203	AP775151	OT	TOLSTOI	EOC.	SHALE	// //	FAIR	"	"	

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.R. PIERCE
TECHNICAL SERVICE NUMBER 77-9564

SOURCE ROCK SUMMARY
TABLE 1c
DATE 01/06/78

SAMPLE NUMBER						DEPTH FEET	PETROLEUM GENERATION	KEROGEN TYPE	STAGE OF	
LAB NO.	FLD NO.	SMPL TYPE	FORMATION	AGE	LITHOLOGY	TOP***BASE	CAPABILITY	(OIL/GAS)	DIAGENESIS	REMARKS
STATE ALASKA COUNTY					WELL LOCATION 20,23-54S-79W					
WELL NAME					LEASE ALASKA PENINSULA					
R-1204	AP779159	OT	TOLSTOI	LOC.	SHALE Tolstoi, Misty Ridge	GOOD		Gas	Peak gas	
R-1205	AP779162	OT	TOLSTOI	LOC.	SHALE " "	VERY GOOD		"	"	

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE UNIT: DISTRICT WESTERN
TECHNICAL SERVICE NUMBER: 77-9584

SOURCE ROCK DATA
TABLE 2a
DATE 01/26/78

SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	INSOL RESIDUE %	OIL-FREE ORG C WT%	BITUMEN BBL/AF	BITUMEN PPM	SAT HC BBL/AF	SAT HC PPM	SAT HC/ BITUMEN	BITUMEN/ TL ORG C	REMARKS
STATE ALASKA COUNTY					WELL LOCATION 17,20,30,31-54S-76W						BBL/AF = (PPM X .0180)
WELL NAME					LEASE ALASKA PENINSULA						
R-1175		EOC.	87	.4	3	166	1	36	.19	.05	
R-1176		EOC.	75	.1	1	58	<1	14	.24	.04	
R-1177		EOC.	83	.1	3	173	<1	3	.02	.25	
R-1178		EOC.	86	.2	2	117	<1	11	.10	.05	
R-1179		EOC.	81	.2	1	45	<1	9	.21	.02	
R-1180		EOC.	82	.4	1	75	<1	17	.23	.02	
R-1181		EOC.	87	.4	2	95	1	38	.40	.02	
R-1182		EOC.	88	.4	2	166	<1	22	.13	.03	
R-1183		EOC.	83	.3	1	38	<1	5	.15	.02	
R-1184		EOC.	85	.1	1	57	<1	5	.09	.07	
R-1185		EOC.	83	.3	10	548	<1	15	.03	.14	
R-1186		EOC.	81	1.4	6	366	2	109	.26	.05	
R-1187		EOC.	83	.7	4	210	1	60	.29	.07	
STATE ALASKA COUNTY					WELL LOCATION 13,24,25-55S-79W						
WELL NAME					LEASE ALASKA PENINSULA						
R-1188		EOC.	78	1.0	2	116	<1	2	.02	.01	
R-1189		EOC.	78	.7	4	198	INVALID ANALYSIS			.03	
R-1190		EOC.	81	.5	1	65	<1	4	.06	.01	
R-1191		EOC.	87	.6	2	96	<1	2	.02	.02	

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 72584

SOURCE ROCK DATA
TABLE 2b
DATE 01/06/78

SAMPLE NUMBER	DEPTH FEET TOP**BOTTOM	GEOL. AGE	INSOL RESIDUE	BIT-FREE ORG C WT%	BITUMEN BBL/AF	BITUMEN PPM	SAT HC BBL/AF	SAT HC PPM	SAT HC/ BITUMEN	BITUMEN/ TL ORG C	REMARKS
STATE ALASKA COUNTY				WELL LOCATION 18-55S-78W							BBL/AF = (PPM X .0180)
WELL NAME				LEASE ALASKA PENINSULA							
R-1192		EOC.	86	.6	1	70	<1	2	.04	.01	
STATE ALASKA COUNTY				WELL LOCATION 12,13-55S-79W							
WELL NAME				LEASE ALASKA PENINSULA							
R-1193		EOC.	84	.4	1	48	<1	1	.03	.01	
R-1194		EOC.	81	.8	1	33	<1	2	.09	<.01	
R-1195		EOC.	85	.8	1	60	<1	10	.13	.01	
R-1196		EOC.	86	.5	1	64	<1	4	.07	.01	
STATE ALASKA COUNTY				WELL LOCATION 1-55S-79W							
WELL NAME				LEASE ALASKA PENINSULA							
R-1197		EOC.	87	.2	<1	3	<1	1	.50	<.01	
STATE ALASKA COUNTY				WELL LOCATION 35-54S-79W							
WELL NAME				LEASE ALASKA PENINSULA							
R-1198		EOC.	85	.6	3	159	<1	20	.13	.03	
R-1199		EOC.	87	2.6	5	262	4	203	.78	.01	
R-1200		EOC.	88	5.8	1	75	<1	8	.12	<.01	
R-1201		EOC.	88	.9	1	62	<1	11	.18	.01	
STATE ALASKA COUNTY				WELL LOCATION 26,23-54S-79W							
WELL NAME				LEASE ALASKA PENINSULA							
R-1202		EOC.	88	.4	1	53	<1	8	.16	.01	
R-1203		EOC.	82	.8	<1	35	<1	4	.18	<.01	
R-1204		EOC.	80	1.6	3	172	<1	13	.08	.02	

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RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 77656A

SOURCE ROCK DATA
TABLE 2c
DATE 01/06/78

SAMPLE NUMBER	DEPTH FEET TOP**BOTTOM	GEOL. AGE	INSOL RESID%	BITUMEN ORG C WT%	BITUMEN BBL/AF	BITUMEN PPM	SAT HC BBL/AF	SAT HC PPM	SAT HC/ BITUMEN	BITUMEN/ TL ORG C	REMARKS
STATE ALASKA COUNTY				WELL LOCATION 26,23-54S-79W							BBL/AF = (PPM X .0180)
WELL NAME				LEASE ALASKA PENINSULA							
R-1945		CRC.	63	10.6	15	859	1	56	.07	.01	

4284

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RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 77 9564

KEROGEN DATA
TABLE 3a
DATE 01/06/78

LAB SAMPLE NUMBER	DEPTH FEET TOP**BOTTOM	GEOL. AGE	NORM. ELEMENTAL ANALYSIS, WT. % CARBON	HYDROGEN	OXYGEN	NITROGEN	ATOMIC RATIO H/C	PERCENT UNSTRU. KEROGEN	PERCENT STRU. KEROGEN	CARBONZ. SCALE	VIT REFLECT %RO
STATE ALASKA COUNTY			WELL LOCATION 17,20,30,31-54S-7W								
WELL NAME			LEASE ALASKA PENINSULA								
R-1175		EOC.	72	4.8	21	2.0	.80	20	80	3-4	
R-1176		EOC.									
R-1177		EOC.			NOT ANALYZED						
R-1178		EOC.									
R-1179		EOC.									
R-1180		EOC.	77	3.9	17	2.2	.62	20	80	3-4	
R-1181		EOC.	73	3.8	20	2.4	.62	10	90	3-4	
R-1182		EOC.	72	3.3	23	2.1	.55	10	90	3-4	
R-1183		EOC.									
R-1184		EOC.			NOT ANALYZED						
R-1185		EOC.									
R-1186		EOC.	74	3.7	21	1.9	.61	5	95	3-4	
R-1187		EOC.	74	3.8	20	2.1	.62	5	95	3-4	
STATE ALASKA COUNTY			WELL LOCATION 13,24,25-55S-7W								
WELL NAME			LEASE ALASKA PENINSULA								
R-1188		EOC.	91	1.2	6	1.2	.16	20	80	6	
R-1189		EOC.	85	2.7	10	2.3	.39	10	90	6	
R-1190		EOC.	79	3.7	15	2.6	.57	10	90	6	
R-1191		EOC.	86	2.5	7	2.0	.34	NOT ANALYZED			

Weathering probably has reduced the carbon and hydrogen, and increased the oxygen contents of many of these kerogens

A M O C O P R O D U C T I O N C O M P A N Y
R E S E A R C H C E N T E R

OFFICE DENVER   DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 77 9584

KEROGEN DATA
TABLE 3b
DATE 01/06/78

LAB SAMPLE NUMBER	DEPTH FEET TOP**BOTTOM	GEOL. AGE	NORM. ELEMENTAL ANALYSIS, WT. % CARBON	HYDROGEN	OXYGEN	NITROGEN	ATOMIC RATIO H/C	PERCENT UNSTRU. KEROGEN	PERCENT STRU. KEROGEN	CARBNZ. SCALE	VIT REFLECT %RO
STATE ALASKA COUNTY			WELL LOCATION 18-55S-78W								
WELL NAME			LEASE ALASKA PENINSULA								
R-1192		EOC.	N O T A V A I L A B L E				.49	10	90	6	
STATE ALASKA COUNTY			WELL LOCATION 12,13-55S-79W								
WELL NAME			LEASE ALASKA PENINSULA								
R-1193		EOC.	94	1.6	4	.2	.20	95	5	6 -7	
R-1194		EOC.	82	2.4	14	1.5	.35	5	95	6	
R-1195		EOC.	82	2.9	13	2.0	.43	5	95	6	
R-1196		EOC.	83	3.3	12	1.7	.47	50	50	5 -6	
STATE ALASKA COUNTY			WELL LOCATION 1-55S-79W								
WELL NAME			LEASE ALASKA PENINSULA								
R-1197		EOC.	N O T A N A L Y Z E D								
STATE ALASKA COUNTY			WELL LOCATION 35-54S-79W								
WELL NAME			LEASE ALASKA PENINSULA								
R-1198		EOC.	84	2.3	11	1.5	.47	10	90	5-6	
R-1199		EOC.	86	3.1	9	1.7	.43	10	90	6	
R-1200		EOC.	83	2.6	13	1.7	.37	5	95	6-7	
R-1201		EOC.	85	3.6	10	1.6	.51	5	95	6	
STATE ALASKA COUNTY			WELL LOCATION 26,23-54S-79W								
WELL NAME			LEASE ALASKA PENINSULA								
R-1202		EOC.	84	3.4	11	1.5	.49	5	95	6	
R-1203		EOC.	85	3.1	10	1.7	.44	5	95	6	
R-1204		EOC.	83	3.3	12	1.6	.47	5	95	6	

See footnote Table 3a

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 79564

KEROGEN DATA
TABLE 3c
DATE 01/08/78

LAB SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	NORM. ELEMENTAL ANALYSIS, WT. % CARBON	HYDROGEN	OXYGEN	NITROGEN	ATOMIC RATIO H/C	PERCENT UNSTRU. KEROGEN	PERCENT STRU. KEROGEN	CARBNZ. SCALE	VIT REFLECT ZRO
STATE ALASKA COUNTY		WELL LOCATION 20.23-54S-79W									
WELL NAME		LEASE ALASKA PENINSULA									
R-1205		LOC.	87	3.7	8	1.5	.51	5	95	6	

See footnote Table 3a

MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name: Alaska Peninsula Outcrops
Location:
State or Country:
Geol. Province:

SRA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1175	3049 Stepovak McGinty Point	OTCP	Stepovak	EOC	LT to MED BR	3-4	Gas	30% Cuticular Mtl 50% Wood and Charcoal 20% Amorphous Mtl Common Palyno
R-1180	3068 // //	"	"	"	"	3-4	Gas	30% Cuticular Mtl 50% Wood and Charcoal 20% Amorphous Mtl Common Palyno
R-1181	3070 // //	"	"	"	"	3-4	Gas	60% Cuticular Mtl 30% Wood and Charcoal 10% Amorphous Mtl Common Palyno
R-1182	3073 // //	"	"	"	"	3-4	Gas	60% Cuticular Mtl 30% Wood and Charcoal 10% Amorphous Mtl Common Palyno
R-1186	3090 // //	"	"	"	"	3-4	Gas	75% Cuticular Mtl 20% Wood and Charcoal 5% Amorphous Mtl Common Palyno

COLOR	CARBONIZATION SCALE	WEIGHT % CARBON
LIGHT YELLOW	1	65%
YELLOW	2	70%
LIGHT BROWN	3	75%
MEDIUM BROWN	4	78%
DARK BROWN	5	81%
BLACK	6	84% 86%
ALL ORGANIC MATTER	7	90%

T.S. 779584CR
Table 4a

MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name: Alaska Peninsula Outcrops
Location:
State or Country:
Geol. Province:

RA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1187	3096 Stepovak McGinty Point	OTCP	Stepovak	EOC	LT to MED BR	3-4	Gas	80% Cuticular Mtl 15% Wood and Charcoal 5% Amorphous Mtl Occasional Palyno
R-1188	4072 Stepovak Misty Ridge	"	"	"	BLK	6	Gas	70% Charcoal like frag. 10% Cuticular like frag. 20% Unstruct Mtl Rare Palyno
R-1189	4077 //	"	"	"	BLK	6	Gas	80% Dark Cuticular like Mtl 10% Wood and Charcoal frag. 10% Unstruct lookinh Mtl Rare Palyno
R-1190	4085 //	"	"	"	BLK	6	Gas	80% Dark Cuticular like Mtl 10% Wood and Charcoal frag. 10% Unstruct looking Mtl Rare Palyno
R-1192	4100 //	"	"	"	BLK	6	Gas	80% Dark Cuticular like Mtl 10% Wood and Charcoal frag. 10% Unstruct looking Mtl Rare Palyno
R-1193	4107 Tolstoi ? Misty Ridge	"	Tolstoi	"	BLK	6-7	Oil (?)	95% Finely divided unstruct Mtl 5% Charcoal like frag. Barren of Palyno
R-1194	4116 //	"	"	"	BLK	6	Gas	70% Dark Cuticular like Mtl 25% Charcoal like Mtl 5% Unstruct looking Mtl Rare Palyno

T. S. 779584CR
Table 4b

MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name: Alaska Peninsula Outcrops
Location:
State or Country:
Geol. Province:

SRA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1195	4128 Tolstoi ? Misty Ridge	OTCP	Tolstoi	EOC	BLK	6	Gas	70% Dark Cuticular like Mtl 25% Charcoal like Mtl 5% Unstruct looking Mtl Rare Palyno
R-1196	4133 // //	"	"	"	DK BR to BLK	5-6	Wet Gas	50% Black Cuticular like Mtl 50% Finely divided unstruct Mt Rare Palyno
R-1198	5126 // //	"	"	"	DK BR to BLK	5-6	Gas	70% Cuticular like Mtl 20% Wood and Charcoal frag. 10% Unstruct looking Mtl Rare Palyno
R-1199	5134 // //	"	"	"	BLK	6	Gas	70% Cuticular like Mtl 20% Wood and Charcoal frag. 10% Unstruct looking Mtl Barren of Palyno
R-1200	5138 // //	"	"	"	BLK	6-7	Gas	75% Cuticular like Mtl 20% Wood and Charcoal frag. 5% Unstruct looking Mtl Barren of Palyno
R-1201	5144 // //	"	"	"	BLK	6	Gas	75% Charcoal looking frag. 20% Cuticular like Mtl 5% Finely divided unstruct Mtl Barren of Palyno
R-1202	5147 // //	"	"	"	BLK	6	Gas	80% Cuticular like Mtl 15% Wood and Charcoal frag. 5% Unstruct looking Mtl Rare Palyno

T.S. 779584CR
Table 4c

MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name: Alaska Peninsula Outcrops
Location:
State or Country:
Geol. Province:

RA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1203	5151	OTCP	Tolstoi Misty Ridge	EOC	BLK	6	Gas	80% Cuticular like Mtl 15% Wood and Charcoal frag. 5% Finely divided unstruct Mtl Rare Palyno
R-1204	5159	"	"	"	BLK	6	Gas	60% Wood and Charcoal frag. 35% Cuticular like Mtl 5% Unstruct looking Mtl Barren of Palyno
R-1205	5162	"	"	"	BLK	6	Gas	85% Wood and Charcoal frag. 10% Cuticular like Mtl 5% instruct looking Mtl Barren of Palyno

T.S. 779584CR
Table 4d

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

SOURCE ROCK EVALUATION

Alaska Peninsula Outcrops

Petroservices Group

R. J. Harwood

Distribution: R. H. Calvert, Attn: W. R. Connelly-Denver
D. F. Work-Denver
D. L. Boyne/J. L. Severson

Technical Service 779608CR
Job 9608
Requested by C. Pierce
DENVER
Roger Hines (12-21-77)

R. J. Harwood
9608

Technical Service No. 779608CR

Subject: Alaska Peninsula Outcrops (Figure 1)

INTRODUCTION

Seven samples from the Cretaceous Hoodoo and Eocene Stepovak formations were submitted for source rock evaluation as part of the Alaska Peninsula study.

SOURCE ROCK EVALUATION

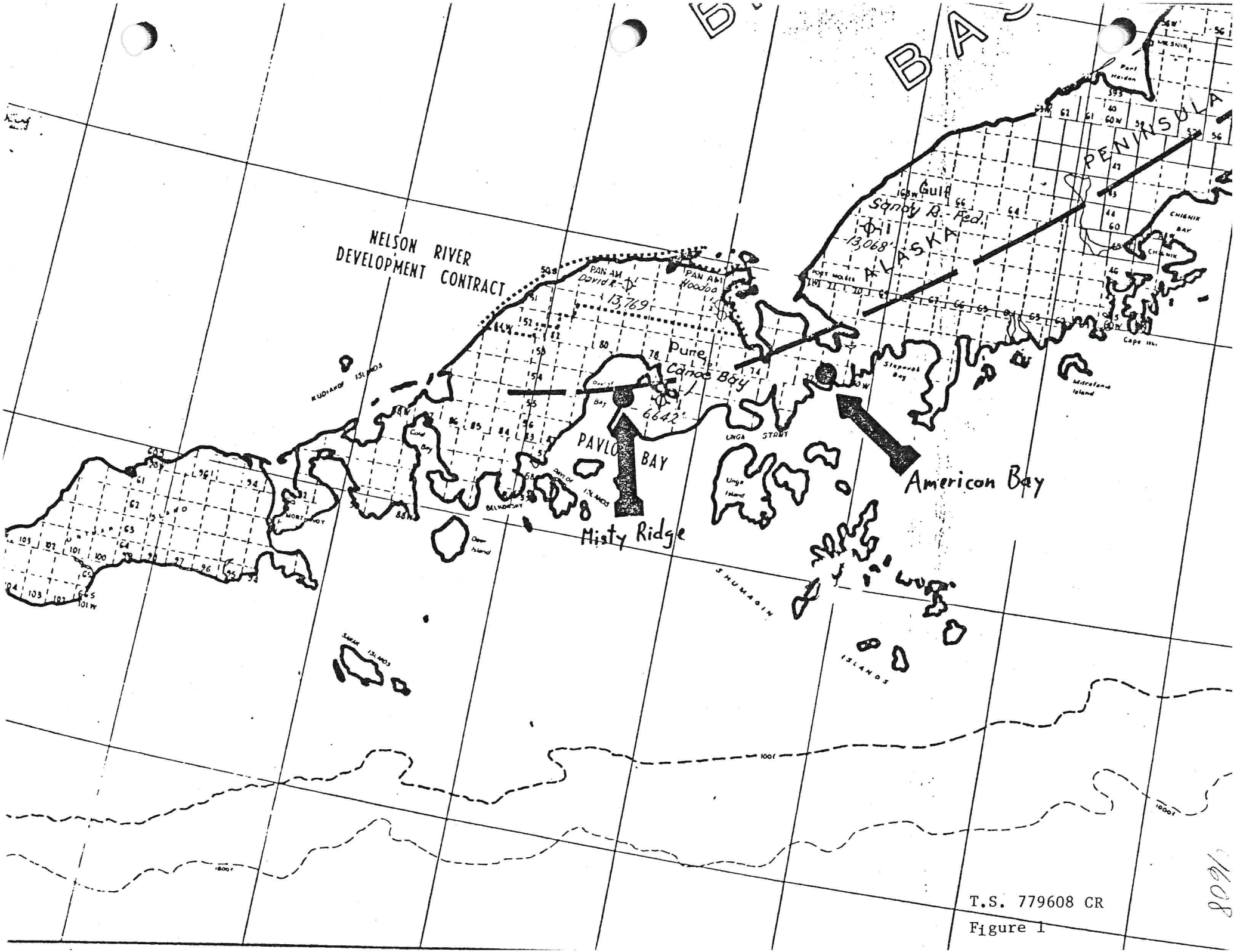
Six samples have fair petroleum generation ratings and one sample has a very good rating based on organic carbon contents (Table 1, 2). The kerogens are gas generating and at peak gas generation (Hoodoo, Stepovak), and possibly advanced diagenesis (Stepovak) for six of the samples according to elemental analysis and visual data (Table 1, 3, 4). One Stepovak sample (5186) appears to be at early peak gas generation from the scale of 5 and H/C ratio of 0.84. Very small amounts of bitumen are present in six of these samples, probably due to the high level of maturation. The slightly larger amount of bitumen in sample 5186 is mature in character according to the saturate fraction

chromatogram (Figure 2). Weathering probably has reduced the organic carbon and bitumen contents of these samples. The liquid generating ability of these samples is difficult to determine because of both weathering and diagenesis effects. These results are similar to other analyses from the general area.

R. J. Harwood

RJH:sb(2)

Attachments

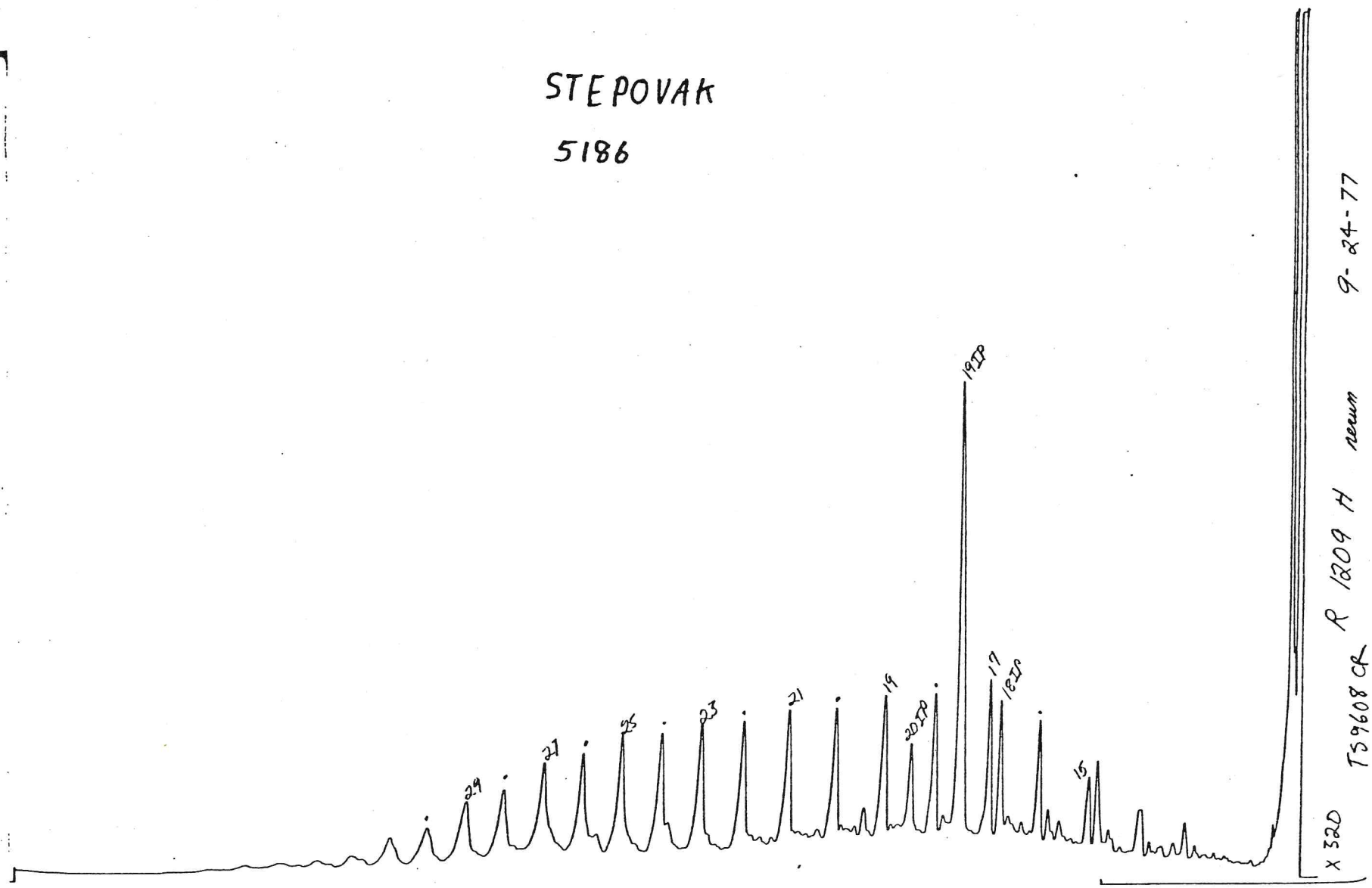


T.S. 779608 CR

Figure 1

STEPOVAK

5186



T.S. 779608 CR
Figure 2

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.R.PIERCE
TECHNICAL SERVICE NUMBER 9608

SOURCE ROCK SUMMARY
TABLE 1.
DATE 12/13/77

SAMPLE NUMBER						DEPTH FEET		PETROLEUM GENERATION	KEROGEN TYPE	STAGE OF	
LAB NO.	FLD NO.	SMPL TYPE	FORMATION	AGE	LITHOLOGY	TOP	BASE	CAPABILITY	(OIL/GAS)	DIAGENESIS	REMARKS
STATE ALASKA COUNTY Misty Ridge Section WELL LOCATION 23.14-5AS-79W 55°26'N, 161°19'W WELL NAME LEASE ALASKA PENINSULA											
R-1206	AP775170	OT	HOODOO	CRET	SHALE	Hoodoo, Misty Ridge		VERY GOOD	Gas	Peak gas	
R-1207	AP775174	OT	HOODOO	CRET	SHALE	"	"	FAIR	"	"	
R-1208	AP775177	OT	HOODOO	CRET	SHALE	"	"	FAIR	"	"	
STATE ALASKA COUNTY WELL LOCATION 5.8.17.20-52S-70W 55°42'N, 160°08'W WELL NAME LEASE ALASKA PENINSULA											
R-1209	AP775186	OT	STEPOVAK	EOC.	SHALE	Stepovak, American Bay		FAIR	"	Early peak gas	
R-1210	AP775196	OT	STEPOVAK	EOC.	SHALE	"	"	FAIR	"	Peak gas	
R-1211	AP775199	OT	STEPOVAK	EOC.	SHALE	"	"	FAIR	"	Advanced?	
R-1212	AP776011	OT	STEPOVAK	EOC.	SHALE	"	"	FAIR	"	"	
R-1213	AP776014	OT	STEPOVAK	EOC.	SHALE	"	"	FAIR	"	"	

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 9608

SOURCE ROCK DATA
TABLE 2.
DATE 12/13/77

SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	INSOL RESIDX	BIT-FREE ORG C WT%	BITUMEN BBL/AF	BITUMEN PPM	SAT HC BBL/AF	SAT HC PPM	SAT HC/ BITUMEN	BITUMEN/ TL ORG C	REMARKS
											BBL/AF = (PPM X .0180)
STATE ALASKA COUNTY				WELL LOCATION 23.14-54S-79W							
WELL NAME				LEASE ALASKA PENINSULA							
R-1206		CRET	86	?.?	2	88	<1	3	.04	<.01	
R-1207		CRET	82	.8	2	91	<1	6	.08	.01	
R-1208		CRET	83	.9	1	60	<1	6	.11	.01	
STATE ALASKA COUNTY				WELL LOCATION 5.8.17.20-52S-70W							
WELL NAME				LEASE ALASKA PENINSULA							
R-1209		EOC.	83	.7	3	186	<1	52	.28	.03	
R-1210		EOC.	83	.9	1	68	<1	8	.13	.01	
R-1211		EOC.	80	.7	1	45	<1	3	.07	.01	
R-1212		EOC.	83	.7	<1	22	<1	11	.50	<.01	
R-1213		EOC.	83	.8	1	34	<1	10	.31	<.01	

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 9608

KEROGEN DATA
TABLE 3.
DATE 12/13/77

LAB SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	NORM. ELEMENTAL ANALYSIS.WT. % CARBON	HYDROGEN	OXYGEN	NITROGEN	ATOMIC RATIO H/C	PERCENT UNSTRU. KEROGEN	PERCENT STRU. KEROGEN	CARBNZ. SCALE	VIT REFLECT %RO
STATE ALASKA COUNTY			WELL LOCATION 23.14-54S-79W								
WELL NAME			LEASE ALASKA PENINSULA								
R-1206		CRET	85	2.3	11	1.5	.33	2	98	6-7	
R-1207		CRET	83	2.9	13	1.5	.43	5	95	6	
R-1208		CRET	87	3.4	8	1.3	.46	5	95	6	
STATE ALASKA COUNTY			WELL LOCATION 5.8.17.20-52S-70W								
WELL NAME			LEASE ALASKA PENINSULA								
R-1209		EOC.	78*	5.4	15	1.7	.84	10	90	5	
R-1210		EOC.	86	3.8	8	1.8	.54	5	95	6	
R-1211		EOC.	91	3.0	4	1.6	.40	10	90	6	
R-1212		EOC.	92	2.1	4	1.0	.28	10	90	6	
" R-1213		EOC.	93	2.0	4	.7	.26	5	95	6	

* Carbonization low due to weathering.

MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name:
Location: Alaska Peninsula Outcrops
State or Country:
Geol. Province:

SRA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1206	5170	OTCP	Hoodoo Misty Ridge	Cret	Black	6-7	Gas	98% Wood and charcoal frag 2% Unstruct looking mtl Barren of palyno
R-1207	5174	OTCP	Hoodoo "	Cret	Black	6	Gas	90% Wood and charcoal 5% Cuticular mtl 5% Unstruct looking mtl Rare palyno
R-1208	5177	OTCP	Hoodoo "	Cret	Black	6	Gas	90% Wood and charcoal 5% Cuticular mtl 5% Unstruct looking mtl Barren of palyno
R-1209	5186	OTCP	Stepovak American Bay	Eoc	Dk Br	5	Gas	60% Cuticular like mtl 30% Wood and charcoal 10% Unstruct looking mtl Occasional palyno

COLOR	CARBONIZATION SCALE	WEIGHT % CARBON
LIGHT YELLOW	1	65%
YELLOW	2	70%
LIGHT BROWN	3	75%
MEDIUM BROWN	4	78%
DARK BROWN	5	81%
BLACK	6	84% 86%
ALL ORGANIC MATTER	7	90%

MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name:
Location: Alaska Peninsula Outcrops
State or Country:
Geol. Province:

SRA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1210	5196	OTCP	Stepovak American Bay	EOC	Black	6	Gas	90% Wood and charcoal 5% Cuticular mtl 5% Unstruct mtl Rare palyno
R-1211	5199	OTCP	Stepovak //	EOC	Black	6	Gas	70% Cuticular like mtl 20% Wood and charcoal 10% Unstruct mtl Common palyno
R-1212	6011	OTCP	Stepovak //	EOC	Black	6	Gas	75% Cuticular like mtl 15% Wood and charcoal 10% Unstruct looking mtl Rare palyno
R-1213	6014	OTCP	Stepovak //	EOC	Black	6	Gas	70% Cuticular like mtl 25% Wood and charcoal 5% Unstruct looking mtl Rare palyno

T. S. 779608CR
Table 4b

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

SOURCE ROCK EVALUATION

Alaska Peninsula Outcrops

Petroservices Group

R. J. Harwood

Distribution: R. H. Calvert, Attn: W. Connelly-Denver
D. F. Work-Denver
D. L. Boyne/J. L. Severson

Technical Service 779671CR
Job 9671
Requested by D. J. Hartmann
DENVER DIVISION

Roger Haines (2-28-78)
D. L. Boyne 78.03.28

R. J. Harwood
9671

TECHNICAL SERVICE 779671CR

Subject: Alaska Peninsula Outcrops (figure 1)

INTRODUCTION

An additional six samples from the Alaska Peninsula were submitted for analysis as part of the investigation of this area.

CONCLUSIONS

1. The single Cretaceous Chignik sample has very good generating capability and appears to be oil source in past peak oil - peak gas generation.

2. A poor and a good-rated Eocene Tolstoi sample may have been oil sources, and the other two Tolstoi samples are poor gas sources.

3. The one Pliocene Tachilni sample is a thermally immature oil source with a poor rating.

DISCUSSION

Kerogen Evaluation

Based on organic carbon contents these samples are rated as follows: Tolstoi 3 poor, 1 good; Tachilni - 1 poor; Chignik - 1 very good (tables 1, 2). Visual kerogen evaluation (tables 3, 4) shows that the Chignik sample and Tolstoi sample 2132 are oil sources in a past peak stage of oil generation; the Tachilni sample appears to be a thermally immature oil source. Data for the Tolstoi samples show less internal consistency than normal. Visual analyses suggest that the other Tolstoi samples are mature gas sources; however, bitumen data indicate that Tolstoi sample 2142 may have some liquid generating ability. Elemental analyses (table 3) in general confirm these stages of diagenesis, but the low hydrogen

content of the immature Tachilni sample does not confirm an oil generating potential. Weathering, in addition to reducing the organic carbon and bitumen amounts, can affect the carbon and hydrogen contents of the kerogen.

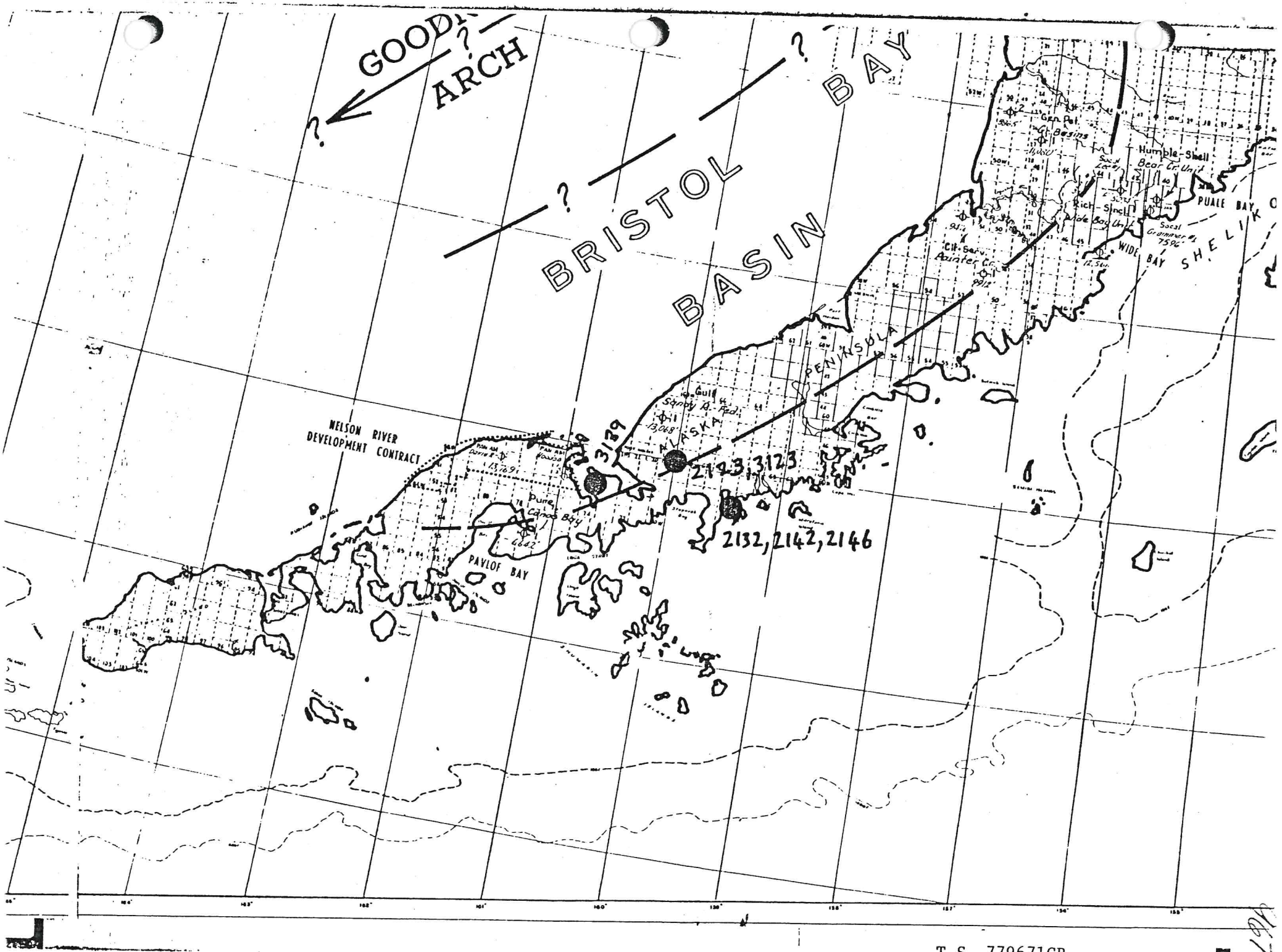
Bitumen Analyses

All samples except Tolstoi sample 2142 and Chignik sample 3139 have small amounts of bitumen (table 2). These two samples contain moderate amounts of bitumen, and the bitumen is composed dominantly of saturated hydrocarbons. According to saturate fraction chromatograms (figure 2) these bitumens appear unbiodegraded and have a waxy character. Carbon isotope values and infrared spectra are similar for these bitumens. A significant amount of bitumen in the Chignik sample is expected as it appears to be a mature oil source, but the high proportion of structured kerogen in the Tolstoi sample would not suggest a major liquid generating ability. This Tolstoi sample either has generated more petroleum liquids than is expected from the kerogen appearance, or migrated oil is present. These choices for the Tolstoi plus the existence of the very-good-rated Chignik oil generating sample are favorable signs for petroleum exploration in this area.

Robert J. Harwood

R. J. Harwood

RJH:sh
186580



T.S. 779671CR
Figure 1

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.R. PIERCE
TECHNICAL SERVICE NUMBER 779671

SOURCE ROCK SUMMARY
TABLE 1.
DATE 02/13/78

SAMPLE NUMBER LAB NO.	SAMPLE NUMBER FLD NO.	SMPL TYPE	FORMATION	AGE	LITHOLOGY	DEPTH FEET TOP***BASE	PETROLEUM GENERATION CAPABILITY	KEROGEN TYPE (OIL/GAS)	STAGE OF DIAGENESIS	REMARKS
STATE ALASKA COUNTY PORT MOLLER QUAD WELL LOCATION 2,3,10,15-50S-66W										
WELL NAME IVANOF BAY SECTION LEASE ALASKA PENINSULA OUTCROPS										
R-1371	AP 2132	OT	TOLSTOI	EOC	SHALE	Tolstoi, Ivanof Bay	POOR	Oil		Past peak oil - peak gas
R-1373	AP 2142	OT	TOLSTOI	EOC	SHALE	" "	GOOD	Gas (oil?)		Peak gas (past peak oil)
R-1374	AP 2146	OT	TOLSTOI	EOC	SHALE	" "	POOR	Gas		Peak gas
STATE ALASKA COUNTY PORT MOLLER QUAD WELL LOCATION 26,27,34,35-48S-69W										
WELL NAME MILKY RIVER SECTION LEASE ALASKA PENINSULA OUTCROPS										
R-1372	AP 2123	OT	TOLSTOI	EOC	SHALE	Stepovak?, Milky River	POOR	"		"
STATE ALASKA COUNTY PORT MOLLER QUAD WELL LOCATION C 48S-69W										
WELL NAME MILKY RIDGE SECTION LEASE ALASKA PENINSULA OUTCROPS										
R-1375	AP 3123	OT	TACHILNI	PLIO	SHALE	Tachilni, Milky Ridge	POOR	Oil		Pregeneration
STATE ALASKA COUNTY PORT MOLLER QUAD WELL LOCATION 29,32-50S-74W										
WELL NAME COAL BLUFF SECTION LEASE ALASKA PENINSULA OUTCROPS										
R-1376	AP 3139	OT	CHIGNIK	CRET	SHALE	Coal Valley Fm, Coal Bluff	VERY GOOD	"		Past peak oil-peak gas

1 of 1

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.R. PIERCE
TECHNICAL SERVICE NUMBER 779671

SOURCE ROCK SUMMARY
TABLE 1.
DATE 02/13/78

SAMPLE NUMBER LAB NO.	SAMPLE NUMBER FLD NO.	SMPL TYPE	FORMATION	AGE	LITHOLOGY	DEPTH FEET TOP***BASE	PETROLEUM GENERATION CAPABILITY	KEROGEN TYPE (OIL/GAS)	STAGE OF DIAGENESIS	REMARKS
STATE ALASKA COUNTY PORT MOLLER QUAD WELL LOCATION 2.3.10.15-50S-66W										
WELL NAME IVANOF BAY SECTION LEASE ALASKA PENINSULA OUTCROPS										
R-1371	AP 2132	OT	TOLSTOI	EOC	SHALE	Tolstoi, Ivanof Bay	POOR	Oil	Past peak oil - peak gas	
R-1373	AP 2142	OT	TOLSTOI	EOC	SHALE	" "	GOOD	Gas (oil?)	Peak gas (past peak oil)	
R-1374	AP 2146	OT	TOLSTOI	EOC	SHALE	" "	POOR	Gas	Peak gas	
STATE ALASKA COUNTY PORT MOLLER QUAD WELL LOCATION 26.27.34.35-48S-69W										
WELL NAME MILKY RIVER SECTION LEASE ALASKA PENINSULA OUTCROPS										
R-1372	AP 2123	OT	TOLSTOI	EOC	SHALE	Stepovak?, Milky River	POOR	"	"	
STATE ALASKA COUNTY PORT MOLLER QUAD WELL LOCATION C 48S-69W										
WELL NAME MILKY RIDGE SECTION LEASE ALASKA PENINSULA OUTCROPS										
R-1375	AP 3123	OT	TACHILNI	PLIO	SHALE	Tachilni, Milky Ridge	POOR	Oil	Pregeneration	
STATE ALASKA COUNTY PORT MOLLER QUAD WELL LOCATION 29.32-50S-74W										
WELL NAME COAL BLUFF SECTION LEASE ALASKA PENINSULA OUTCROPS										
R-1376	AP 3139	OT	CHIGNIK	CRET	SHALE	Coal Valley Fm, Coal Bluff.	VERY GOOD	"	Past peak oil-peak gas	

11-01

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 779671

SOURCE ROCK DATA
TABLE 2.
DATE 02/13/78

SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	INSOL RESID%	BIT-FREE ORG C WT%	BITUMEN BBL/AF	BITUMEN PPM	SAT HC BBL/AF	SAT HC PPM	SAT HC/ BITUMEN	BITUMEN/ TL ORG C	REMARKS
											BBL/AF = (PPM X .0180)
											SAT. FRAC. δC^{13} o/oo
STATE ALASKA COUNTY PORT MOLLER QUAD					WELL LOCATION 2,3,10,15-50S-66W						
WELL NAME IVANOF BAY SECTION					LEASE ALASKA PENINSULA OUTCROPS						
R-1371		EOC	81	.4	1	80	<1	18	.23	.02	
R-1373		EOC	83	1.2	10	558	7	368	.66	.04	-28.4
R-1374		EOC	85	.6	1	55	<1	4	.09	.01	
STATE ALASKA COUNTY PORT MOLLER QUAD					WELL LOCATION 26,27,34,35-48S-69W						
WELL NAME MILKY RIVER SECTION					LEASE ALASKA PENINSULA OUTCROPS						
R-1372		EOC	67	.5	2	99	<1	14	.15	.02	
STATE ALASKA COUNTY PORT MOLLER QUAD					WELL LOCATION C 48S-69W						
WELL NAME MILKY RIDGE SECTION					LEASE ALASKA PENINSULA OUTCROPS						
R-1375		PLIO	69	.5	3	178	<1	21	.12	.04	
STATE ALASKA COUNTY PORT MOLLER QUAD					WELL LOCATION 29,32-50S-74W						
WELL NAME COAL BLUFF SECTION					LEASE ALASKA PENINSULA OUTCROPS						
R-1376		CRET	80	2.2	20	1084	13	695	.64	.05	-28.2

MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name: Alaska Peninsula Outcrops
Location:
State or Country:
Geol. Province:

SRA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1371	2132	OTCP	Tolstoi Ivanof Bay	EOC	Black	6	Oil	95% Dark unstruct looking mtl 5% Charcoal like frag Barren of palyno
R-1373	2142	OTCP	Tolstoi "	EOC	Dk Br to Blk	5-6	Gas	80% Dark cuticular frag 10% Charcoal frag 10% Unstruct looking mtl Rare palyno
R-1374	2146	OTCP	Tolstoi "	EOC	Black	6	Gas	90% Black cuticular like frag 5% Charcoal frag 5% Unstruct looking mtl Barren of palyno
R-1372	2123	OTCP	Tolstoi Milky River	EOC	Dk Br to Blk	5-6	Gas	80% Dark cuticular frag 10% Charcoal frag 10% Unstruct looking mtl Occasional palyno

COLOR	CARBONIZATION SCALE	WEIGHT % CARBON
LIGHT YELLOW	1	65%
YELLOW	2	70%
LIGHT BROWN	3	75%
MEDIUM BROWN	4	78%
DARK BROWN	5	81%
BLACK	6	84% 86%
ALL ORGANIC MATTER BLACK	7	90%

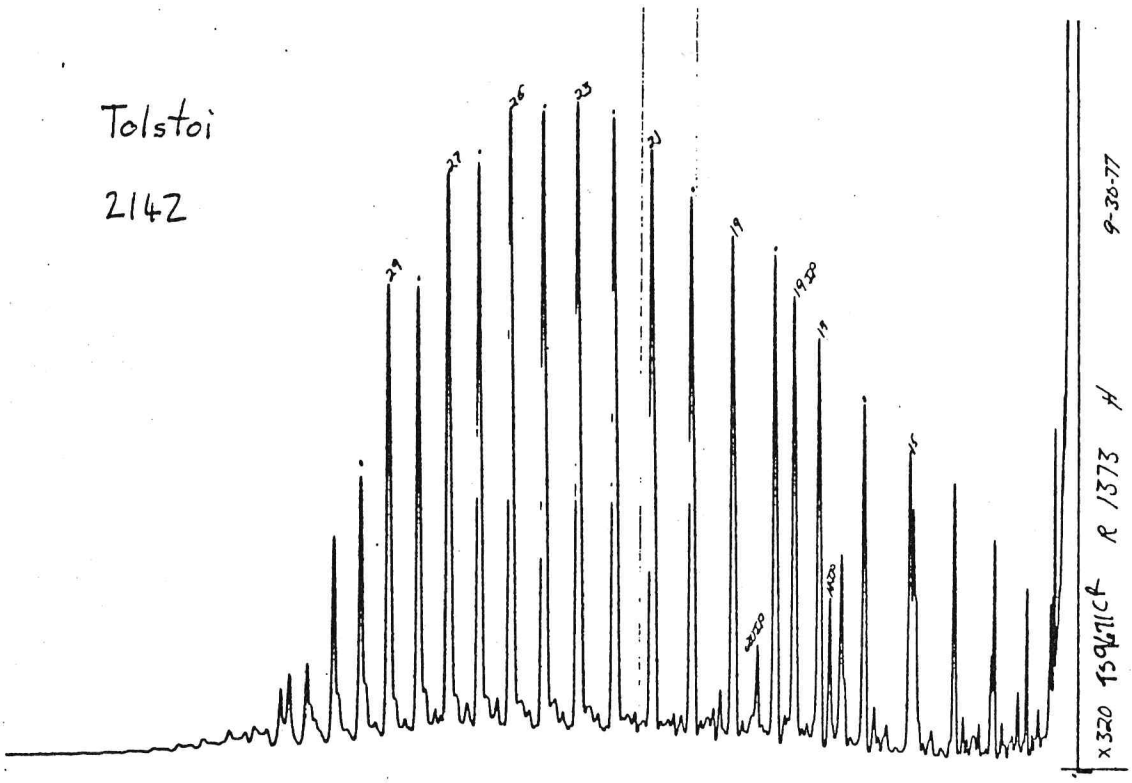
T.S.779671CR
Table 4a

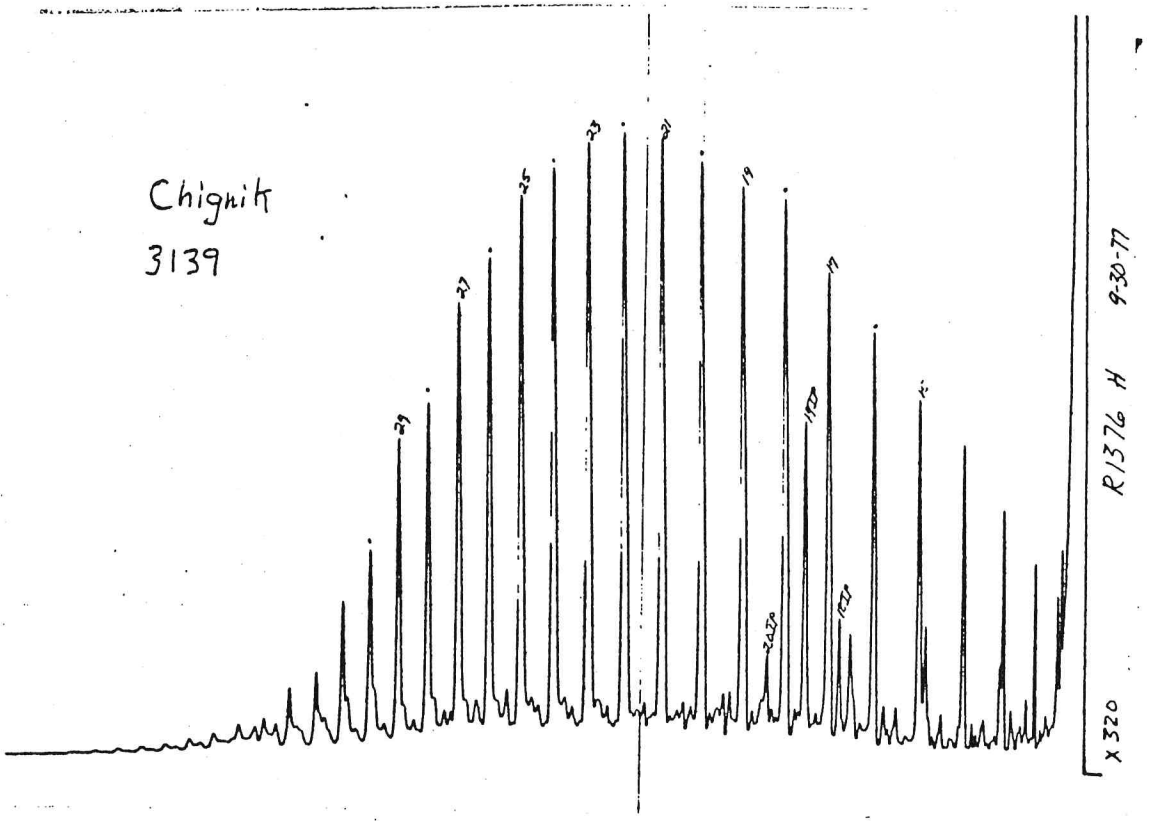
MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name: Alaska Peninsula Outcrops
Location:
State or Country:
Geol. Province:

SRA No.	FIELD No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1375	3123	OTCP	Tachilni Milky Ridge	Plio	Lt Br	3	Oil	90% Amorphous looking mtl 10% Cuticular like mtl Barren of palyno
R-1376	3139	OTCP	Chignik Coal Valley Coal Bluff	Cret	Black	6-7	Oil (?)	95% Black unstruct looking mtl 5% Charcoal like frag Barren of palyno

T.S.779671CR
Table 4b





Saturation Fraction Chromatogram
T.S. 779671CR
Figure 2

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

Source Rock Evaluation

Eocene Outcrop Samples, Alaska Peninsula

Petroservices

R. J. Harwood

Distribution: R. H. Calvert, Attn: W. Connelly-Denver
D. F. Work-Denver
D. L. Boyne/J. L. Severson

Technical Service 779693CR
Job 9693
Requested by D. J. Hartmann
Denver Division

Roger [illegible] (2-6-78)
D. L. Boyne 78.02.06

[redacted]

RJ Harwood
9693

9693

Amoco Production Company
4502 East 41st Street
P.O. Box 591
Tulsa, Oklahoma 74102
Research Center

February 3, 1978

Technical Service 779693CR

Subject: Eocene Outcrop Samples, Alaska Peninsula (Figure 1)

INTRODUCTION

An additional six samples from the Eocene Tolstoi Formation were submitted for analysis as part of the continuing Alaska Peninsula study.

CONCLUSIONS

1. These samples are rated as 4 nonsource, 1 poor, and 1 very good.

2. The sample with a very good rating is a gas source at peak gas generation and the sample with a poor rating may be a marginal quality oil source at past peak oil-peak gas generation.

3. No evidence of migrated oil is seen in these samples.

DISCUSSION

The petroleum generation ratings of these samples based on organic carbon contents (Table 1,2) are 4 nonsource, 1 poor, and 1 very good.

Visual evaluations (Table 3,4) are somewhat tenuous because of the dark color of the kerogens, but the very good-rated sample appears to contain gas-type kerogen and the poor-rated sample appears to contain oil-type kerogen. Both visual and elemental analyses (Table 3) indicate that the kerogens are at peak gas generation (past peak oil generation for sample 2035). Therefore, the hydrogen content of the kerogens cannot help determine the kerogen type because of hydrogen loss during hydrocarbon generation. Only small amounts of bitumen (Table 2) are present in these samples, probably because of the high stage of diagenesis. Too little bitumen is present to confirm oil generation for sample 2035 or interpret migrated oil.

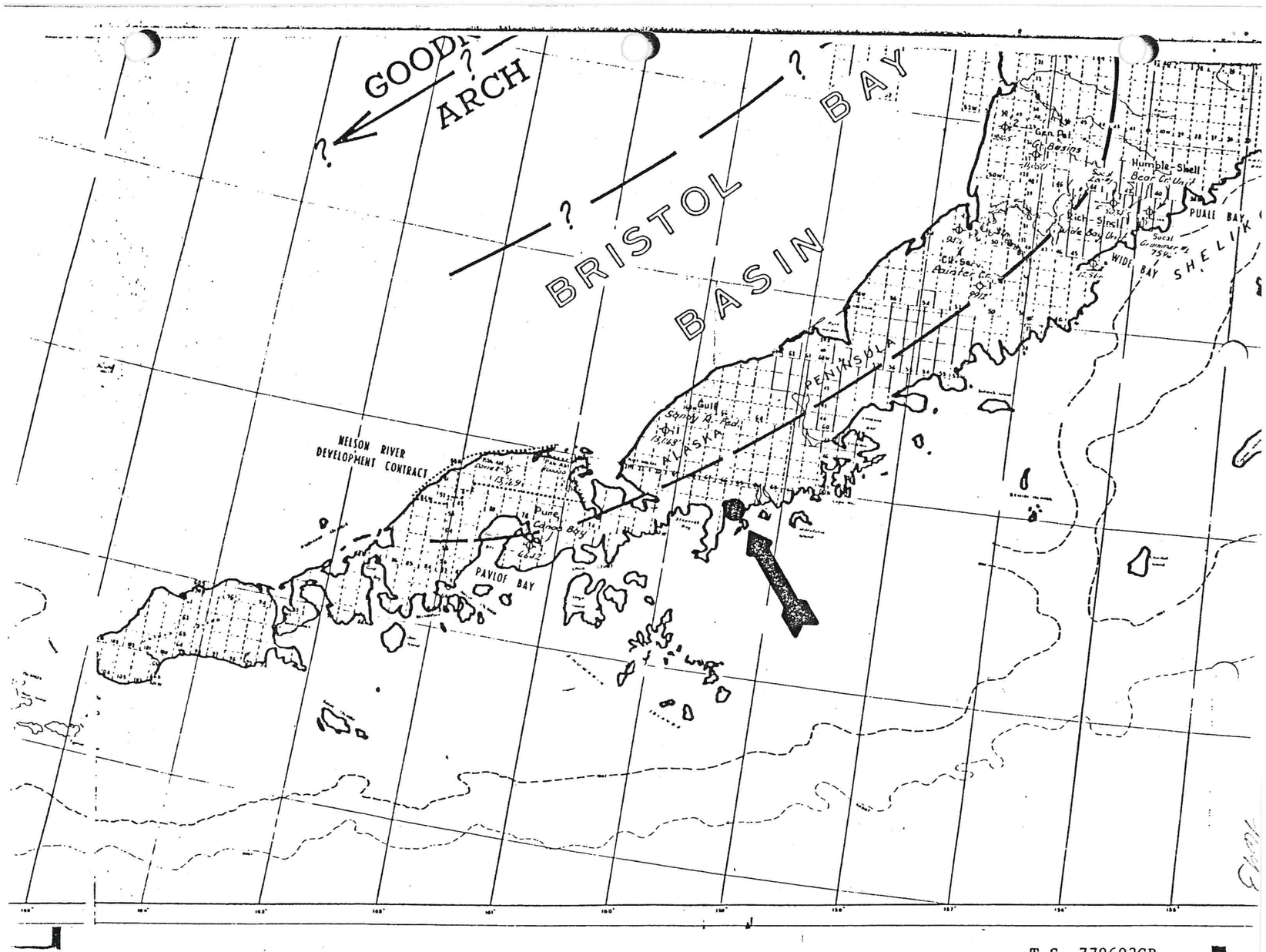
As with all outcrop samples, weathering could have reduced the organic carbon and bitumen contents, altered the elemental carbon and hydrogen contents, and also decreased the unstructured kerogen contents. Sample 2035 is the first indication of possibly significant oil generating ability in the Alaska Peninsula area, although the low organic carbon percentage reduces the importance of this sample.

Robert J. Harwood

R. J. Harwood

RJH:mk (1)

Attachments



T.S. 779693CR
Figure 1

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.R. PIERCE
TECHNICAL SERVICE NUMBER 779693

SOURCE ROCK SUMMARY
TABLE 1.
DATE 01/26/78

SAMPLE NUMBER LAB NO.	SAMPLE NUMBER FLD NO.	SMPL TYPE	FORMATION	AGE	LITHOLOGY	DEPTH FEET TOP***BASE	PETROLEUM GENERATION CAPABILITY	KEROGEN TYPE (OIL/GAS)	STAGE OF DIAGENESIS	REMARKS
STATE ALASKA COUNTY Stepovak Bay Quad. WELL LOCATION 2, 3, 10, 15-50S-66W										
WELL NAME Ivanof Bay Section LEASE ALASKA PENINSULA OUTCROPS										
R-1377	AP772022	OT	TOLSTOI Fm	EOC.	SHALE	Tolstoi Fm, Ivanof Bay	NON SOURCE			
R-1378	AP772024	OT	TOLSTOI	EOC.	SHALE	〃 〃	NON SOURCE			
R-1379	AP772031	OT	TOLSTOI	EOC.	SHALE	〃 〃	NON SOURCE			
R-1380	AP772033	OT	TOLSTOI	EOC.	SHALE	〃 〃	VERY GOOD	Gas	Peak gas	
R-1381	AP772035	OT	TOLSTOI	EOC.	SHALE	〃 〃	POOR	Oil?	Past peak oil - peak gas	
R-1382	AP772037	OT	TOLSTOI	EOC.	SHALE	〃 〃	NON SOURCE			

AMOCO PRODUCTION COMPANY
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OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 77 9693

SOURCE ROCK DATA
TABLE 2.
DATE 01/26/78

SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	INSOL RESID%	BIT-FREE ORG C WT%	BITUMEN BBL/AF	BITUMEN PPM	SAT HC BBL/AF	SAT HC PPM	SAT HC/ BITUMEN	BITUMEN/ TL ORG C	REMARKS
STATE ALASKA COUNTY					WELL LOCATION						BBL/AF = (PPM X .0180)
WELL NAME					LEASE ALASKA PENINSULA OUTCROPS						
R-1377		EOC.	68	.2	1	41	<1	5	.13	.03	
R-1378		EOC.	50	.2	1	83	<1	4	.06	.04	
R-1379		EOC.	67	.3	1	41	<1	1	.04	.01	
R-1380		EOC.	79	3.8	2	107	<1	11	.11	<.01	
R-1381		EOC.	83	.5	1	74	<1	18	.24	.02	
R-1382		EOC.	66	.3	1	71	<1	3	.04	.03	

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OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 779693

KEROGEN DATA
TABLE 3.
DATE 01/26/78

LAB SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	NORM. ELEMENTAL ANALYSIS,WT. % CARBON	HYDROGEN	OXYGEN	NITROGEN	ATOMIC RATIO H/C	PERCENT UNSTRU. KEROGEN	PERCENT STRU. KEROGEN	CARBNZ. SCALE	VIT REFLECT %RO
STATE ALASKA COUNTY			WELL LOCATION								
WELL NAME			LEASE ALASKA PENINSULA OUTCROPS								
R-1377		EOC.	90	4.2	5	1.2	.56	20	80	5-6	
R-1378		EOC.	89	3.6	6	1.2	.49	20	80	5-6	
R-1379		EOC.	90	3.8	5	1.2	.50	80	20	5-6	
R-1380		EOC.	89	3.5	6	1.6	.47	5	95	6	
R-1381		EOC.	88	3.4	7	1.4	.46	80	20	5-6	
R-1382		EOC.	90	4.2	4	1.5	.57	80	20	5-6	

MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name:
Location: Alaska Peninsula
State or Country:
Geol. Province:

SRA No.	Field No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1377	2022	OTCP	Tolstoi Ivan of Bay	EOC	Dk Br To Blk	5-6	Gas	80% Black struct frag 20% unstruct looking mtl Rare palyno
R-1378	2024	OTCP	Tolstoi "	EOC	Dk Br To Blk	5-6	Gas	80% Black struct frag 20% unstruct looking mtl Barren of palyno
R-1379	2031	OTCP	Tolstoi "	EOC	Dk Br To Blk	5-6	Oil?	80% unstruct looking mtl 20% struct like frag. Barren of palyno
R-1380	2033	OTCP	Tolstoi "	EOC	Black	6	Gas	95% black charcoal like frag. 5% unstruct looking mtl Barren of palyno

COLOR	CARBONIZATION SCALE	WEIGHT % CARBON
LIGHT YELLOW	1	65%
YELLOW	2	70%
LIGHT BROWN	3	75%
MEDIUM BROWN	4	78%
DARK BROWN	5	81%
BLACK	6	84% 86%
ALL ORGANIC MATTER BLACK	7	90%

T.S. 779693CR
Table 4a

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MICROSCOPIC KEROGEN ANALYSIS

Division: Denver
Well Name:
Location: Alaska Peninsula Outcrops
State or Country:
Geol. Province:

SRA No.	Field No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1381	2035	OTCP	Tolstoi Ivanof Bay	EOC	Dk. Br To Blk	5-6	Oil?	80% unstruct looking mtl 20% struct like frag. Barren of palyno
R-1382	2037	OTCP	Tolstoi "	EOC	Dk Br To Blk	5-6	Oil?	80% unstruct looking mtl 20% struct like frag. Barren of palyno

COLOR	CARBONIZATION SCALE	WEIGHT % CARBON
LIGHT YELLOW	1	65%
YELLOW	2	70%
LIGHT BROWN	3	75%
MEDIUM BROWN	4	78%
DARK BROWN	5	81%
BLACK	6	84% 86%
ALL ORGANIC MATTER BLACK	7	90%

T.S. 779693CR
Table 4b

AMOCO PRODUCTION COMPANY
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Source Rock Evaluation

Alaska Peninsula, Shelikof Strait Outcrops

Petroservices Group

R. J. Harwood

Distribution: J. H. Calvert, Attn: W. R. Connelly - Denver
D. F. Work - Denver
D. L. Boyne/J. L. Severson

Technical Service 779717CR
Job 9717
Requested by D. J. Hartmann
Denver Division

Roger Thomas (11-18-77)

9717 R.J. Harwood

Technical Service No. 779717CR

Subject: Alaska Peninsula, Shelikof Strait Outcrops (Figure 1)

INTRODUCTION

Thirteen outcrop samples of Cretaceous and Jurassic age from the Alaska Peninsula were submitted for source rock analysis. Preliminary results of these analyses have been discussed by J. A. Momper and G. J. Wiloth as part of an evaluation for the lower Cook Inlet sale.

SOURCE ROCK EVALUATION

1. Petroleum generation ratings of these samples based on organic carbon (Table 1, 2) are: Cretaceous 3 nonsource, 3 poor, and 6 fair; Jurassic 1 nonsource. As with all outcrop samples, weathering could have reduced both the organic carbon and bitumen contents. Visual analyses (Table 3, 4) show the stage of diagenesis is early peak gas to peak gas generation. Large amounts of reworked charcoal in these samples have caused high carbonizations (Table 3), low hydrogen contents, and low H/C ratios.

2. Only small amounts of bitumen are present in these samples because of the gas generating character and high stage of diagenesis.

3. Saturate chromatograms (Figure 2a, b) show that these samples are thermally mature. Groups of these chromatograms showing similar character are: (1) 2260, 2263, 2266, 2269, 2271; (2) 2274, 2277, 2280; (3) 2283, 2286, 2290, 2292; (4) 3156. Categories (1) and (2) include those samples with the highest organic carbon contents.

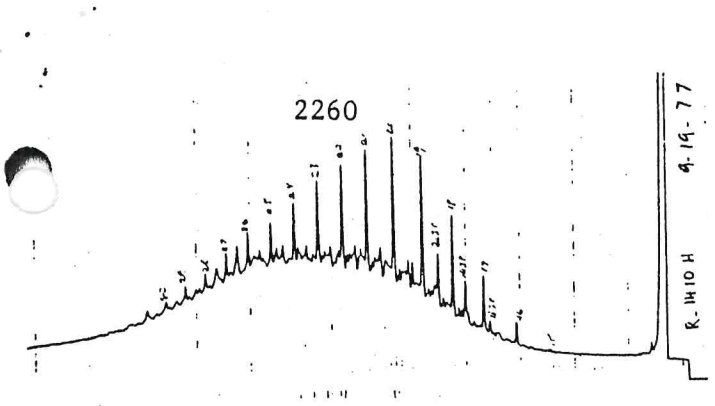
4. Because of the large amount of reworked kerogen with low hydrogen contents, this section appears to have a mediocre petroleum generating ability.

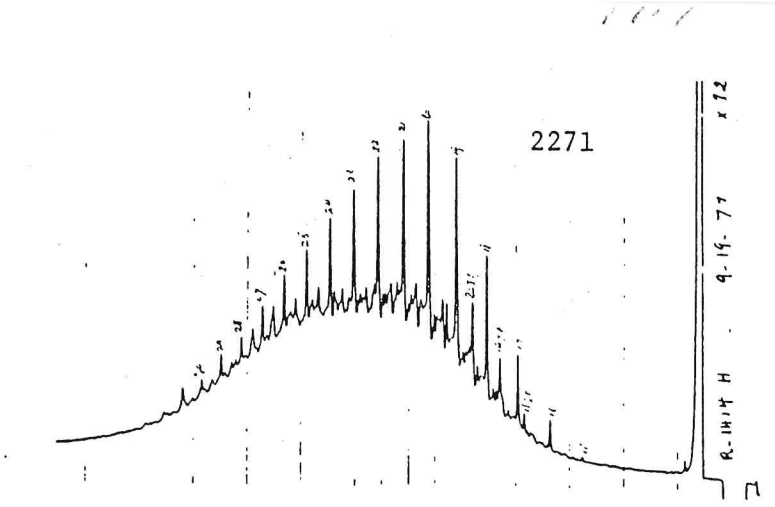
R. J. Harwood

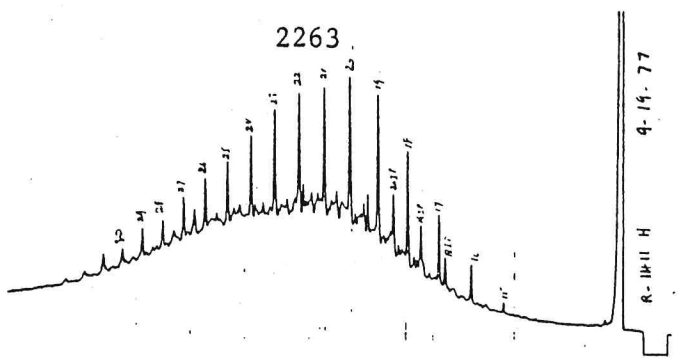
RJH:mk (5)

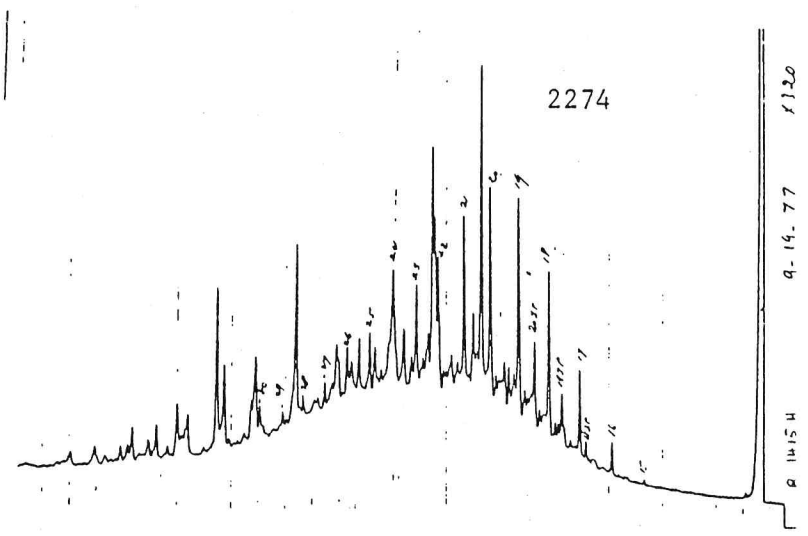
Attachments

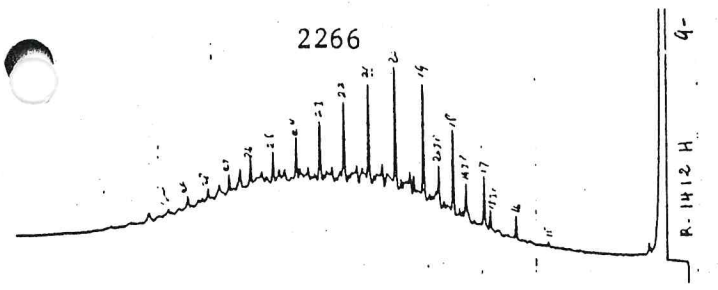
ALEUTIAN RANGE
COOK INLET BASIN
Hunt
Kalgin Is
KENAI
Hunt
Old Mans Bay
Iniskin
Bepl No. 1
Zappa No. 1
Std-Cal.
Halbouty
ILIAMNA
LAKE
DILLINGHAM
KOGGIUNG
KING SALMON
Gen. Pet.
Gt. Basins
Humble-Shell
Bear Cr. Unit
Socal
Rich-Sinclair
Pide Bay Unit
Socal
PUALE BAY
ALASKA PENINSULA
COOK INLET
PORTLOCK
KODIAK
ISLAND
T.S. 779717
Figure 1

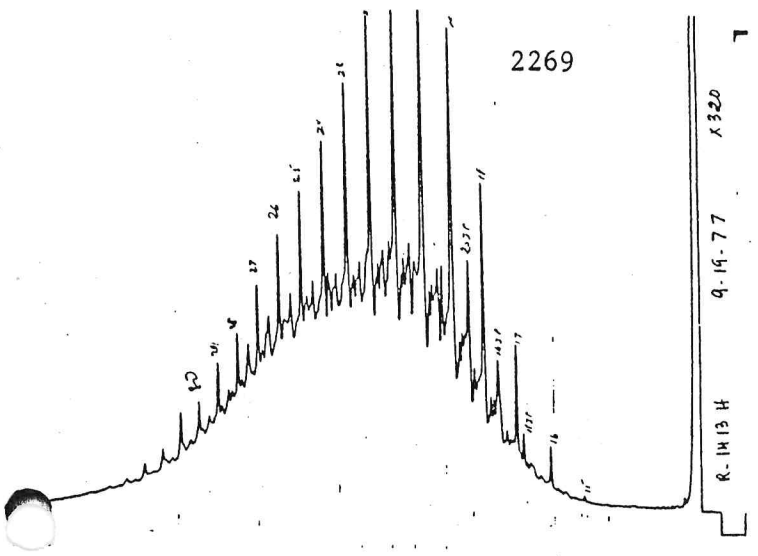


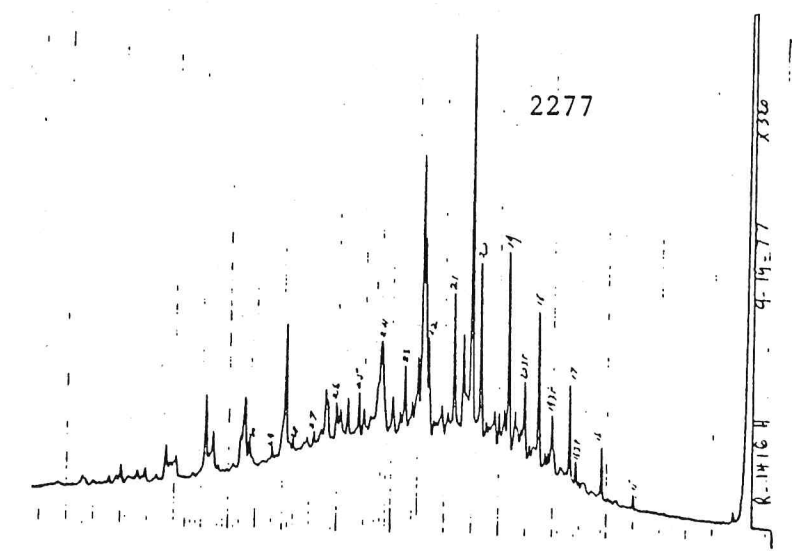






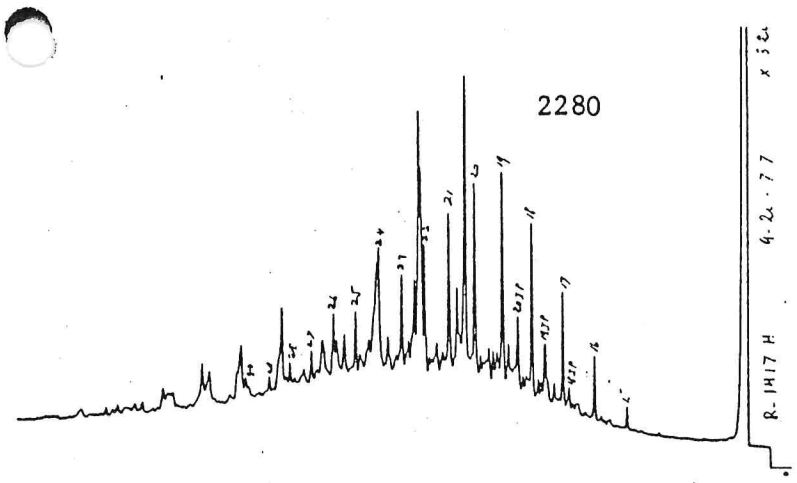


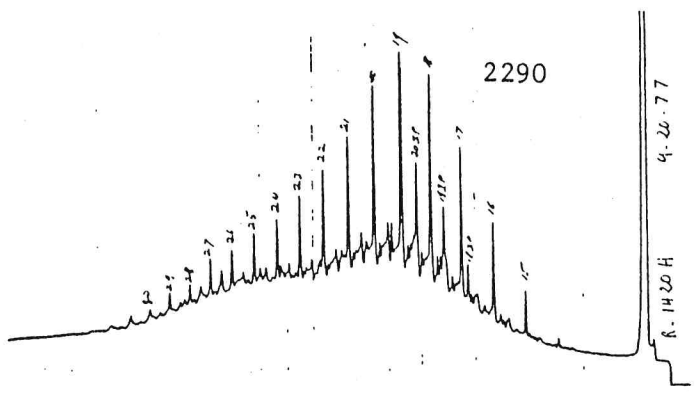


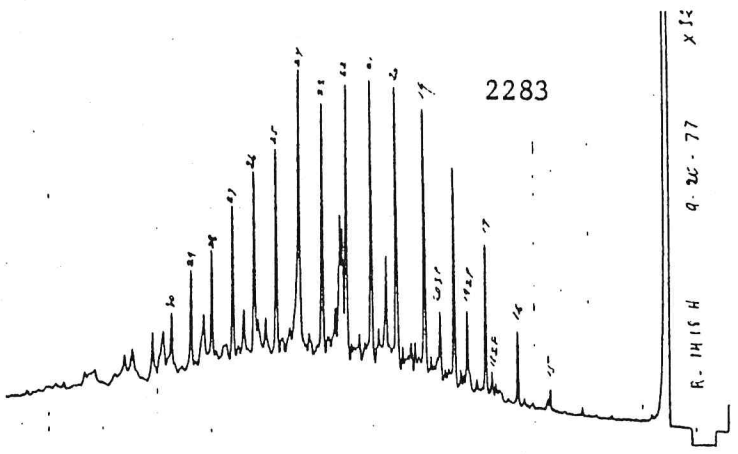


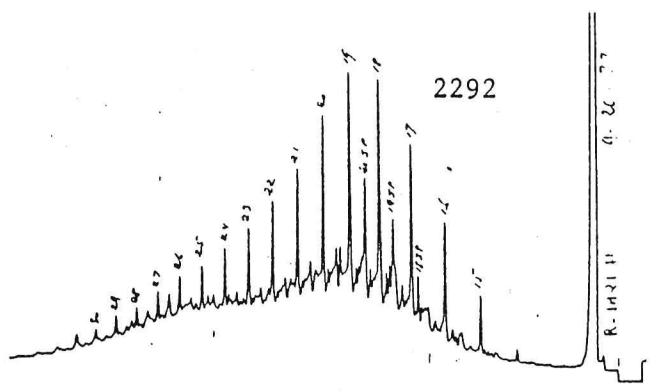
Saturate Fraction Chromatograms
T.S. 779717
Figure 2a

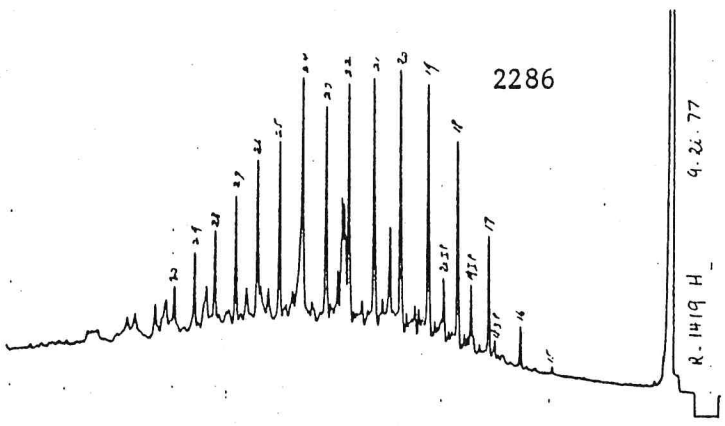
1717

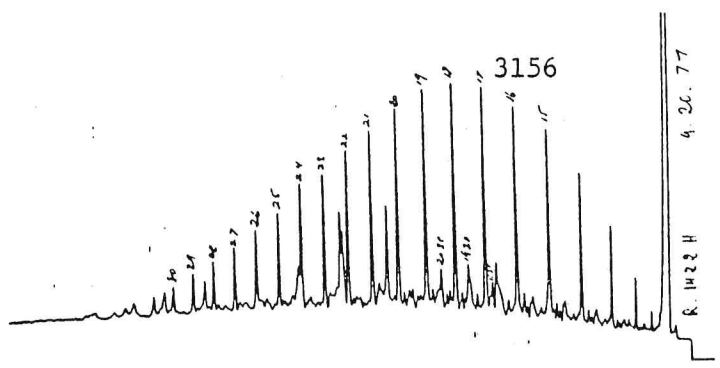












Saturate Fraction
Chromatograms
T.S. 779717
Figure 2b

MICROSCOPIC KEROGEN ANALYSIS

Division:
Well Name: , Outcrops
Location:
State or Country: Alaska
Geol. Province: Alaska Peninsula, Shelikof Strait

SRA No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1410	OTCP	Kaguyak	Cret	Dk Br	5	Gas	60% Black Charcoal frag 35% Cuticular Mtl 5% Unstruct Mtl Occasional Palyno
R-1411	"	"	"	Dk Br	5	Gas	60% Black charcoal frag 30% Cuticular Mtl 10% Unstruct Mtl Occasional Palyno
R-1412	"	"	"	Dk Br	5	Gas	80% Black charcoal frag 15% Cuticular Mtl 5% Unstruct Mtl Rare Palyno
R-1413	"	"	"	Dk Br	5	Gas	85% Black charcoal frag 10% Cuticular Mtl 5% Unstruct Mtl Rare Palyno

COLOR	CARBONIZATION SCALE	WEIGHT % CARBON
LIGHT YELLOW	1	65%
YELLOW	2	70%
LIGHT BROWN	3	75%
MEDIUM BROWN	4	78%
DARK BROWN	5	81%
BLACK	6	84% 86%
ALL ORGANIC MATTER BLACK	7	90%

T. S. 779717
Table 4a

MICROSCOPIC KEROGEN ANALYSIS

Division:
Well Name: Outcrops
Location:
State or Country: Alaska
Geol. Province: Alaska Peninsula, Shelikof Strait

SRA No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1414	OTCP	Kaguyak	Cret	Dk Br	5	Gas	85% Charcoal frag 10% Cuticular Mtl 5% Unstruct Mtl Rare Palyno
R-1415	"	"	"	Dk Br	5	Gas	70% Charcoal frag 20% Cuticular Mtl 10% Unstruct Mtl Occasional Palyno
R-1416	"	"	"	Dk Br	5	Gas	75% Charcoal frag 20% Cuticular Mtl 5% Unstruct Mtl Rare Palyno
R-1417	"	"	"	Dk Br	5	Gas	85% Charcoal frag 10% Cuticular Mtl 5% Unstruct Mtl Rare Palyno
R-1418	"	"	"	Dk Br	5	Gas	65% Charcoal frag 25% Cuticular Mtl 10% Unstruct Mtl Occasional Palyno
R-1419	"	"	"	Dk Br	5	Gas	50% Charcoal frag 40% Cuticular Mtl 10% Unstruct Mtl Occasional Palyno

T. S. 779717

Table 4b

MICROSCOPIC KEROGEN ANALYSIS

Division:
Well Name: Outcrops
Location:
State or Country: Alaska
Geol. Province: Alaska Peninsula, Shelikof Strait

SRA No.	DEPTH (ft)	FORMATION	AGE	COLOR	SCALE	KEROGEN TYPE	DESCRIPTION - REMARKS
R-1420	OTCP	Kaguyak	Cret	Black	6	Gas	85% Charcoal frag 10% Cuticular like frag 5% Unstruct looking Mtl Rare Palyno
R-1421	"	"	"	Black	6	Gas	90% Charcoal frag 5% Cuticular like frag 5% Unstruct looking Mtl Rare Palyno
R-1422	"	Naknek	Jur	Black	6	Gas	80% Charcoal frag 20% Finely divided Unstruct looking Mtl Barren of Palyno

T. S. 779717
Table 4c

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
AUTHORIZED BY C.R. PIERCE
TECHNICAL SERVICE NUMBER 779717

SOURCE ROCK SUMMARY
TABLE 1.
DATE 10/24/77

STATE ALASKA COUNTY
WELL NAME
WELL LOCATION ALALASKA PENINSULA 18S-27,28W
LEASE ALASKAN PENINSULA OUTCROPS

SAMPLE NUMBER LAB NO.	SAMPLE NUMBER FLD NO.	SMPL TYPE	FORMATION	AGE	LITHOLOGY	DEPTH FEET TOP***BASE	PETROLEUM GENERATION CAPABILITY	KEROGEN TYPE (OIL/GAS)	STAGE OF DIAGENESIS	REMARKS
R-1410	AP 2260	OT	Kaguyak	CRET	SH	Kaguyak Fm, Kaguyak	FAIR	Gas	Early peak gas to peak gas generation	
R-1411	AP 2263	OT	"	"	SH	//	//	FAIR	"	"
R-1412	AP 2266	OT	"	"	SH	//	//	FAIR	"	"
R-1413	AP 2269	OT	"	"	SH	//	//	FAIR	"	"
R-1414	AP 2271	OT	"	"	SH	//	//	POOR	"	"
R-1415	AP 2274	OT	"	"	SH	//	//	FAIR	"	"
R-1416	AP 2277	OT	"	"	SH	//	//	POOR	"	"
R-1417	AP 2280	OT	"	"	SH	//	//	FAIR	"	"
R-1418	AP 2283	OT	"	"	SH	//	//	NON SOURCE		
R-1419	AP 2286	OT	"	"	SH	//	//	POOR	"	"
R-1420	AP 2290	OT	"	"	SH	//	//	NON SOURCE		
R-1421	AP 2292	OT	"	"	SH	//	//	NON SOURCE		
R-1422	AP 3156	OT	Naknek	JUR	SH	Naknek, Cape Uyak		NON SOURCE		

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 779717

SOURCE ROCK DATA
TABLE 2.
DATE 10/24/77

SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	INSOL RESID%	BIT-FREE ORG C WT%	BITUMEN BBL/AF	BITUMEN PPM	SAT HC BBL/AF	SAT HC PPM	SAT HC/ BITUMEN	BITUMEN/ TL ORG C	REMARKS
STATE ALASKA COUNTY					WELL LOCATION ALALASKA PENINSULA						BBL/AF = (PPM X .0180)
WELL NAME					LEASE ALASKAN PENINSULA OUTCROPS						
R-1410		CRET	85	.8	1	69	<1	10	.15	.01	
R-1411		"	85	.9	1	36	<1	13	.37	<.01	
R-1412		"	87	.6	<1	10	<1	8	.79	<.01	
R-1413		"	85	.9	<1	9	<1	4	.40	<.01	
R-1414		"	84	.6	1	47	<1	4	.08	.01	
R-1415		"	85	.7	1	36	<1	15	.43	<.01	
R-1416		"	85	.5	1	33	<1	17	.52	.01	
R-1417		"	86	.7	1	62	1	33	.53	.01	
R-1418		"	84	.4	1	76	1	45	.59	.02	
R-1419		"	86	.5	1	53	1	36	.68	.01	
R-1420		"	83	.3	1	44	<1	11	.25	.02	
R-1421		"	85	.5	<1	24	<1	9	.46	.01	
R-1422		JUR	81	.2	5	295	3	167	.57	.14	

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER DISTRICT WESTERN
TECHNICAL SERVICE NUMBER 779717

KEROGEN DATA
TABLE 3.
DATE 10/24/77

LAB SAMPLE NUMBER	DEPTH FEET TOP***BOTTOM	GEOL. AGE	NORM. ELEMENTAL ANALYSIS,WT. % CARBON	HYDROGEN	OXYGEN	NITROGEN	ATOMIC RATIO H/C	PERCENT UNSTRU. KEROGEN	PERCENT STRU. KEROGEN	CARBNZ. SCALE	VIT REFLECT %RO
STATE ALASKA COUNTY			WELL LOCATION ALALASKA PENINSULA								
WELL NAME			LEASE ALASKAN PENINSULA OUTCROPS								
R-1410		CRET	95 *	3.0	1	.7	.39 *	5	95	5	
R-1411		"	93 *	2.6	3	1.0	.33 *	10	90	5	
R-1412		"	91 *	2.7	6	1.2	.36 *	5	95	5	
R-1413		"	91 *	2.9	5	1.0	.38 *	5	95	5	
R-1414		"	90 *	2.9	5	1.2	.39 *	5	95	5	
R-1415		"	88 *	3.2	7	1.2	.43 *	10	90	5	
R-1416		"	90 *	3.4	6	1.0	.45 *	5	95	5	
R-1417		"	87 *	3.8	7	1.4	.53 *	5	95	5	
R-1418		"	89 *	3.2	6	2.1	.43 *	10	90	5	
R-1419		"	89 *	3.5	6	1.3	.48 *	10	90	5	
R-1420		"	93 *	2.6	3	.7	.33 *	5	95	6	
R-1421		"	88 *	2.2	9	.9	.31 *	5	95	6	
R-1422		JUR	84	3.6	10	2.4	.54 *	20	80	6	

High carbonization and low H/C ratio because of content of reworked kerogen (charcoal) at a high stage of diagenesis.

Tachilni Formation

Sample	K (md)	Ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
Cape Tachilni													
AP 1000	12.46	42.9	2.72	55	10	-	-	-	35	-	-	-	
4009	-	-	-	24	50	8	-	-	18	-	-	-	
Milky Ridge Section:													
3103	-	-	-	24	30	6	-	-	-	-	-	-	40
3115	-	-	-	65	20	-	-	-	trc	-	-	-	15
3126	-	-	-	52	29	4	-	trc	10	-	-	-	5
Sandy Lake Section:													
2149	95.0	38.3	2.68										
2151	-	-	-	17	79	trc	-	-	-	2	-	-	2
2154	9785.	30.7	2.76	-	-	-	-	-	-	-	-	-	
2157	-	-	-	58	28	trc	-	-	7	-	-	-	7

Bear Lake Formation

Sample	K (md)	Ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
North Steponof Flats:													
AP 2118	17.7	16.2	2.69										
Milky River Section:													
2041	55.6	24.0	2.63										
2045	76.3	20.3	2.61										
2048	-	-	-	53	7	17	-	3	7	11	-	-	2
2051	74.7	22.0	2.54										
2071	-	-	-	53	7	40	-	trc	trc	-	-	-	trc
2095	-	-	-	56	15	21	3	-	-	-	-	-	5
2109	-	-	-	35	20	34	trc	4	5	2	-	-	
Sandy Lake Section:													
2162	-	-	-	57	36	trc	-	-	-	-	-	-	7
2163	missing												
2165	missing												
2167	599	33.3	2.6?										
2168	-	-	-	79	21	-	trc	-	-	-	-	-	
Windy Ridge Section:													
2200	-	-	-	73	5	19	3	trc	-	-	-	-	

Unga Conglomerate

Sample	K (md)	ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
West of McGinty Point:													
AP 3102	6.64	20.7	2.69										
Tolstoi Pk. Area:													
1024	(1)	(1)	(1)	10	47	3	-	-	30	10	-	-	
North Unga Island Section:													
3030	3640	35.9	2.61										
3033	-	-	-	59	35	2	trc	2	-	2	-	-	
3034	missing												
3035	missing												
Zachary Bay Section:													
3039	20.1	51.7	2.70										
3040	-	-	-	7	54	7	-	-	32	-	-	-	

Ugashik Conglomerate

Lower Ugashik Lake Section:													
2183	0.20	10.1	2.66										
2187	-	-	-	35	32	-	-	-	-	24	-	-	9
2189	0.57	7.5	2.61										
2193	-	-	-	68	13	trc	-	3	-	9	-	-	7
2195	-	-	-	63	5	2	-	3	-	25	-	-	2

Belkofski Formation

Sample		K (md)	ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
Balance Rock Section:														
AP	5000	1.23	11.6	2.75	10	33	35	-	10	-	-	-	3	
	5002	.05	1.1	2.71	31	26	10	-	33	-	-	-	-	
	5004	.21	9.0	2.63	29	31	5	-	16	13	-	-	6	
	5008	.05	8.6	2.69	51	33	-	-	10	6	-	-	-	
	5014	.05	1.4	2.61	24	39	14	-	20	3	-	-	-	
	5016	.05	7.7	2.71	52	20	3	-	25	-	-	-	-	
	5018	.85	11.4	2.60	41	40	5	-	trc	8	-	-	6	
Bold Cape Section:														
	4000	.05	6.5	2.68	43	28	-	-	16	6	-	7	trc	
Kitchen Anchorage Section:														
	5021	.05	2.3	2.73	41	27	-	-	32	-	-	-	-	
	5022	.05	3.4	2.72	32	21	18	-	29	-	-	-	-	
	5023	.05	7.1	2.75	63	17	-	-	20	-	-	-	-	
	5024	.05	4.2	2.64	43	34	7	-	16	-	-	-	-	
	5025	.05	2.8	2.71	50	30	-	-	20	-	-	-	-	
	5026	.05	6.2	2.66	72	15	-	-	13	-	-	-	-	
	5027	.08	7.8	2.70	64	16	2	-	18	-	-	-	-	
	5028	.05	6.4	2.68	58	27	-	-	15	-	-	-	-	
	5029	.05	6.4	2.72	56	19	2	-	23	-	-	-	-	
Seaweed Cove Section:														
	3007	.93	7.6	2.57	70	17	-	9	-	-	-	-	4	
	3008	.34	6.5	2.58	69	12	5	-	-	8	-	-	6	
	3009	1.06	8.9	2.60	74	12	-	-	-	7	-	-	7	
	3010	1.40	9.4	2.61	71	18	-	-	-	4	-	-	7	
	3011	.50	12.3	2.53	55	19	5	-	-	14	-	-	7	
	3013	.25	11.7	2.66	45	37	-	-	-	14	-	-	4	
	3014	.15	9.3	2.61	59	14	5	-	-	14	-	-	8	
	3016	.19	8.2	2.63	81	11	-	4	4	-	-	-	trc	
	3018	.05	15.1	2.70	48	42	-	-	-	10	-	-	-	
	3023	.15	13.2	2.68	42	25	17	-	-	16	-	-	-	
	3024	.07	10.0	2.59	44	39	3	-	-	17	-	-	7	
	3025	.24	9.0	2.64	33	42	-	-	-	20	-	-	5	
Soggy Foggy Peak Section:														
AP	3000	.05	5.4	2.68	55	23	9	-	13	-	-	-	-	
	3002	.05	14.1	2.78	54	10	15	-	15	6	-	-	-	

Stepovak Formation

Sample	K (md)	Ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
Unga Island Section:													
AP 1026	13.7	14.0	2.68	17	43	-	-	-	30	10	-	-	
American Bay Section:													
5180	0.05	10.0	2.69										
5182	0.05	3.9	2.69										
5183	1.04	7.0	2.68										
5188	0.05	6.5	2.72										
5190	0.05	5.3	2.75										
5192	0.05	3.8	2.69										
6009	0.95	4.9	2.77										
Coal Bay Section:													
5057	0.05	11.1	2.67	45	15	17	-	12	-	-	11	-	
5075	0.15	8.8	2.69	60	20	9	-	11	trc	-	-	-	
5078	0.05	14.0	2.72	48	26	10	-	14	2	-	-	-	
5088	0.05	15.5	2.65	69	15	-	trc	10	-	-	6	-	
McGinty Pt. Section:													
3057	0.05	16.9	2.68										
3062	0.06	10.7	2.65										
3077	0.13	8.9	2.71										
Milky River Section:													
2115	0.25	21.2	2.89										
2121	-	-	-	61	14	-	9	14	2	-	-	-	
2128	-	-	-	69	9	-	12	6	2	-	-	-	2
Misty Ridge Section:													
4080	0.05	10.4	2.75										
4083	0.69	5.3	2.65										
4105	0.05	5.0	2.72										

Eocene

Sample	K (md)	Ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
Windy Ridge													
AP 2245	-	-	-	29	10	44	11	6	trc	-	-	-	

Tolstoi Formation

Sample	K (md)	Ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
Ivanof Bay Section:													
AP 4016	0.05	3.9	2.66	59	28	5	-	8	-	-	-	-	
4022	0.05	9.0	2.66	56	44	-	-	trc	-	-	-	-	
4024	0.05	6.8	2.72	52	34	-	trc	14	trc	-	-	-	
4025	0.05	6.9	2.68	62	18	-	trc	20	-	-	-	-	
4027	0.05	10.5	2.70	46	30	-	trc	13	2	-	-	-	
4028	0.10	10.8	2.68										
4032	0.05	11.1	2.72	47	29	-	4	18	2	-	-	-	
4033	0.05	8.1	2.68	57	34	-	-	9	-	-	-	-	
4035	0.05	7.1	2.70	41	41	6	6	6	-	-	-	-	
4036	0.05	4.6	2.75	43	14	22	16	-	2	-	-	-	3
4039	0.05	7.6	2.75	37	13	25	trc	25	-	-	-	-	
4041	0.05	5.1	2.71	62	15	3	13	7	trc	-	-	-	
4050	0.05	12.0	2.69	46	31	-	trc	23	trc	-	-	-	
4053	0.05	6.2	2.66	60	18	6	trc	14	2	-	-	-	
Korovin Island													
2000	0.09	6.2	2.70										
Ivanof Bay Section:													
2001	-	-	-	51	15	3	22	9	-	-	-	-	
2004	0.05	3.5	2.72										
2008	0.05	3.0	2.69										
2016	0.44	4.8	2.67										
2017	0.13	5.8	2.70										
2019	2.75	3.5	2.66										
2020	-	-	-	60	22	2	6	10	-	-	-	-	
2021	-	-	-	46	30	trc	11	13	-	-	-	-	
2025	0.38	3.2	2.68										
2026	-	-	-	63	21	2	trc	14	-	-	-	-	
2028	0.23	6.6	2.73										
2029	-	-	-	51	27	6	trc	16	-	-	-	-	
2030	1.03	10.1	2.70	-	-	-	-	-	-	-	-	-	
2133	-	-	-	52	17	6	-	18	5	-	-	-	2
2135	-	-	-	52	20	-	13	10	5	-	-	-	
2136	0.06	5.8	2.67										
2140	-		-	58	16	6	9	9	2	-	-	-	
2147	68.1	35.8	2.70	68	15	-	5	10	-	-	-	-	2
Misty Ridge Section:													
4111	0.05	0.9	2.71										
4119	0.05	6.5	2.67										
4120	0.05	5.9	2.67										
4122	0.05	5.7	2.69										
5108	0.05	3.8	2.69										
5116	0.05	3.1	2.67										
5120	0.05	6.2	2.67										
5124	0.05	2.7	2.70										
5132	0.07	7.5	2.61										
5139	0.05	4.5	2.68										
5141	0.11	5.8	2.71										

Kaguyak Formation

Sample	K (md)	Ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
Kaguyak Section:													
AP 2258	0.05	2.7	2.72										
2261	0.05	3.8	2.73										
2264	0.05	3.4	2.73										
2267	0.05	4.9	2.72										
2272	0.05	4.4	2.71										
2275	0.05	8.0	2.72										
2278	0.05	6.8	2.71										
2281	0.05	5.7	2.70										
2284	0.05	3.7	2.72										
2287	0.05	9.6	2.71										

Cretaceous

Sample	K (md)	Ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
Kaguyak													
AP 2255	0.05	5.5	2.70										

Lower Cretaceous

Kaguyak													
AP 2252	0.05	2.8	2.71										

Coal Valley Mbr of Chignik Formation

Sample	K (md)	Ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
Coal Bluff Section:													
AP 3138	-	-	-	59	19	-	2	-	20	-	-	-	
3140	-	-	-	33	48	4	-	-	15	-	-	-	
3144	-	-	-	66	3	4	22	-	5	-	-	-	

Naknek Formation

Sample	K (md)	Ø (%)	D (g/cc)	qtz	felds	cc & Dolo	Kaol illi	chl	mont mxlr	clin	anal	laum	etc.
Cape Chiniak													
AP 3154	0.20	5.8	2.64										
Kamishak Hills													
AP 3147	0.51	11.7	2.65										
3148	-	-	-	38	32	-	trc	7	trc	-	-	13	10
3149	-	-	-	38	31	-	3	10	trc	-	-	4	14
3150	0.64	8.0	2.64										
3151	0.30	7.3	2.64										
3152	0.34	7.2	2.68										
3153	0.30	7.8	2.65										

J. T. Robison
9537

Amoco Production Company

Tulsa, Oklahoma
October 31, 1977

File: Technical Service 9537SR

Mr. Ron Calvert
Denver Division

Attention: Mr. Bill Connelly

Subject: Mineralogy, Porosity, and Permeability of Outcrop Samples from the Alaska Peninsula

Mineralogy as determined by X-ray diffraction is reported in Table 1. The samples are predominantly quartz and feldspar. Calcite is the most common carbonate, but dolomite occurs in three samples and siderite in one sample. The clay mineral suite consists of kaolinite, chlorite, montmorillonite and mixed-layer illite/montmorillonite and are present in amounts up to 32%. Clinoptilolite (2-10%) is present in three samples, and analcite (6-11%) is present in two samples.

Porosities, permeabilities, and grain densities were determined by the R.T.&A. Group, Production Research, and are reported in Table 2. The porosities range from 3.9 to 40.5% and the permeabilities from less than 0.05 to 167 millidarcies.

J. T. Robison

J. T. Robison

JTR:pt
832 401

cc: D. L. Boyne/J. L. Severson
R. L. Ames

X-RAY DIFFRACTION MINERAL PERCENTAGES

OCALITY: ALASKA PENINSULA

O[illegible]TION:

GE:

T.S. NO.: 9537SR

CHARGE: 9537

SAMPLE ID. NUMBER	QRTZ	FELD	CALC	DOL	SIDR	ANHY	GYPS	PYRT	BARI	KAOL	ILLI	CHLR	MONT	MXLR	CLIN	ANAL
1024 Unga Congl. Tolstoi Park	10	47	3										30		10	
1026 Stepovak Unga Island	17	43											30		10	
3033 Unga Congl. Main Unga Island	59	35		2							TRC	2			2	
3040 Unga Congl Zachary Bay	7	54	7										32			
4016 Tolstoi Fm. Pavlof Bay	59	28	5									8				
4026 "	49	37									TRC	14				
4022 "	56	44										TRC				
4[illegible] "	52	34									TRC	14		TRC		
4025 "	62	18									TRC	20				
4027 "	46	30									9	13		2		
4032 "	47	29									4	18		2		
4033 "	57	34										9				
4035 "	41	41	6							6		6				
4036 "	43	14	2	20	3					2	14			2		
4039 "	37	13	25								TRC	25				
4041 "	62	15	3								13	7		TRC		
4050 "	46	31									TRC	23		TRC		
4053 "	60	18	6								TRC	14		2		
5037 Stepovak Fm. Coal Bay	45	20	21									14				
5057 "	45	15	6	11								12				11
50[illegible] "	60	20	9									11		TRC		
5078 "	48	26	10									14		2		
5088 "	69	15									TRC	10				6

7357

AMOCO PRODUCTION COMPANY
Research Department

CORE ANALYSIS SUMMARY

Subject Alaska Peninsula Field Party - 1977 Lab No. F-129
Area Alaska Peninsula Date Cored
Location Alaska Date Analyzed
Formation Analyzed Elev.
Transmittal Letter by J. T. Robison Date 7-5-77 File No. 9538X

CORING DATA

Type of Analysis Core Plug Analysis, Type A
Number of Samples 23

Remarks:

Explanatory Notes:

(1) Analysis could not be performed due to the physical nature of the sample as received; i.e., shattered, fractured, unconsolidated, or shale.
(2) Sample contained a horizontal or vertical fracture.
(3) Insufficient sample for all requested tests.
(4) Sample missing or not received.
(5) Data were obtained on small plugs due to sample being unsuitable for large core analysis.
(6) These expedited, hand-calculated core analysis data do not contain graphical well log or porosity vs permeability plots available on computerized form.

By Robert P. Sawyer Date 9-2-77

cc: J. L. Severson
J. T. Robison
W. W. Owens

9537

Small Core

Lab. No. F-129
Date 8-31-77

Core Analysis Data Record

ubject Alaska Peninsula Field Party Area Alaska Peninsula State Alaska

ample Number	Depths	Description	Permeability-Millidarcys		Effective Porosity	Saturation % Pore		Gra Dens
			Horizontal	Vertical		Oil	Water	
A	Tolstoi Fm Pavlof Bay	AP4016PP	<0.05		3.9			2.6
B	" "	AP4022PP	0.05		9.0			2.6
C	" "	AP4024PP	<0.05		6.8			2.7
D	" "	AP4025PP	<0.05		6.9			2.6
E	" "	AP4027PP	<0.05		10.5			2.7
F	" "	AP4028PP	0.10		10.8			2.6
G	" "	AP4032PP	<0.05		11.1			2.7
H	" "	AP4033PP	<0.05		8.1			2.6
I	" "	AP4035PP	<0.05		7.1			2.7
J	" "	AP4036PP	<0.05		4.6			2.7
K	" "	AP4039PP	<0.05		7.6			2.7
L	" "	AP4041PP	<0.05		5.1			2.7
M	" "	AP4050PP	<0.05		12.0			2.6
N	" "	AP4053PP	<0.05		6.2			2.6
O	Stepovak Fm Coal Bay	AP5037PP	0.09		10.2			2.7
P	" "	AP5057PP	<0.05		11.1			2.6
Q	" "	AP5075PP	0.15		8.8			2.6
R	" "	AP5078PP	<0.05		14.0			2.7
S	" "	AP5088PP	<0.05		15.5			2.6
T	Stepovak Fm. Unga Island	AP1026PP	13.7		14.0			2.6
U	Unga Congl Unga Island	AP3040PP	167.		40.5			2.6
V	Unga Congl Tolstoi Bay	AP1024L	(1)		(1)			(1)

Amoco Production Company

Tulsa, Oklahoma
September 6, 1977

File: Technical Service 9598SR

Mr. D. J. Hartmann
Denver Division

Attention: Mr. C. R. Pierce

Subject: Porosity and Permeability Measurements of Outcrop Samples from the Alaskan Peninsula

Porosities, permeabilities and grain densities were determined by the ST & A Group, Production Research, and are reported in Table 1.

J. T. Robison

JTR:sg
2889

p2B

Small Core

Lab. No. F-113
Date 8-22-77

Core Analysis Data Record

Alaska Peninsula Field Party Area Alaska Peninsula State Alaska

Sample Number	Depths	Description	Permeability-Millidarcys Horizontal	Permeability-Millidarcys Vertical	Effective Porosity	Saturation % Pore Oil	Saturation % Pore Water	Grain Density
A	Unga Congl. North Unga Island	3030 PP	3640		35.9			2.61
B	Unga Congl. Zachary Bay	3039 PP	20.1		51.7			2.70
C	Stepovak McGinty Point	3057 PP	< 0.05		16.9			2.68
D	" "	3062 PP	0.06		10.7			2.65
E	" "	3077 PP	0.13		8.9			2.71
F	Unga Congl. West of McGinty ?	3102 PP	6.64		20.7			2.69
G	Stepovak Misty Ridge	4080 PP	0.05		10.4			2.75
H	" "	4083 PP	0.69		5.3			2.65
I	" "	4105 PP	< 0.05		5.0			2.72
J	Tolstoi ? Misty Ridge	4111 PP	< 0.05		0.9			2.71
K	" "	4119 PP	< 0.05		6.5			2.67
L	" "	4120 PP	< 0.05		5.9			2.67
M	" "	4122 PP	< 0.05		5.7			2.69
N	Tolstoi Fm Misty Ridge	5108 PP	< 0.05		3.8			2.69
O	" "	5115 ~~5155~~ PP	0.07		4.1			2.69

9653

Amoco Production Company

Tulsa, Oklahoma
November 4, 1977

File: Technical Service 9653SR

Mr. Ron Calvert
Denver Division

Attention: Mr. Bill Connelly

Subject: Petrology, Porosity and Permeability of Outcrop Samples from the Alaska Peninsula

Outcrop samples collected by the Alaska Peninsula field party were submitted for petrologic studies on seventeen samples and porosity and permeability on nine samples.

Mineralogy as determined by x-ray diffraction is recorded in Table 1. The samples are generally quartz and feldspar. The carbonate minerals include calcite and dolomite ranging up to 34%. The clay mineral suite consists of kaolinite, illite, chlorite, montmorillonite, mixed-layer illite/montmorillonite and ranges from 0 to 28%. Actinolite is present in minor amounts (3-5%) in three samples, pyrite (trace to 20%) in three samples, augite (2-20%) in six samples, magnetite (trace to 5%) in ten samples, and clinoptilolite (2-11%) in three samples.

Thin sections of rocks impregnated with blue plastic are being prepared by Western Petrographic, Tucson, Arizona, will be shipped directly to you.

Porosities, permeabilities, and grain densities were determined by the RT&A Group, Production Research, and are recorded in Table 2. The porosities range from 5.8 to 38.3% and the permeabilities from 0.06 to 95.0 md. Sample AP2154 contained a fracture and the permeability was extremely high, 9785 md.

J. T. Robison

J. T. Robison

JTR:sg
1785

cc: D. L. Boyne/J. L. Severson
R. L. Ames

X-RAY DIFFRACTION MINERAL PERCENTAGES

OCALITY: ALASKAN PENINSULA

T.S. NO.: 9653SR

IATION:
BEAR LAKE FM, STEPOVAK FM, TOLSTOI FM, TACHILNI FM

GE: MIOCENE EOCENE EOCENE PLIOCENE

CHARGE: 9653

SAMPLE ID. NUMBER	QRTZ	FELD	CALC	DOLO	SIDR	ANHY	ACTI	PYRT	AUGI	KAOL	ILLI	CHLR	MONT	MXLR	MAGN	CLIN
AR LK FM. AP2048 Milky River	53	7	17									3	7		2	11
EAR LK FM. AP2095 Milky River	56	15	2	19				2		3					3	
EAR LK. FM AP2109 Milky River	35	20	34							TRC		4		5		2
AL VALLEY AP2120 Herendeen Bay	30	32	4				4			TRC			25		5	
Stepovak AP2121 Milky River	61	14									9	14		2		
TEPOVAK FM AP2128 Milky River	69	9							2		12	6	2			
OLSTOI FM AP2133 Ivanof Bay	52	17	6						2			18		5		
OLSTOI FM AP2135 Ivanof Bay	52	20								10	3	10		5		
TOI FM AP2140 Ivanof Bay	58	16	6							9		9		2		
OLSTOI FM AP2147 Ivanof Bay	68	15							2		5	10				
ACHILNI FM AP2151 Sandy Lake	17	79		TRC											2	2
ACHILNI FM AP2157 Sandy Lake	58	28		TRC			5						7		2	
AR LK. FM. AP2162 Sandy Lake	57	36		TRC			3		2						2	
EAR LK FM AP2071 Bear Lake	53	7	19	21				TRC				TRC	TRC		TRC	
ACHILNI FM AP3103 Milky Ridge	24	30		6				20	20						TRC	
ACHILNI FM AP3115 Milky Ridge	65	20							10					TRC	5	
ACHILNI FM AP3126 Milky Ridge	52	29	4									TRC		10	5	

7605

AMOCO PRODUCTION COMPANY
Research Department

CORE ANALYSIS SUMMARY

Subject Alaska Peninsula Field Party, June, 1977 Lab No. F - 154
Area. Alaska Peninsula Date Cored
Location Alaska Date Analyzed
Formation Analyzed Elev.
Transmittal Letter by J. T. Robison Date 8-17-77 File No. 9654X

CORING DATA

Type of Analysis Core Plug Analysis, Type A
Number of Samples 9

Remarks:

Explanatory Notes:

(1) Analysis could not be performed due to the physical nature of the sample as received; i.e., shattered, fractured, unconsolidated, or shale.
(2) Sample contained a horizontal or vertical fracture.
(3) Insufficient sample for all requested tests.
(4) Sample missing or not received.
(5) Data were obtained on small plugs due to sample being unsuitable for large core analysis.
(6) These expedited, hand-calculated core analysis data do not contain graphical well log or porosity vs permeability plots available on computerized form.

By Robert A. Sawyer Date 9-20-77

cc: John L. Severson
J. T. Robison
W. W. Owens
Walt Jenkins

7025

Small Core

Lab. No. F - 154
Date 9-19-77

Core Analysis Data Record

ct Alaska Peninsula Field Party, June, 1977 Area Alaska Peninsula State Alaska

mple mber	Depths	Sample Description	Permeability-Millidarcys		Effective Porosity	Saturation % Pore		Grain Densit
			Horizontal	Vertical		Oil	Water	
A	Milky River Bear Lake Fm	AP2041PP	55.6		24.0			2.63
B	Bear Lake Fm Milky River "	AP2045PP	76.3		20.3			2.61
C	Bear Lake Milky River	AP2051PP	74.7		22.0			2.54
D	Milky River Stepovak Fm ?	AP2115PP	0.25		21.2			2.89
E	North Stepanof Flats Bear Lake Fm	AP2118PP	17.7		16.2			2.69
F	Ivanof Bay Tolstoi Fm	AP2136PP	0.06		5.8			2.67
G	Sandy Lake Tachilni Fm.	AP2149PP	95.0		38.3			2.68
(2) H	Tachilni Fm Sandy lake "	AP2154PP	9785.		30.7			2.76
I	Ivanof Bay Tolstoi Fm	AP2147-65PP	68.1		35.8			2.70

9672

Amoco Production Company

Tulsa, Oklahoma
November 1, 1977

File: Technical Service 9672SR

Mr. Ron Calvert
Denver Division

Attention: Mr. Bill Connelly

Subject: Petrology, Porosity, and Permeability of Outcrop Samples from the Alaska Peninsula

Outcrop samples collected by the Alaska Peninsula Field Party were submitted for petrologic studies on four samples, and porosity and permeabilities on two samples.

Sample 2168 is quartz (79%) and feldspar (21%) with trace amounts of clays. The sample has fine grained, moderately sorted subangular grains with fairly good intergranular porosity. Chert, metamorphic grains, and organic matter were detected in the thin section.

Sample 3138 is predominantly quartz with fairly significant feldspar (19%) and mixed-layer illite/montmorillonite (20%), with a minor amount of illite (2%). In this section, the sample has medium grained, moderately sorted, subangular, grains with only fair intergranular and dissolution porosity. The sample contains abundant chert.

Sample 3140 is predominantly quartz (33%) and feldspar (48%) with significant montmorillonite (15%) and minor calcite (4%). The sample has coarse grained, moderately sorted, subrounded to subangular grains with no apparent porosity. The thin section showed organic matter and chert fairly abundant.

Sample 3144 is predominantly quartz (66%) with fairly significant kaolinite (22%) and minor feldspar, calcite, and montmorillonite. The thin section shows the sample has coarse grained, moderately sorted, subangular grains with only a trace of porosity. The quartz is predominantly chert and contains organic matter scattered throughout the thin section. Based on Dott's (1964) sandstone classification Samples 2168 and 3138 are subarkoses; Sample 3140 is an arkosic arenite; and Sample 3144 is a sublitharenite.

Porosities, permeabilities, and grain densities were determined by the RT&A Group, Production Research and are reported in Table 3. Sample 2169 has 33.3% porosity and 599 millidarcies permeability, but does contain fractures.

Sample 3137 has 16.6% porosity and 0.37 millidarcies of permeability.

J. T. Robison

JTR:pt
185003

cc: D. L. Boyne/J. L. Severson
R. L. Ames

AMOCO PRODUCTION COMPANY
Research Department

CORE ANALYSIS SUMMARY

Subject Alaska Peninsula Field Party, June 1977 Lab No. F - 156
Area Alaska Peninsula Date Cored
Location Alaska Date Analyzed
Formation Analyzed Elev.
Transmittal Letter by J. T. Robison Date 8-24-77 File No. 9673X

CORING DATA

Type of Analysis Core Plug Analysis, Type A
Number of Samples 2

Remarks:

Explanatory Notes:

(1) Analysis could not be performed due to the physical nature of the sample as received; i.e., shattered, fractured, unconsolidated, or shale.
(2) Sample contained a horizontal or vertical fracture.
(3) Insufficient sample for all requested tests.
(4) Sample missing or not received.
(5) Data were obtained on small plugs due to sample being unsuitable for large core analysis.
(6) These expedited, hand-calculated core analysis data do not contain graphical well log or porosity vs permeability plots available on computerized form.

By Robert A. Sawyer Date 9-20-77

cc: J. L. Severson
J. T. Robison
W. W. Owens
Walt Jenkins

Small Core

Lab. No. F - 156
Date 9-19-77

Core Analysis Data Record

June, 1977

ct Alaska Peninsula Field Party - Area Alaska Peninsula State Alaska

ber	Depths	Sample Description	Permeability-Millidarcys		Effective Porosity	Saturation % Pore		Gra Dens
			Horizontal	Vertical		Oil	Water	
(2)	Bear Lake Sandy Lake	AP-2169PP	599.		33.3			2.6
	Coal Valley Mbr. of Chignik Coal Bluff	AP-3137PP	0.37		16.6			2.6

SANDSTONES : BRIEF DES[illegible]PTION OF THIN SECTIONS

PAGE ____ S. NO. 7677

FORMATION

AGE

LOCALITY Alaska Peninsula Outcrops

SAMPLE NO. AND/OR DEPTH	WHOLE ROCK 100 %				GRAINS 100 %			CEMENT TYPES 100 %					POROSITY TYPES 100 %			AVERAGE GRAIN SIZE mm.						SORTING				ROUNDNESS				OTHER	COMMENTS
	GRAINS	MATRIX	CEMENT	PORES	QTZ.+CHT.+QTZITE.	FELDSPAR	LITHIC FRAGS.	QUARTZ	CALCITE	DOLOMITE		PRESSURE SOLUTION	INTERGRAN.	DISSOLUTION	FRACTURE	VC > 1.0	C 0.5 - 1.0	M 0.25-0.5	F 0.13-0.25	VF 0.06-0.13	SILT < 0.06	EXCELLENT	WELL	MODERATE	POOR	ROUNDED	SUBROUNDED	SUBANGULAR	ANGULAR		
Bear Lake Sandy Lake AP2168	80	8	-	12	76	16	8						90	10					✓					✓				✓			Chert-organic matt[er] metamorphic grains
Coal Valley Mbr of Chignik Coal Bluff AP3138	70	25	-	5	78	12	10						70	30				✓						✓				✓			abundant chert
Coal Valley Mbr of Chignik Coal Bluff AP3140	82	18	-	-	34	60	6						-	-			✓							✓			✓	✓			organic matter - ch[ert] plagioclase feldspar
Coal Valley Mbr of Chignik Coal Bluff AP3144	70	15	14	1	90	2	8		✓					✓			✓							✓				✓			Chert stone organic matter

X-RAY DIFFRACTION MINERAL PERCENTAGES

ALITY: ALASKA PENINSULA

TION:

T.S. NO.: 9672SR

CHARGE: 9672

SAMPLE ID. NUMBER	QRTZ	FELD	CALC	DOLO	SIDR	ANHY	GYPS	PYRT	BARI	KAOL	ILLI	CHLR	MONT	MXLR	HALI	CELE
Lop Lake AP2168	79	21								TRC	TRC					
Valley AP3138L	59	19									2			20		
Valley AP3140L	33	48	4										15			
Valley AP3144 Bluffs	66	3	4							22			5			

J. T. Robison
9691

Amoco Production Company

Tulsa, Oklahoma
October 31, 1977

File: Technical Service 9691SR

Mr. Ron Calvert
Denver Division

Attention: Bill Connelly

Subject: Petrology, Porosity and Permeability of Outcrop Samples from the Alaska Peninsula

Outcrop samples collected by the Alaska Peninsula field party June 19, 1977, were submitted for petrologic analysis on eleven samples and porosity and permeability on five samples.

Mineralogy as determined by x-ray diffraction is reported in Table 1. The outcrop samples are predominantly quartz and feldspar. Calcite is present in most of the samples and in a significant amount (44%) in Sample No. 2245. Dolomite and siderite are present in two samples. The clay mineral suite consists of illite and chlorite in most of the samples with kaolinite present in one sample and montmorillonite in two samples. Clinoptilolite (zeolite) is present in four samples in fairly significant amounts (7-25%) and actinolite in three samples (7-11%). Thin sections of rock impregnated with blue plastic are being prepared by Western Petrographic, Tucson, Arizona, and will be shipped directly to you.

Porosity, permeability, and grain densities were determined by the RT&A Group, Production Research, and are recorded in Table 2. The porosities range from 3.2 to 10.1% and the permeabilities from 0.20 to 1.03 md.

J. T. Robison

J. T. Robison

JTR:sg
6053

cc: D. L. Boyne/J. L. Severson
R. L. Ames

9691

X-RAY DIFFRACTION MINERAL PERCENTAGES

LOCALITY: ALASKA PENINSULA

LOCATION:

PAGE:

T.S. NO.: 9691SR

CHARGE: 9691

SAMPLE ID. NUMBER	QTZ	FELD	CALC	DOLO	SIDR	ANHY	GYPS	PYRT	BARI	KAOL	ILLI	CHLR	MONT	MXLR	CLIN	ACTI
2001 Tolstoi Ivanof Bay	51	15	3								22	9				
2020 Tolstoi Ivanof Bay	60	22	2								6	10				
2021 Tolstoi Ivanof Bay	46	30	TRC								11	13				
2026 Tolstoi Ivanof Bay	63	21	2								TRC	14				
2029 Tolstoi Ivanof Bay	51	27	6								TRC	16				
2187 Naknek Lower Ugashik Lake	35	32													24	9
2193 Naknek Lower Ugashik Lake	68	13	TRC									3			9	7
2195 Naknek Lower Ugashik Lake	63	5	2		2							3			25	
2200 Bear Lake Windy Ridge	73	5	14	5						3	TRC	TRC				
2225 Meshik Kujulik Bay	19	34	6										23		7	11
2245 Eocene Windy Ridge	29	10	44								11	6	TRC			

AMOCO PRODUCTION COMPANY
Research Department

CORE ANALYSIS SUMMARY

Object Alaska Peninsula Field Party-June, 1977 Lab No. F - 165
Area Alaska Peninsula Date Cored
Location Alaska Date Analyzed
Formation Analyzed Elev.
Transmittal Letter by J. T. Robison Date 8-31-77 File No. 9692X

CORING DATA

Type of Analysis Core Plug Analysis, Type A
Number of Samples 5

Remarks:

Explanatory Notes:

(1) Analysis could not be performed due to the physical nature of the sample as received; i.e., shattered, fractured, unconsolidated, or shale.
(2) Sample contained a horizontal or vertical fracture.
(3) Insufficient sample for all requested tests.
(4) Sample missing or not received.
(5) Data were obtained on small plugs due to sample being unsuitable for large core analysis.
(6) These expedited, hand-calculated core analysis data do not contain graphical well log or porosity vs permeability plots available on computerized form.

By Robert A. Sawyer Date 9-22-77

cc: John L. Severson
J. T. Robison
W. W. Owens
Walt Jenkins

Small Core

Lab. No. F - 165
Date 9-20-77

Core Analysis Data Record

Alaska Peninsula Field Party-June, 1977 Area Alaska Peninsula State Alaska

Depths	Sample Description	Permeability-Millidarcys		Effective Porosity	Saturation % Pore		Grain Densit
		Horizontal	Vertical		Oil	Water	
Tolstoi Ivanof Bay	AP2025PP	0.38		3.2			2.68
Tolstoi Ivanof Bay	AP2028PP	0.23		6.6			2.73
Tolstoi Ivanof Bay	AP2030PP	1.03		10.1			2.70
Naknek Lower Ugashik Lake	AP2183PP	0.20		10.1			2.66
Naknek Lower Ugashik Lake	AP2189PP	0.57		7.5			2.61

9719

Amoco Production Company

Tulsa, Oklahoma
September 22, 1977

File: TS 9719SR

Mr. D. J. Hartmann
Denver Division

Attention: Mr. C. R. Pierce

Subject: Petrology of Outcrop Samples, Alaska Peninsula Field Party, 1977

Two samples were submitted for petrographic analysis and 19 for porosity and permeability. Mineralogy determined by X-ray diffraction is reported in Table 1. A brief description of thin sections of rocks impregnated with blue plastic are given in Table 2. Porosity, permeability, and grain densities were determined by the RT and A Group, Production Research and are reported in Table 3.

Samples 3148 and 3149 are medium grained, moderately sorted, subangular arkosic arenites. The samples are primarily quartz and feldspar (69-70%) with fairly significant laumontite (4-13%) and actinolite-tremolite (10-14%). The clay minerals are predominantly chlorite (7-10%) with trace to minor amounts of illite and mixed-layer chlorite/montmorillonite. Lithic fragments of metamorphic rocks were observed in thin sections of both rock suggesting a nearby metamorphic terrain.

Three types of porosities were observed in thin sections of both samples; intergranular, dissolution, and fracture. Sample 3148 appears to have about 7% intergranular porosity in the thin section, and it probably has fair permeability. Sample 3149 is estimated to have only 3% porosity in the thin section, and the porosity is predominantly dissolution type which is often noneffective. The measured porosity is much higher (10.7%) indicating a high percentage of microporosity which along with the noneffective dissolution porosity gives the low permeability (0.05 md).

The porosities range from 2.7% to 11.7%, and the permeabilities vary from less than 0.05 to 0.64 md.

J. T. Robison

J. T. Robison

JTR:km
5128

cc: D. L. Boyne/J. L. Severson
R. L. Ames

X-RAY DIFFRACTION MINERAL PERCENTAGES

LOCALITY ALASKA PENINSULA FIELD PARTY - JUNE 1977

FORMATION AGE T. S. NO. 9719SR

SAMPLE IDENTIFICATION NUMBER	QUARTZ	FELDSPAR	CALCITE	DOLOMITE	SIDERITE	ANHYDRITE	GYPSUM	PYRITE	BARITE	KAOLINITE	ILLITE	CHLORITE	MONTMORILLONITE	MIXED LAYER ILLITE/MONT.	MIXED LAYER CHLORITE/MONT.	Lamontite	Actinolite-Tremolite				TOTAL
Naknek, Kamishak Hills 3148	38	32									TRC	7			TRC	13	10				
" " 3149	38	31									3	10			TRC	4	14				

SANDSTONES: BRIEF DES[illegible]PTION OF THIN SECTIONS

PAGE 1 [illegible]   [illegible]S. NO. ______

FORMATION   AGE   LOCALITY *Alaska Peninsula Field Party June 1977*

SAMPLE NO. AND/OR DEPTH	WHOLE ROCK 100 %: GRAINS	MATRIX	CEMENT	PORES	GRAINS 100 %: QTZ.+CHT.+QTZITE.	FELDSPAR	LITHIC FRAGS.	CEMENT TYPES 100 %: QUARTZ	CALCITE	DOLOMITE		PRESSURE SOLUTION	POROSITY TYPES 100 %: INTERGRAN.	DISSOLUTION	FRACTURE	AVERAGE GRAIN SIZE mm.: VC > 1.0	C 0.5-1.0	M 0.25-0.5	F 0.13-0.25	VF 0.06-0.13	SILT < 0.06	SORTING: EXCELLENT	WELL	MODERATE	POOR	ROUNDNESS: ROUNDED	SUBROUNDED	SUBANGULAR	ANGULAR	OTHER			COMMENTS
Naknek Kamishak Hills 3148	83	10	-	7	60	30	10						75	10	15			X						X				X					biotite – zeolites organic matter
" 3149	80	17	-	3	63	25	12						10	80	10			X						X				X					abundant biotite metamorphic grains zeolites - organic mat

AMOCO PRODUCTION COMPANY
Research Department

CORE ANALYSIS SUMMARY

ubject Alaska Peninsula Field Party - June, 1977 Lab No. F-166
Area Alaska Peninsula Date Cored
Location Alaska Date Analyzed
Formation Analyzed Elev.
Transmittal Letter by J. T. Robison Date 9-14-77 File No. 9720X

CORING DATA

Type of Analysis Core Plug Analysis, Type A
Number of Samples 19

Remarks:

Explanatory Notes:

(1) Analysis could not be performed due to the physical nature of the sample as received; i.e., shattered, fractured, unconsolidated, or shale.
(2) Sample contained a horizontal or vertical fracture.
(3) Insufficient sample for all requested tests.
(4) Sample missing or not received.
(5) Data were obtained on small plugs due to sample being unsuitable for large core analysis.
(6) These expedited, hand-calculated core analysis data do not contain graphical well log or porosity vs permeability plots available on computerized form.

By Robert P. Sawyer Date 9-19-77

cc: J. L. Severson
J. T. Robison
W. W. Owens
Walt Jenkins

Small Core

Lab. No. F-166
Date 9-16-77

Core Analysis Data Record

Alaska Peninsula Field Party, June, 1977/AREA Alaska Peninsula State Alaska

mple mber	Depths	Sample Description	Permeability-Millidarcys		Effective Porosity	Saturation % Pore		Grain Density
			Horizontal	Vertical		Oil	Water	
A	Lower Cretaceous Kaguyak	AP2252PP	<0.05		2.8			2.71
B	Cretaceous Kaguyak	AP2255PP	<0.05		5.5			2.70
C	Kaguyak Kaguyak	AP2258PP	<0.05		2.7			2.72
D	"	AP2261PP	<0.05		3.8			2.73
E	"	AP2264PP	<0.05		3.4			2.73
F	"	AP2267PP	<0.05		4.9			2.72
G	"	AP2272PP	<0.05		4.4			2.71
H	"	AP2275PP	<0.05		8.0			2.72
I	"	AP2278PP	<0.05		6.8			2.71
J	"	AP2281PP	<0.05		5.7			2.70
K	"	AP2284PP	<0.05		3.7			2.72
L	"	AP2287PP	<0.05		9.6			2.71
M	Naknek Kamishak Hills	AP3147PP	0.51		11.7			2.65
N	"	AP3149PP	0.05		10.7			2.69
O	"	AP3150PP	0.64		8.0			2.64
P	"	AP3151PP	0.30		7.3			2.64
Q	"	AP3152PP	0.34		7.2			2.68
R	"	AP3153PP	0.30		7.8			2.65
S	Naknek Cape Chiniak	AP3154PP	0.20		5.8			2.64

9861

Amoco Production Company

Tulsa, Oklahoma
December 13, 1977

File: Technical Service 9861SR

Mr. R. H. Calvert
Denver Division

Attention: Mr. C. R. Pierce

Subject: Porosity and Permeability of Outcrop Samples from the Alaska Peninsula

Porosities, permeabilities and grain densities were determined by the RT&A Group, Production Research, and are reported on the attached sheet. The porosities range from 2.7 to 10.0% and the permeabilities from <0.05 to 2.75 md.

J. T. Robison

JTR:hmc
5955

Attachment

cc: D. L. Boyne/J. L. Severson
R. L. Ames

JECT ALASKA PENINSULA FIELD PARTY OUTCROPS
EA ~~ALASKA~~ PENINSULA
CATION ALASKA
RMATION ANALYZED TOLSTOI & STEPOVAK
QUESTED BY J.T. ROBISON

LAB NO. F204
DATE DEC 1,1977
FILE 9862X

DATE 10-24-77

7061

F ANALYSIS CORE PLUG TYPE A

MPLE MBER	CORE NUMBER	DESCRIPTION	PERM - MD HORIZ	PERM - MD VERT	POROSITY	AGE	FORMATION	GRAIN DENSITY GM/CC
	AP2000	LMS Tolstoi, Korovin Is.	0.09		6.2	EOCENE	TOLSTOI	2.70
	2004	LMS Tolstoi, Ivanof Bay	<0.05		3.5	"	"	2.72
	2008	LMS Tolstoi, Ivanof Bay	<0.05		3.0	"	"	2.69
	2016	SN Tolstoi, Ivanof Bay	0.44		4.8	"	"	2.67
	2017	LMS Tolstoi, Ivanof Bay	0.13		5.8	"	"	2.70
	2019	SN Tolstoi, Ivanof Bay	2.75		3.5	"	"	2.66
	5116	SN Tolstoi, Misty Ridge	<0.05		3.1	"	"	2.67
	5120	SN Tolstoi, Misty Ridge	<0.05		6.2	"	"	2.67
	5124	LMS Tolstoi, Misty Ridge	<0.05		2.7	"	"	2.70
	5132	SNXSH Tolstoi, Misty Ridge	0.07		7.5	"	"	2.61
	5139	SN Tolstoi, Misty Ridge	<0.05		4.5	"	"	2.68
	5141	LMS Tolstoi, Misty Ridge	0.11		5.8	"	"	2.71
	5180	LMS Stepovak, American Bay	<0.05		10.0	"	STEPOVAK	2.69
	5182	LMS Stepovak, American Bay	<0.05		3.9	"	"	2.69
	5183	SN Stepovak, American Bay	1.04		7.0	"	"	2.68
	5188	LMS Stepovak, American Bay	<0.05		6.5	"	"	2.72
	5190	LMS Stepovak, American Bay	<0.05		5.3	"	"	2.75
	5192	LMS Stepovak, American Bay	<0.05		3.8	"	"	2.69
	6009	DOL Stepovak, American Bay	0.95		4.9	"	"	2.77

By Robert A. Sawyer

Date 12-7-77

J. L. Severson
J. T. Robison
W. W. Owens
Walt Jenkins

FORM 760 2-64

Amoco Production Company

September 19, 1977

Mr. R. C. Brooke
Mr. D. J. Hartmann
B u i l d i n g

Re: Micropaleontology and Palynology of Outcrop Samples from the Kaguyak Area, Lower Cook Inlet, Alaska, Project 77-23

Eighteen outcrop sampels from the study area were examined for forams with the following results:

Sample No.	Interpretation
AP-2247	Barren - coal fragments.
AP-2253	Barren - Upper Cretaceous? Radiolaria.
AP-2254	Indeterminate - rare long ranging forams; Radiolaria, Peleaypod fragments.
AP-2256	Indeterminate - rare indeterminate forams; Upper Cretaceous? Radiolaria.
AP-2257	Barren.
AP-2259	"
AP-2262	"
AP-2265	"
AP-2268	"
AP-2270	"
AP-2273	"
AP-2276	"
AP-2279	Barren - Coal fragments.
AP-2282	"
AP-2285	"
AP-2289	Barren - rare Inoceramus prisms.
AP-2291	Upper Cretaceous? - rare poorly preserved forams similar to those seen in the 1977 ARCO C.O.S.T. well between 4660' and 5050'.
AP-3155	Indeterminate - rare long ranging forams.

The above samples were also studied for palynology. All samples were barren of fossil palynomorphs because of intense oxidation.

Palynology source rock estimations are not reliable and conclusions should not be used for evaluative purposes. All samples seemingly indicated only a gas source potential, but it is very possible amorphous kerogen once present could have been eliminated by the intense weathering. Maturation stage estimations were not possible because of the absence of fossils.

Earl Armstrong

Earl Armstrong

Peter K. H. Groth

EA:PKHG:dh

cc: G. Wiloth
S. McCoy
J. Parks