FOOTHILLS BELT GEOCHEMISTRY SUMMARY

C.G. Mull, 3/29/01

Station no.	Formation		Location	Paleo by Micropaleo Consultants		Geochemistry by Baseline DGSI				Lithology notes	Discussion	Lat	Long
				Age	Paleo Zone	TOC Wt%	TMax °C	Ro	HI				
		UPPER CRETACEOUS BROOKIAN MARINE SEDIMENTS											
99Mu 16-3	Schrader Bluff Fm. (?)		Ivishak River	Senonian,Campanian-Maestrichtian*		0.52	505		42	Gr silty sh.			
99Mu 16-6	Schrader Bluff Fm., S flank Kuparuk anticline		Ivishak River	Senonian,Campanian-Maestrichtian*	P-M14 to P-M13	1.18	439	1.19	59	Gr silty sh.	2.30		
99DL 40-3.4	Schrader Bluff Fm.		Ivishak River	Senonian, (Santonian-Maestrichtian)	P-M14 to P-M13	11.86	436		169				
99DL 44B-4.4	Schrader Bluff Fm.		Toolik River	Senonian (Campanian -- Maestrichtian)*	P-M13 to P-M14	7.17	411		25				
99Mu 15-1	Schrader Bluff Fm. (?)		Ivishak River	Senonian, possible Santonian-Campanian*	P-M 14?	1.15	438	1.22	48	Silty mudst	2.30		
99Mu 15-2	Hue Shale equivalent		Ivishak River	Senonian, possible Santonian-Campanian*	P-M 14?	2.35	429	1.17	153	Gr clay shale	2.0-2.3		
99Mu 15-3	Hue Shale equivalent		Ivishak River	Senonian, possible Santonian-Campanian*	P-M 14? Probable F-6	2.46	426	1.29	284	Organic paper sh	2.0-2.3		
00 TJR105-104	Seabee Formation		Shale Wall Bluff	Cretaceous undiff.		0.52	459		27	Black shale	Measured section		
00 TJR105(23)	Lower Tuluvak Fm. (Ayiyak Mbr Seabee Fm.)		Shale Wall Bluff	Late Cretaceous, probable Santonian	Probable F-5 P-M14?	0.89	431	V 0.90	47				
00 TJR 105-0	Lower Tuluvak Fm. (Ayiyak Mbr Seabee Fm.)		Shale Wall Bluff	Late Cretaceous undiff.		0.50	412	V 0.97	22				
		LOWER CRETACEOUS BROOKIAN DELTAIC SEDIMENTS											
00 Ha 30-A	Nanushuk Formation.		Autumn Creek			8.47	432		519		Carbonaceous siltstone		
00 Ha 33	Nanushuk Formation.		Autumn Creek			51.26	427	V 0.69	247		Coal		
99 DL 64.29.7	Nanushuk Formation.		E Rooftop Ridge	Cret. undiff.								68.844	150.557
99 DL 64.151.4	Nanushuk Formation.		E Rooftop Ridge	Prob. E. Cret. undiff.								68.844	150.557
99 Ha 123	Nanushuk Formation.		Kanayut River	Albian paly		0.81	449	0.70	28.4			68.645	150.905
99 DL47-119.4	Torok Fm.--Nanushuk Formation		Arc Mountain	Aptian-Albian		0.57	446		26.3			68.646	150.585
99 DL47-176.3	Torok Fm.--Nanushuk Formation		Arc Mountain	Prob. Aptian-Albian		1.21	440	0.50	52.1			68.646	150.585
00 HA 54	Nanushuk Fm or Torok Formation		Kayak Mountain anticline.			1.05	443	V ?0.71	44			68.5091	152.065
00 Mu 59	Torok Formation.		Cobblestone Ck	Aptian-Albian	P-M18 to P-M 17	0.65	447	V.0.88	28		Upper Torok, near base of Nanushuk.	68 34.189	150 28.048
99 Mu 80	Torok Formation		Autumn Creek	Prob. E. Cret. undiff.		0.75	440		40.0			68.713	151.917
99 Mu80-1	Torok Formation		Autumn Creek	E. Cret. undiff.		0.90	441	?0.57	55.6			68.713	151.917
84 Mu 75	Torok Formation		Autumn Creek	Probable Aptian-Albian		0.79	447	0.92	67			68.689	151.988
99 Mu 79	Torok Formation		Autumn Creek	No paleo		0.56	437	B0.63	76.8			68.682	152.012
99 Mu 56	Torok -Fortress Mtn. Fm		Kanayut River	Prob. Cret. undiff.		0.75	449		52.0			68.494	150.935
99 Mu 58	Torok -Fortress Mtn. Fm		Kanayut River	Aptian-Albian		0.81	447		24.7			68.503	150.856
99 Mu 60	Torok -Fortress Mtn. Fm		Nanushuk River	Indeterminate		0.77	481	1.4	26.0			68.459	150.574
99 Mu 60-1	Torok -Fortress Mtn. Fm		Nanushuk River	Indeterminate		0.79	480		20.3			68.459	150.574
		LOWER CRETACEOUS BROOKIAN FOREDEEP SEDIMENTS											
00 Mu 51	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Confusion Ck.	Early Cret.		4.31	444	V 0.70	147	Coaly layer			
00 Mu 52	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Ck tributary	Poss Early Cret Undiff		0.41	494	V 0.77	27			68.43	151.9271
00 Mu 53	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Creek	Poss Early Cret Undiff		0.37	475		16			68 27.812	152 02.046
00 Mu 54	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Creek	Poss Early Cret Undiff		0.60	475	V 1.25	60			68 30.589	152 03.932
00 Mu 54-1	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Creek	Poss Early Cret Undiff		7.46	443		253	Carbonaceous debris		68 30.589	152 03.932

00 Mu 55	Fortress Mtn/ Torok Formation		Thumbprint syncline, west of Tiglukpuk Ck.	Hauterivian	F-13a P-M19?	0.79	451	V 0.87	56		From mudstone section just above basal Fortress Mountain conglomerate	68.5417	152.1835
00 Mu 58	Torok Formation.		Tiglukpuk Creek	Hauterivian	P-M19	0.80	449	V 1.25	64			68 35.043	152 14.368
00 Ha 51	Fortress Mtn Formation		Siksikpuk River			1.08	443	V 0.86	54			68.599	152.058
00 Ha 52	Torok Formation.		Siksikpuk River			1.02	453	V 0.97	73			68.5795	152.0633
00 Mu 61	Torok Formation.		Desolation Creek.	Aptian-Albian	P-M18 to P-M 17	0.97	436	V. 0.87	61		Part of regional terrane with scattered knockers of Imnaitchiak Chert.	68 37.510	151 45.474
00 Mu 62	**Torok Formation.**		**Desolation Creek.**	**Aptian-Albian**		**2.03**	**438**	**-**	**398**	**Bk silic marl w organic odor, from block of Triassic Imnaitchiak Chert.**	**Part of regional terrane with scattered knockers of Imnaitchiak Chert.**	**68 35.310**	**151 44.894**
00 Mu 62-1	Torok Formation.		Desolation Creek.	Probable Aptian-Albian	P-M18 to P-M 17	0.17	483	V 1.03	82		Part of regional terrane with scattered knockers of Imnaitchiak Chert.	68 35.310	151 44.894
00 Mu 63	Torok Formation.		Desolation Creek.	Early Cretaceous Undiff		0.79	440	V 1.06	37		Part of regional terrane with scattered knockers of Imnaitchiak Chert.	68 34.059	151 45.650
OO Ha 51	Fortress Mtn Formation		Siksikpuk River	Lower Cretaceous	Indet.	1.08	443		54			68.599	152.058
OO Ha 52	Torok Formation.		Tiglukpuk Creek	Lower Cretaceous	Indet.	1.02	453		73			68.5795	152.0633
	COBBLESTONE PARAUTOCHTHONOUS SEQUENCE, EASTERN DISTURBED BELT												
	Northern Cobblestone parautochthonous sequence												
		Ellesmerian platform deposits, Lower Cretaceous to Upper Triassic											
		Northernmost exposure of Triassic-Lower Jurassic rocks in foothills belt											
00 Mu 34-3.1	**Blankenship Member of Otuk Fm.**		**May Creek, north of Cobblestone Hills**	**Lower Jurassic**	**Indet.**	**6.53**	**460**	**V ? 1.80**	**45**	**Black organic marl, contains Otapiria tailleuri**	**1 m above Karen Creek Ss.**	**68.33.440**	**150.15.712**
OO Mu 34-3	**Blankenship Member of Otuk Fm.**		**May Creek, north of Cobblestone Hills**	**Lower Jurassic**	**Indet.**	**5.41**	**465**	**V 1.91**	**58**	**Black organic shale, contains Otapiria tailleuri**	**1/2 m above Karen Creek Ss.**	**68.33.440**	**150.15.712**
OO Mu 34-2	**Otuk/Shublik Fm., limestone member**		**May Creek, north of Cobblestone Hills**	**Late Triassic**		**6.20**	**465**	**V 1.76**	**59**	**Black limestone**	**1 m below Karen Creek Ss.**	**68.33.440**	**150.15.712**
OO Mu 34-1	Otuk/Shublik Fm., limestone member		May Creek, north of Cobblestone Hills	Probable Late Triassic		1.25	461	V 1.66	24	Black limestone	Beds less siliceous and more limestone than Otuk at Endicott Mtns allochthon at mountain front	68.33.440	150.15.712
00 Mu 34	**Otuk/Shublik Fm., limestone member**		**May Creek, north of Cobblestone Hills**	**Upper Triassic**		**3.74**	**492**		**31**	**Bk sooty shale**		**68.33.440**	**150.15.712**
00 Mu 34-4	**Otuk/Shublik Fm., limestone member**		**May Creek, north of Cobblestone Hills**	**Upper Triassic**		**6.72**	**488**		**48**	**Black limestone**		**68.33.440**	**150.15.712**
	Central Cobblestone parautochthonous sequence												
		Foredeep deposits, Lower Cretaceous											
99 Mu 67	Torok Formation		Cobblestone ridges	Possible Hauterivian		1.04	461	?1.24	31.7			68.529	150.323
99 Mu 68	Torok Formation		Cobblestone ridges	Possible Aptian-Albian		0.96	461		40.6			68.535	150.444
99 Mu 68-1	Torok Formation		Cobblestone ridges	Prob. E Cret. undiff		1.18	452	1.34	63.6			68.535	150.444
00 RR 104 C	Torok/manganiferous shale unit		6 km SW of Toolik Lake	Lower Cretaceous		1.49	485	V ?1.27	19		Associated with the Cobblestone ss unit	68 35.130	149 40.933
00 Mu 25	Torok/manganiferous shale unit		May Creek tributary, Cobblestone Hills area.	Lower Cretaceous	Indet.	2.77	505	B?1.51	18		Underlies Cobblestone Ss. unit	68 32.028	150 12.083
99 Mu 62	Torok, "manganiferous" shale		Kanayut River	Poss. Aptian-Albian								68.479	150.584
85 Mu 71	Lower Torok Fm., phosphatic-manganiferous shale.		Cobblestone Creek	Aptian ?-Albian		0.94	455	0.96	51			68.510	150.473
		Ellesmerian platform deposits, Lower Cretaceous to Upper Triassic											
82 Mu 67-3	Coquinoid limestone		Cobblestone Creek	Valanginian		0.30	385		10			68.423	150.227
82 Mu 79-3	Coquinoid limestone		May Creek tributary	Valanginian		0.37	444	?0.11	35				

99 Mu 44-A	Kingak Formation		Cobblestone Creek	Valanginian	F-13b P-M 20	0.26	487	V ? 1.04	38	Gray silty shale	Resample of 1999 location	68.512	-150.388
99 Mu 44-B	Kingak Formation		Cobblestone Creek	Valanginian	F-13b P-M 20	0.22	422	V ? 1.77	23	Gray silty shale	Resample of 1999 location	68.512	-150.388
00 Mu 26	Kingak Formation		May Creek tributary, Cobblestone Hills	Valanginian	F-13b	0.22	422	V ?1.16	45	Gray silty shale		68 32.114	150 12.979
00 Mu 26-1	Kingak Formation		May Creek tributary, Cobblestone Hills	Valanginian	F-13b	0.24	481		21	Gray silty shale		68 32.114	150 12.979
00 Mu 26-2	Kingak Formation		May Creek tributary, Cobblestone Hills	Probable Valanginian	F-13b P-M 20	0.90	490		11			68 32.114	150 12.979
00 Mu 26-3	**Blankenship Member of Otuk Fm.**		**May Creek tributary, Cobblestone Hills**	**Lower Jurassic**	**Indet.**	**4.08**	**457**		**61**	**Fissile black organic shale**		**68 32.114**	**150 12.979**
00 Mu 26-3.1	**Blankenship Member of Otuk Fm.**		**May Creek tributary, Cobblestone Hills**	**Lower Jurassic**	**Indet.**	**2.43**	**461**		**46**	**Fissile black organic shale**		**68 32.114**	**150 12.979**
00 Mu 26-3.2	**Blankenship Member of Otuk Fm.**		**May Creek tributary, Cobblestone Hills**	**Lower Jurassic**	**Indet.**	**2.17**	**461**	**B?1.55**	**47**	**Fissile black organic shale**		**68 32.114**	**150 12.979**
99 Mu 44-1	**Blankenship Member of Otuk Fm.**		**Cobblestone Creek**	**Lower Jurassic**		**10.12**	**459**	**1.17**	**200.6**			**68.512**	**150.388**
99 Mu 44-1.1	**Blankenship Member of Otuk Fm.**		**Cobblestone Creek**	**Lower Jurassic**		**6.74**	**444**	**V ? 1.67**	**158**	**Fissile black organic shale**	**Resample of 1999 location**	**68.512**	**150.388**
	Southern Cobblestone parautochthonous sequence												
		Foredeep deposits, Lower Cretaceous											
99 Mu 45	Torok Formation		Peregrine Creek	Probable Valanginian	Probable Valanginian	1.18	472	?1.22	31.4			68.477	150.372
99 Mu 45-1	Torok Formation		Peregrine Creek	Jur-Cret undiff.	Jur-Cret undiff.	0.95	473		26.3			68.477	150.372
99 Mu 45-2	Torok Formation		Peregrine Creek	Indeterminate	Indeterminate	0.46	475		30.4			68.477	150.372
99 Mu 45-3	Torok Formation		Peregrine Creek	Probable Valanginian	Probable Valanginian	0.78	476	?1.47	25.6			68.477	150.372
	ALLOCHTHONOUS ROCKS												
	ENDICOTT MOUNTAINS ALLOCHTHON AT MOUNTAIN FRONT												
OO Ha 61	**Blankenship Member of Otuk Fm.**		**Atigun Gorge**	**Lower Jurassic**	**Indet.**	**5.65**	**447**	**V ?1.53**	**141**	**Fissile black organic shale, contains Otapiria tailleuri**			
OO Ha 61-1	**Otuk Fm., limestone member**		**Atigun Gorge**	**Upper Ttiassic**		**4.52**	**448**	**V ?1.98**	**164**	**Black shale**			
	ATIGUN GORGE MEASURED SECTION	**Meters**	Sampled by Mike Mickey and Art Banet on 7/6/00, measured and described by Mike Whalen, 7/7/00										
00 MCI 1-20	Coquinoid limestone	61.3	Atigun Gorge	Early Cretaceous, Valanginian	F-13b, P-M20b?	1.13	456	V 1	58				
00 MCI 1-19	Kingak	56.6	Atigun Gorge	Early Cretaceous, Valanginian	F-13b	0.43	494	-	58				
00 MCI 1-18	**Kingak**	**42.5**	**Atigun Gorge**	**Indeterminate**		**7.80**	**446**	**V ?1.24**	**180**	**Source rock type kerogen**			
00 MCI 1-17	**Blankenship Mbr., Otuk Fm.**	**38.8**	**Atigun Gorge**	**Indeterminate**		**4.03**	**445**	**V ?1.35**	**180**	**Source rock type kerogen**			
00 MCI 1-16	**Blankenship Mbr., Otuk Fm.**	**35.2**	**Atigun Gorge**	**Probbly Early to Middle Jurassic**		**4.73**	**445**	**-**	**120**	**Source rock type kerogen**			
00 MCI 1-15	**Blankenship Mbr., Otuk Fm.**	**32.8**	**Atigun Gorge**	**Indeterminate**		**6.50**	**447**	**-**	**140**	**Source rock type kerogen**			
00 MCI 1-14	**Blankenship Mbr., Otuk Fm.**	**25.8**	**Atigun Gorge**	**Indeterminate**		**10.15**	**444**	**-**	**162**	**Source rock type kerogen**			
00 MCI1 1-13	**Blankenship Mbr., Otuk Fm.**	**25**	**Atigun Gorge**	**Indeterminate**		**10.59**	**447**	**-**	**130**	**Source rock type kerogen**			
00 MCI 1-12B	Otuk, ls member	21.8	Atigun Gorge	Indeterminate		0.78	450	B ?1.36	108				
00 MCI 1-11	Otuk, ls member	19.4	Atigun Gorge	Late Triassic, Norian	F-19b	1.09	453		62				
00 MCI 1-10	Otuk, ls member, ?	15.7	Atigun Gorge	Late Triassic, Norian	F-19b	1.63	450		121				
00 MCI 1-9	Otuk, ls member, ?	15.4	Atigun Gorge	Late Triassic, Norian	F-19b	0.88	449	V 1.50	74				
00 MCI 1-8	Otuk, chert member	11.8	Atigun Gorge	Late Triassic, Norian	F-19b	0.70	445		76				
00 MCI 1-6	Otuk, chert member	9.2	Atigun Gorge	Late Triassic, Norian	F-19b	1.67	450		86				

00 MCI 1-7	Otuk, chert member	10.6	Atigun Gorge	Late Triassic, Norian	F-19b	1.31	450	V ?1.43	69				
00 MCI 1-5	**Otuk, chert member**	**5.2**	**Atigun Gorge**	**Late Triassic, probable Norian**	**Probable F-19b**	**5.29**	**450**	**V ?1.43**	**160**	**Source rock type kerogen**			
00 MCI 1-4	**Otuk, chert member**	**3.8**	**Atigun Gorge**	**Late Triassic, probable Norian**	**Probable F-19b**	**5.49**	**447**		**186**	**Source rock type kerogen**			
00 MCI 1-3	Otuk, chert member	3	Atigun Gorge	Late Triassic, probable Norian	Probable F-19b	1.69	447		92				
00 MCI 1-2	**Otuk, chert member**	**2**	**Atigun Gorge**	**Late Triassic, probable Norian**	**Probable F-19b**	**4.29**	**451**		**125**	**Source rock type kerogen**			
00 MCI 1-1	Otuk, chert member	0	Atigun Gorge	Late Triassic,Carnian to Norian	F 19b to F 19c	1.26	451	V ?1.62	124				
OO Mu 31	Okpikruak Formation		May Creek, east fork	Lower Cretaceous	Indet.	0.79	482	V ?2.29	25			68 24.94	150 09.77
OO Mu 31-1	Okpikruak Formation		May Creek, east fork	Lower Cretaceous	Indet.	0.53	486		19			68 24.94	150 09.77
00 Mu 27-5	**Blankenship Member of Otuk Fm.**		**May Creek, west fork of west fork**	**Lower Jurassic**	**Indet.**	**4.11**	**540**	**V ?2.17**	**3**	**Bk organic shale, contains Otapiria tailleuri**	**Same section as 00 MCI 3. 1m above Karen Ck.Ss.**	**68 24.399**	**150 15.152**
00 Mu 27-3.2	Otuk Formation		May Creek, west fork of west fork	Probable Norian	F-13b	0.59	353		5	Bk clay shale	8 cm below Karen Ck. Ss.	68 24.399	150 15.152
00 Mu 27-3	Otuk Formation		May Creek, west fork of west fork	Probable Norian	F-13b	0.33	N.A.	V 2..15		Green gray claystone	20 cm below Karen Ck.Ss.	68 24.399	150 15.152
00 Mu 27-2	Otuk Formation, limestone member		May Creek, west fork of west fork	Upper Triassic		1.55	533	V 2.42	12	Bk shaly limstone	2 m below Karen Ck.Ss.	68 24.399	150 15.152
00 Mu 27-1	**Otuk Formation., shale member**		**May Creek, west fork of west fork**	**Upper Triassic**		**2.88**	**533**	**B ?2.52 V ?2.23**	**6**	**Bk sooty shale**		**68 24.399**	**150 15.152**
00 Mu 27	Siksikpuk Formation		May Creek, west fork of west fork	Permian		1.21	486	V 2.41	2	Gr silty shale	Near top Ps, poorly exposed, weathered.	68 24.399	150 15.152
	WEST FORK OF MAY CREEK SECTION (structurally complicated)			Sampled by Mike Whalen, Rachel Pachter, and Mike Mickey, 7/11/00									
00 MCI 3-1	**Otuk Fm.**		**May Creek, west fork of west fork**	**Late Triassic, probable Norian**	**Probable F-19b**	**3.12**	**532**	**V ?2.60**	**10**			**68 24.399**	**150 15.152**
00 MCI 3-2	Otuk Fm.		May Creek, west fork of west fork	Indeterminate	Indeterminate	1.01	539		14			68 24.399	150 15.152
00 MCI 3-3	Otuk Fm.		May Creek, west fork of west fork	Late Triassic, probable Norian	Probable F-19b	1.36	453		1			68 24.399	150 15.152
00 MCI 3-4	**Otuk Fm.**		**May Creek, west fork of west fork**	**Indeterminate**	**Indeterminate**	**2.20**	**528**	**B ?2.52**	**4**			**68 24.399**	**150 15.152**
00 MCI 3-6	Otuk Fm.		May Creek, west fork of west fork	Indeterminate	Indeterminate	0.83	534		7			68 24.399	150 15.152
OO Mu 32	Okpikruak Formation		Cobblestone Creek	Lower Cret., Indet.		0.36	517	V ?2.06	39				
OO Mu 33	Okpikruak Formation		Cobblestone Creek	Lower Cret., Indet.		0.90	529	V ?2.16	26				
00 Mu 29-3	Otuk Fm., limestone member		Cobblestone Creek	Late Triassic		1.68	540		5		Same section as OOMCI 2	68 23.954	150 19.117
00 Mu 29-2.1	**Otuk Formation, limestone member**		**Cobblestone Creek**	**Upper Triassic**		**5.00**	**526**	**V ?2.60**	**6**	**Bk limestone**		**68 23.954**	**150 19.117**
00 Mu 29-2	**Otuk Formation., shale member**		**Cobblestone Creek**	**Indet.**		**5.37**	**537**	**V ? 2.08**	**4**	**Source rock type kerogen**		**68 23.954**	**150 19.117**
82 Mu 71-4	**Otuk Formation**		**Cobblestone Creek**	**Upper Triassic**		**3.45**	**495**	**?2.34**	**8**	**Source rock type kerogen**		**68.388**	**-150.318**
82 Mu 71-1	Siksikpuk Formation		Cobblestone Creek	Permian		0.79	457	2.56	9			68.387	-150.319
00 Mu 29-1	Siksikpuk Formation		Cobblestone Creek	Probable Permian		0.54	444		13	Gray clay shale		68 23.954	150 19.117
00 Mu 29	Siksikpuk Formation		Cobblestone Creek	Probable Permian		0.56	N.A.	V 2.29		Gray clay shale		68 23.954	150 19.117
	COBBLESTONE CREEK SECTION (structurally complicated)			Measured and described by Mike Whalen, Rachel Pachter, and Mike Mickey, 7/8/00									
00 MCI 2-1	**Otuk Formation**	**0**	**Cobblestone Creek**	**Indeterminate**	**Indeterminate**	**9.52**	**523**	**V ?2.16**	**9**	**Otuk, shale member**		**68 23.954**	**150 19.117**

00 MCI 2-2	Otuk Formation	2.7	Cobblestone Creek	Indeterminate	Indeterminate	4.28	524	V ?2.18	6	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-3	Otuk Formation	4.7	Cobblestone Creek	Late Triassic, possible Carnian to Norian	F-19b? to F-19c?	4.69	523		5	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-4	Otuk Formation	7.5	Cobblestone Creek	Late Triassic, probable Norian	Probable F-19b	0.83	527		14	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-5	Otuk Formation	9.8	Cobblestone Creek	Late Triassic, Norian	F-19b	1.43	466	V 2.31	7	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-6	Otuk Formation	11.2	Cobblestone Creek	Late Triassic, probable Norian	Probable F-19b	1.13	485		11	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-7	Otuk Formation	13.8	Cobblestone Creek	Late Triassic, probable Norian	Probable F-19b	4.44	535	V ?2.22	8	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-8	Otuk Formation	28.5	Cobblestone Creek	Indeterminate	Indeterminate	2.81	495	V 2.31	8	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-9	Otuk Formation	32.2	Cobblestone Creek	Late Triassic, Norian	F-19b	2.15	519		5	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-10	Otuk Formation	34	Cobblestone Creek	Indeterminate	Indeterminate	2.07	531		5	Otuk, below Karen Ck. ss.		68 23.954	150 19.117
82 Mu 75-1	Blankenship Mbr, Otuk Fm		Welcome Creek	Lower Jurassic		6.25	488	?2.02	25			68.364	150.792
00 Mu 30-6	Kingak Formation		Erratic Creek	Probable Valanginian	F-13b	0.26	478		4	Gray silty shale below coquinoid limestone	Section 00 Mu 30 is on thrust sheet of Endicott Mountains allochthon structurally higher than sections to the east	68 23.441	150 52.228
00 Mu 30-5	Kingak Formation		Erratic Creek	Valanginian	F-13b P-M 20	0.09	406	V ? 1.97	33	Gray silty shale below coquinoid limestone		68 23.441	150 52.228
00 Mu 30-4	Blankenship Member of Otuk Fm.		Erratic Creek	Early Jurassic?		7.42	493		26	Platy bk shale, contains Otapiria tailleuri		68 23.441	150 52.228
00 Mu 30-3	Blankenship Member of Otuk Fm.		Erratic Creek	Early Jurassic?		9.82	489	V ? 2.25	18	Platy bk shale, contains Otapiria tailleuri		68 23.441	150 52.228
00 Mu 30-1	Otuk Formation, top of limestone mbr		Erratic Creek	Probable Norian		0.56	442	V ? 1.93	16	Ls, dk gr-bk		68 23.441	150 52.228
00 Mu 30	Otuk Formation, shale/chert mbr.		Erratic Creek	Probable Late Triassic		4.08	492	V ?1.83	32	Sooty shale		68 23.441	150 52.228
OO Mu 36	Otuk Formation, limestone member		Tiglukpuk Creek	Late Triassic		2.13	462	V ? 1.94	128	Source rock type kerogen		68 21.347	151 52.396
OO Mu 36-1	Otuk Formation., chert member		Tiglukpuk Creek	Late Triassic		5.53	453		151	Source rock type kerogen		68 21.347	151 52.396
OO Mu 36-2	Otuk Formation., chert member		Tiglukpuk Creek	Late Triassic		1.77	461	B ?1.49 V? 1.23	61	Source rock type kerogen		68 21.347	151 52.396
OO Mu 36-2.1	Otuk Formation., chert member		Tiglukpuk Creek	Late Triassic		1.53	461		52			68 21.347	151 52.396
OO Mu 36-4	Siksikpuk Formation		Tiglukpuk Creek	Permian?		0.48	488	V 1.94	48	Gray clay shale		68 21.347	151 52.396
	Allochthonous rocks in Disturbed Belt, from allochthons structurally higher than Endicott Mountains allochthon												
00 Mu 35	Okpikruak Formation		Tiglukpuk Creek	Neocomian		0.35	486	V. 1.62	20		Ipnavik River allochthon		
00 Mu 41	Okpikruak Formation		Kiruktagiak River	Valanginian ?	P-M20?	0.68	443	V ? 1.79	143			68 26.174	152 45.845
00 Mu 43	Okpikruak Formation		Aucella Creek	Probable Valanginian	Probable P-M20	0.69	450		161			68 27.585	152 43.606
00 Mu 44	Okpikruak Formation		Aucella Creek	Probable Valanginian	Probable P-M20	0.31	467	V 1.52	26			68 27.585	152 43.606
00 Mu 47	Okpikruak Formation		Tiglukpuk Creek	Prob Neocomian Undiff		0.54	481		65			68 25.374	151 53 714
OO Mu 37	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Upper Triassic		3.43	438	V ?1.36	101	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
OO Mu 37-1	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Probable Norian	Probable F-19b P-M26?	4.18	442		127	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
OO Mu 37-2	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Upper Triassic		1.74	444		123	Thin bedded black organic limestone	Float from above, has strong sweet gassy odor	68 29.759	152 16.825

00 Ha 29-A	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Probable Norian	Probable F-19b	3.93	442	V ?2.05	171	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
00 Ha 29-B	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Indet.		1.85	446		111	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
00 Mu 67	Imnaitchiak Chert /Otuk Formation		Tiglukpuk Creek	Upper Triassic		3.99	436	-	180	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68°30.321	152°00.628
	Picnic Creek allochthon												
99 Ha 121	Okpikruak Formation		Irgnyivik Lake	Jur.- Cret. undiff.		0.53	485	1.46	13.2			68.438	151.323
85 Mu 75	Okpikruak Formation		Peregrine Ck.	Neocomian		0.88	482	1.51	32			68.390	150.313
99 Ha 117	Okpikruak Formation		Welcome Ck.	Neocomian		0.52	485	1.64	28.8			68.442	150.912

Organikc geochemistry by Baseline DGSI, 1994, 1999, 2000.				Micropaleontology by Micropaleo Consultants, Inc. 1994, 1999, 2000						Data compiled and tabulated by C.G. Mull, 3/ 21/01			
TOC-total organic carbon		TMax-maximum temperature			HI--Hydrogen Index								
-- <0.5--nonsource		<435---immature for oil			HI > ~400--Type 1 kerogen, algal								
0.5-1.0--poor source rock		~435-460--mature for oil			HI 200-400--Type II kerogen, marine								
1.0-2.0--good source rock		> 460--wet and dry gas			HI < ~200--Type III kerogen, terrestrial								
2.0-4.0--very good source		Ro-- % vitrinite reflectance											
> 4.0--excellent source rock		--< 0.6 -- Immature for oil											
		~0.6--1.2---mature for oil											
		> 2.0---wet and dry gas											

FOOTHILLS BELT GEOCHEMISTRY SUMMARY

C.G. Mull, 3/22/01

Station no.	Formation		Location	Paleo by Micropaleo Consultants		Geochemistry by Baseline DGSI				Lithology notes	Discussion	Lat	Long
				Age	Paleo Zone	TOC Wt%	TMax °C	Ro	HI				
		UPPER CRETACEOUS BROOKIAN MARINE SEDIMENTS											
00 TJR105-104	Seabee Formation		Shale Wall Bluff	Cretaceous undiff.		0.52	459		27	Black shale	Measured section		
00 TJR105(23)	Lower Tuluvak Fm. (Ayiyak Mbr Seabee Fm.)		Shale Wall Bluff	Late Cretaceous, probable Santonian	Probable F-5 P-M14?	0.89	431	V 0.90	47				
00 TJR 105-0	Lower Tuluvak Fm. (Ayiyak Mbr Seabee Fm.)		Shale Wall Bluff	Late Cretaceous undiff.		0.50	412	V 0.97	22				
		LOWER CRETACEOUS BROOKIAN DELTAIC SEDIMENTS											
00 Ha 30-A	Nanushuk Formation.		Autumn Creek			8.47	432		519		Carbonaceous siltstone		
00 Ha 33	Nanushuk Formation.		Autumn Creek			51.26	427	V 0.69	247		Coal		
99 DL 64.29.7	Nanushuk Formation.		E Rooftop Ridge	Cret. undiff.								68.844	150.557
99 DL 64.151.4	Nanushuk Formation.		E Rooftop Ridge	Prob. E. Cret. undiff.								68.844	150.557
99 Ha 123	Nanushuk Formation.		Kanayut River	Albian paly		0.81	449	0.70	28.4			68.645	150.905
99 DL47-119.4	Torok Fm.--Nanushuk Formation		Arc Mountain	Aptian-Albian		0.57	446		26.3			68.646	150.585
99 DL47-176.3	Torok Fm.--Nanushuk Formation		Arc Mountain	Prob. Aptian-Albian		1.21	440	0.50	52.1			68.646	150.585
00 HA 54	Nanushuk Fm or Torok Formation		Kayak Mountain anticline.			1.05	443	V ?0.71	44			68.5091	152.065
00 Mu 59	Torok Formation.		Cobblestone Ck	Aptian-Albian	P-M18 to P-M 17	0.65	447	V.0.88	28		Upper Torok, near base of Nanushuk.	68 34.189	150 28.048
99 Mu 80	Torok Formation		Autumn Creek	Prob. E. Cret. undiff.		0.75	440		40.0			68.713	151.917
99 Mu80-1	Torok Formation		Autumn Creek	E. Cret. undiff.		0.90	441	?0.57	55.6			68.713	151.917
84 Mu 75	Torok Formation		Autumn Creek	Probable Aptian-Albian		0.79	447	0.92	67			68.689	151.988
99 Mu 79	Torok Formation		Autumn Creek	No paleo		0.56	437	B0.63	76.8			68.682	152.012
99 Mu 56	Torok -Fortress Mtn. Fm		Kanayut River	Prob. Cret. undiff.		0.75	449		52.0			68.494	150.935
99 Mu 58	Torok -Fortress Mtn. Fm		Kanayut River	Aptian-Albian		0.81	447		24.7			68.503	150.856
99 Mu 60	Torok -Fortress Mtn. Fm		Nanushuk River	Indeterminate		0.77	481	1.4	26.0			68.459	150.574
99 Mu 60-1	Torok -Fortress Mtn. Fm		Nanushuk River	Indeterminate		0.79	480		20.3			68.459	150.574
		LOWER CRETACEOUS BROOKIAN FOREDEEP SEDIMENTS											
00 Mu 51	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Confusion Ck.	Early Cret.		4.31	444	V 0.70	147	Coaly layer			
00 Mu 52	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Ck tributary	Poss Early Cret Undiff		0.41	494	V 0.77	27			68.43	151.9271
00 Mu 53	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Creek	Poss Early Cret Undiff		0.37	475		16			68 27.812	152 02.046
00 Mu 54	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Creek	Poss Early Cret Undiff		0.60	475	V 1.25	60			68 30.589	152 03.932
00 Mu 54-1	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Creek	Poss Early Cret Undiff		7.46	443		253	Carbonaceous debris		68 30.589	152 03.932
00 Mu 55	Fortress Mtn/ Torok Formation		Thumbprint syncline, west of Tiglukpuk Ck.	Hauterivian	F-13a P-M19?	0.79	451	V 0.87	56		From mudstone section just above basal Fortress Mountain conglomerate	68.5417	152.1835
00 Mu 58	Torok Formation.		Tiglukpuk Creek	Hauterivian	P-M19	0.80	449	V 1.25	64			68 35.043	152 14.368
00 Ha 51	Fortress Mtn Formation		Siksikpuk River			1.08	443	V 0.86	54			68.599	152.058
00 Ha 52	Torok Formation.		Siksikpuk River			1.02	453	V 0.97	73			68.5795	152.0633
00 Mu 61	Torok Formation.		Desolation Creek.	Aptian-Albian	P-M18 to P-M 17	0.97	436	V. 0.87	61		Part of regional terrane with scattered knockers of Imnaitchiak Chert.	68 37.510	151 45.474
00 Mu 62	**Torok Formation.**		**Desolation Creek.**	**Aptian-Albian**		**2.03**	**438**	**-**	**398**	**Bk sllic marl w organic odor, from block of Triassic Imnaitchiak Chert.**	**Part of regional terrane with scattered knockers of Imnaitchiak Chert.**	**68 35.310**	**151 44.894**

00 Mu 62-1	Torok Formation.		Desolation Creek.	Probable Aptian-Albian	P-M18 to P-M 17	0.17	483	V 1.03	82		Part of regional terrane with scattered knockers of Imnaitchiak Chert.	68 35.310	151 44.894
00 Mu 63	Torok Formation.		Desolation Creek.	Early Cretaceous Undiff		0.79	440	V 1.06	37		Part of regional terrane with scattered knockers of Imnaitchiak Chert.	68 34.059	151 45.650
OO Ha 51	Fortress Mtn Formation		Siksikpuk River	Lower Cretaceous	Indet.	1.08	443		54			68.599	152.058
OO Ha 52	Torok Formation.		Tiglukpuk Creek	Lower Cretaceous	Indet.	1.02	453		73			68.5795	152.0633
	COBBLESTONE PARAUTOCHTHONOUS SEQUENCE, EASTERN DISTURBED BELT												
	Northern Cobblestone parautochthonous sequence												
		Ellesmerian platform deposits, Lower Cretaceous to Upper Triassic											
		Northernmost exposure of Triassic-Lower Jurassic rocks in foothills belt											
00 Mu 34-3.1	**Blankenship Member of Otuk Fm.**		**May Creek, north of Cobblestone Hills**	**Lower Jurassic**	**Indet.**	**6.53**	**460**	**V ? 1.80**	**45**	**Black organic marl, contains Otapiria tailleuri**	**1 m above Karen Creek Ss.**	**68.33.440**	**150.15.712**
OO Mu 34-3	**Blankenship Member of Otuk Fm.**		**May Creek, north of Cobblestone Hills**	**Lower Jurassic**	**Indet.**	**5.41**	**465**	**V 1.91**	**58**	**Black organic shale, contains Otapiria tailleuri**	**1/2 m above Karen Creek Ss.**	**68.33.440**	**150.15.712**
OO Mu 34-2	**Otuk/Shublik Fm., limestone member**		**May Creek, north of Cobblestone Hills**	**Late Triassic**		**6.20**	**465**	**V 1.76**	**59**	**Black limestone**	**1 m below Karen Creek Ss.**	**68.33.440**	**150.15.712**
OO Mu 34-1	Otuk/Shublik Fm., limestone member		May Creek, north of Cobblestone Hills	Probable Late Triassic		1.25	461	V 1.66	24	Black limestone	Beds less siliceous and more limestone than Otuk at Endicott Mtns allochthon at mountain front	68.33.440	150.15.712
00 Mu 34	**Otuk/Shublik Fm., limestone member**		**May Creek, north of Cobblestone Hills**	**Upper Triassic**		**3.74**	**492**		**31**	**Bk sooty shale**		**68.33.440**	**150.15.712**
00 Mu 34-4	**Otuk/Shublik Fm., limestone member**		**May Creek, north of Cobblestone Hills**	**Upper Triassic**		**6.72**	**488**		**48**	**Black limestone**		**68.33.440**	**150.15.712**
	Central Cobblestone parautochthonous sequence												
		Foredeep deposits, Lower Cretaceous											
99 Mu 67	Torok Formation		Cobblestone ridges	Possible Hauterivian		1.04	461	?1.24	31.7			68.529	150.323
99 Mu 68	Torok Formation		Cobblestone ridges	Possible Aptian-Albian		0.96	461		40.6			68.535	150.444
99 Mu 68-1	Torok Formation		Cobblestone ridges	Prob. E Cret. undiff		1.18	452	1.34	63.6			68.535	150.444
00 RR 104 C	Torok/manganiferous shale unit		6 km SW of Toolik Lake	Lower Cretaceous		1.49	485	V ?1.27	19		Associated with the Cobblestone ss unit	68 35.130	149 40.933
00 Mu 25	Torok/manganiferous shale unit		May Creek tributary, Cobblestone Hills area.	Lower Cretaceous	Indet.	2.77	505	B?1.51	18		Underlies Cobblestone Ss. unit	68 32.028	150 12.083
99 Mu 62	Torok, "manganiferous" shale		Kanayut River	Poss. Aptian-Albian								68.479	150.584
85 Mu 71	Lower Torok Fm., phosphatic-manganiferous shale,		Cobblestone Creek	Aptian ?-Albian		0.94	455	0.96	51			68.510	150.473
		Ellesmerian platform deposits, Lower Cretaceous to Upper Triassic											
82 Mu 67-3	Coquinoid limestone		Cobblestone Creek	Valanginian		0.30	385		10			68.423	150.227
82 Mu 79-3	Coquinoid limestone		May Creek tributary	Valanginian		0.37	444	?0.11	35				
99 Mu 44-A	Kingak Formation		Cobblestone Creek	Valanginian	F-13b P-M 20	0.26	487	V ? 1.04	38	Gray silty shale	Resample of 1999 location	68.512	-150.388
99 Mu 44-B	Kingak Formation		Cobblestone Creek	Valanginian	F-13b P-M 20	0.22	422	V ? 1.77	23	Gray silty shale	Resample of 1999 location	68.512	-150.388
00 Mu 26	Kingak Formation		May Creek tributary, Cobblestone Hills	Valanginian	F-13b	0.22	422	V ?1.16	45	Gray silty shale		68 32.114	150 12.979
00 Mu 26-1	Kingak Formation		May Creek tributary, Cobblestone Hills	Valanginian	F-13b	0.24	481		21	Gray silty shale		68 32.114	150 12.979
00 Mu 26-2	Kingak Formation		May Creek tributary, Cobblestone Hills	Probable Valanginian	F-13b P-M 20	0.90	490		11			68 32.114	150 12.979
00 Mu 26-3	**Blankenship Member of Otuk Fm.**		**May Creek tributary, Cobblestone Hills**	**Lower Jurassic**	**Indet.**	**4.08**	**457**		**61**	**Fissile black organic shale**		**68 32.114**	**150 12.979**
00 Mu 26-3.1	**Blankenship Member of Otuk Fm.**		**May Creek tributary, Cobblestone Hills**	**Lower Jurassic**	**Indet.**	**2.43**	**461**		**45**	**Fissile black organic shale**		**68 32.114**	**150 12.979**

00 Mu 26-3.2	Blankenship Member of Otuk Fm.		May Creek tributary, Cobblestone Hills	Lower Jurassic	Indet.	2.17	461	B?1.55	47	Fissile black organic shale		68 32.114	150 12.979
99 Mu 44-1	Blankenship Member of Otuk Fm.		Cobblestone Creek	Lower Jurassic		10.12	459	1.17	200.6			68.512	150.388
99 Mu 44-1.1	Blankenship Member of Otuk Fm.		Cobblestone Creek	Lower Jurassic		6.74	444	V ? 1.67	158	Fissile black organic shale	Resample of 1999 location	68.512	150.388
	Southern Cobblestone parautochthonous sequence												
		Foredeep deposits, Lower Cretaceous											
99 Mu 45	Torok Formation		Peregrine Creek	Probable Valanginian	Probable Valanginian	1.18	472	?1.22	31.4			68.477	150.372
99 Mu 45-1	Torok Formation		Peregrine Creek	Jur-Cret undiff.	Jur-Cret undiff.	0.95	473		26.3			68.477	150.372
99 Mu 45-2	Torok Formation		Peregrine Creek	Indeterminate	Indeterminate	0.46	475		30.4			68.477	150.372
99 Mu 45-3	Torok Formation		Peregrine Creek	Probable Valanginian	Probable Valanginian	0.78	476	?1.47	25.6			68.477	150.372
	ALLOCHTHONOUS ROCKS												
	ENDICOTT MOUNTAINS ALLOCHTHON AT MOUNTAIN FRONT												
OO Ha 61	Blankenship Member of Otuk Fm.		Atigun Gorge	Lower Jurassic	Indet.	5.65	447	V ?1.53	141	Fissile black organic shale, contains Otapiria tailleuri			
OO Ha 61-1	Otuk Fm., limestone member		Atigun Gorge	Upper Ttlassic		4.52	448	V ?1.98	164	Black shale			
	ATIGUN GORGE MEASURED SECTION	Meters	Sampled by Mike Mickey and Art Banet on 7/6/00, measured and described by Mike Whalen, 7/7/00										
00 MCI 1-20	Coquinoid limestone	61.3	Atigun Gorge	Early Cretaceous, Valanginian	F-13b, P-M20b?	1.13	456	V 1	58				
00 MCI 1-19	Kingak	56.6	Atigun Gorge	Early Cretaceous, Valanginian	F-13b	0.43	494	-	58				
00 MCI 1-18	Kingak	42.5	Atigun Gorge	Indeterminate		7.80	446	V ?1.24	180	Source rock type kerogen			
00 MCI 1-17	Blankenship Mbr., Otuk Fm.	38.8	Atigun Gorge	Indeterminate		4.03	445	V ?1.35	180	Source rock type kerogen			
00 MCI 1-16	Blankenship Mbr., Otuk Fm.	35.2	Atigun Gorge	Probbly Early to Middle Jurassic		4.73	445	-	120	Source rock type kerogen			
00 MCI 1-15	Blankenship Mbr., Otuk Fm.	32.8	Atigun Gorge	Indeterminate		6.50	447	-	140	Source rock type kerogen			
00 MCI 1-14	Blankenship Mbr., Otuk Fm.	25.8	Atigun Gorge	Indeterminate		10.15	444	-	162	Source rock type kerogen			
00 MCI1 1-13	Blankenship Mbr., Otuk Fm.	25	Atigun Gorge	Indeterminate		10.59	447	-	130	Source rock type kerogen			
00 MCI 1-12B	Otuk, ls member	21.8	Atigun Gorge	Indeterminate		0.78	450	B ?1.36	108				
00 MCI 1-11	Otuk, ls member	19.4	Atigun Gorge	Late Triassic, Norian	F-19b	1.09	453		62				
00 MCI 1-10	Otuk, ls member, ?	15.7	Atigun Gorge	Late Triassic, Norian	F-19b	1.63	450		121				
00 MCI 1-9	Otuk, ls member, ?	15.4	Atigun Gorge	Late Triassic, Norian	F-19b	0.88	449	V 1.50	74				
00 MCI 1-8	Otuk, chert member	11.8	Atigun Gorge	Late Triassic, Norian	F-19b	0.70	445		76				
00 MCI 1-6	Otuk, chert member	9.2	Atigun Gorge	Late Triassic, Norian	F-19b	1.67	450		86				
00 MCI 1-7	Otuk, chert member	10.6	Atigun Gorge	Late Triassic, Norian	F-19b	1.31	450	V ?1.43	69				
00 MCI 1-5	Otuk, chert member	5.2	Atigun Gorge	Late Triassic, probable Norian	Probable F-19b	5.29	450	V ?1.43	160	Source rock type kerogen			
00 MCI 1-4	Otuk, chert member	3.8	Atigun Gorge	Late Triassic, probable Norian	Probable F-19b	5.49	447		186	Source rock type kerogen			
00 MCI 1-3	Otuk, chert member	3	Atigun Gorge	Late Triassic, probable Norian	Probable F-19b	1.69	447		92				
00 MCI 1-2	Otuk, chert member	2	Atigun Gorge	Late Triassic, probable Norian	Probable F-19b	4.29	451		125	Source rock type kerogen			
00 MCI 1-1	Otuk, chert member	0	Atigun Gorge	Late Triassic,Carnian to Norian	F 19b to F 19c	1.26	451	V ?1.62	124				
OO Mu 31	Okpikruak Formation		May Creek, east fork	Lower Cretaceous	Indet.	0.79	482	V ?2.29	25			68 24.94	150 09.77

OO Mu 31-1	Okpikruak Formation		May Creek, east fork	Lower Cretaceous	Indet.	0.53	486		19			68 24.94	150 09.77
00 Mu 27-5	**Blankenship Member of Otuk Fm.**		**May Creek, west fork of west fork**	**Lower Jurassic**	**Indet.**	**4.11**	**540**	**V ?2.17**	**3**	**Bk organic shale, contains Otapiria tailleuri**	**Same section as 00 MCI 3. 1m above Karen Ck.Ss.**	**68 24.399**	**150 15.152**
00 Mu 27-3.2	Otuk Formation		May Creek, west fork of west fork	Probable Norian	F-13b	0.59	353		5	Bk clay shale	8 cm below Karen Ck. Ss.	68 24.399	150 15.152
00 Mu 27-3	Otuk Formation		May Creek, west fork of west fork	Probable Norian	F-13b	0.33	N.A.	V 2..15		Green gray claystone	20 cm below Karen Ck.Ss.	68 24.399	150 15.152
00 Mu 27-2	Otuk Formation, limestone member		May Creek, west fork of west fork	Upper Triassic		1.55	533	V 2.42	12	Bk shaly limstone	2 m below Karen Ck.Ss.	68 24.399	150 15.152
00 Mu 27-1	**Otuk Formation., shale member**		**May Creek, west fork of west fork**	**Upper Triassic**		**2.86**	**533**	**B ?2.52 V ?2.23**	**6**	**Bk sooty shale**		**68 24.399**	**150 15.152**
00 Mu 27	Siksikpuk Formation		May Creek, west fork of west fork	Permian		1.21	486	V 2.41	2	Gr silty shale	Near top Ps, poorly exposed, weathered.	68 24.399	150 15.152
	WEST FORK OF MAY CREEK SECTION (structurally complicated)			Sampled by Mike Whalen, Rachel Pachter, and Mike Mickey, 7/11/00									
00 MCI 3-1	**Otuk Fm.**		**May Creek, west fork of west fork**	**Late Triassic, probable Norian**	**Probable F-19b**	**3.12**	**532**	**V ?2.60**	**10**			**68 24.399**	**150 15.152**
00 MCI 3-2	Otuk Fm.		May Creek, west fork of west fork	Indeterminate	Indeterminate	1.01	539		14			68 24.399	150 15.152
00 MCI 3-3	Otuk Fm.		May Creek, west fork of west fork	Late Triassic, probable Norian	Probable F-19b	1.36	453		1			68 24.399	150 15.152
00 MCI 3-4	**Otuk Fm.**		**May Creek, west fork of west fork**	**Indeterminate**	**Indeterminate**	**2.20**	**528**	**B ?2.52**	**4**			**68 24.399**	**150 15.152**
00 MCI 3-6	Otuk Fm.		May Creek, west fork of west fork	Indeterminate	Indeterminate	0.83	534		7			68 24.399	150 15.152
OO Mu 32	Okpikruak Formation		Cobblestone Creek	Lower Cret., Indet.		0.36	517	V ?2.06	39				
OO Mu 33	Okpikruak Formation		Cobblestone Creek	Lower Cret., Indet.		0.90	529	V ?2.16	26				
00 Mu 29-3	Otuk Fm., limestone member		Cobblestone Creek	Late Triassic		1.68	540		5		Same section as OOMCI 2	68 23.954	150 19.117
00 Mu 29-2.1	**Otuk Formation, limestone member**		**Cobblestone Creek**	**Upper Triassic**		**5.00**	**526**	**V ?2.60**	**6**	**Bk limestone**		**68 23.954**	**150 19.117**
00 Mu 29-2	**Otuk Formation., shale member**		**Cobblestone Creek**	**Indet.**		**5.37**	**537**	**V ? 2.08**	**4**	**Source rock type kerogen**		**68 23.954**	**150 19.117**
82 Mu 71-4	**Otuk Formation**		**Cobblestone Creek**	**Upper Triassic**		**3.45**	**495**	**?2.34**	**8**	**Source rock type kerogen**		**68.388**	**-150.318**
82 Mu 71-1	Siksikpuk Formation		Cobblestone Creek	Permian		0.79	457	2.56	9			68.387	-150.319
00 Mu 29-1	Siksikpuk Formation		Cobblestone Creek	Probable Permian		0.54	444		13	Gray clay shale		68 23.954	150 19.117
00 Mu 29	Siksikpuk Formation		Cobblestone Creek	Probable Permian		0.56	N.A.	V 2.29		Gray clay shale		68 23.954	150 19.117
	COBBLESTONE CREEK SECTION (structurally complicated)			Measured and described by Mike Whalen, Rachel Pachter, and Mike Mickey, 7/8/00									
00 MCI 2-1	**Otuk Formation**	**0**	**Cobblestone Creek**	**Indeterminate**	**Indeterminate**	**9.52**	**523**	**V ?2.16**	**9**	**Otuk, shale member**		**68 23.954**	**150 19.117**
00 MCI 2-2	**Otuk Formation**	**2.7**	**Cobblestone Creek**	**Indeterminate**	**Indeterminate**	**4.28**	**524**	**V ?2.18**	**6**	**Otuk Fm.**		**68 23.954**	**150 19.117**
00 MCI 2-3	**Otuk Formation**	**4.7**	**Cobblestone Creek**	**Late Triassic, possible Carnian to Norian**	**F-19b? to F-19c?**	**4.69**	**523**		**5**	**Otuk Fm.**		**68 23.954**	**150 19.117**
00 MCI 2-4	Otuk Formation	7.5	Cobblestone Creek	Late Triassic, probable Norian	Probable F-19b	0.83	527		14	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-5	Otuk Formation	9.8	Cobblestone Creek	Late Triassic, Norian	F-19b	1.43	466	V 2.31	7	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-6	Otuk Formation	11.2	Cobblestone Creek	Late Triassic, probable Norian	Probable F-19b	1.13	485		11	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-7	**Otuk Formation**	**13.8**	**Cobblestone Creek**	**Late Triassic, probable Norian**	**Probable F-19b**	**4.44**	**535**	**V ?2.22**	**8**	**Otuk Fm.**		**68 23.954**	**150 19.117**
00 MCI 2-8	**Otuk Formation**	**28.5**	**Cobblestone Creek**	**Indeterminate**	**Indeterminate**	**2.81**	**495**	**V 2.31**	**8**	**Otuk Fm.**		**68 23.954**	**150 19.117**

00 MCI 2-9	Otuk Formation	32.2	Cobblestone Creek	Late Triassic, Norian	F-19b	2.15	519		5	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-10	Otuk Formation	34	Cobblestone Creek	Indeterminate	Indeterminate	2.07	531		5	Otuk, below Karen Ck. ss.		68 23.954	150 19.117
82 Mu 75-1	Blankenship Mbr, Otuk Fm		Welcome Creek	Lower Jurassic		6.25	488	?2.02	25			68.364	150.792
00 Mu 30-6	Kingak Formation		Erratic Creek	Probable Valanginian	F-13b	0.26	478		4	Gray silty shale below coquinoid limestone	Section 00 Mu 30 is on thrust sheet of Endicott Mountains allochthon structurally higher than sections to the east	68 23.441	150 52.228
00 Mu 30-5	Kingak Formation		Erratic Creek	Valanginian	F-13b P-M 20	0.09	406	V ? 1.97	33	Gray silty shale below coquinoid limestone		68 23.441	150 52.228
00 Mu 30-4	Blankenship Member of Otuk Fm.		Erratic Creek	Early Jurassic?		7.42	493		26	Platy bk shale, contains Otapiria tailleuri		68 23.441	150 52.228
00 Mu 30-3	Blankenship Member of Otuk Fm.		Erratic Creek	Early Jurassic?		9.82	489	V ? 2.25	18	Platy bk shale, contains Otapiria tailleuri		68 23.441	150 52.228
00 Mu 30-1	Otuk Formation, top of limestone mbr		Erratic Creek	Probable Norian		0.56	442	V ? 1.93	16	Ls, dk gr-bk		68 23.441	150 52.228
00 Mu 30	Otuk Formation, shale/chert mbr.		Erratic Creek	Probable Late Triassic		4.08	492	V ?1.83	32	Sooty shale		68 23.441	150 52.228
OO Mu 36	Otuk Formation, limestone member		Tiglukpuk Creek	Late Triassic		2.13	462	V ? 1.94	128	Source rock type kerogen		68 21.347	151 52.396
OO Mu 36-1	Otuk Formation., chert member		Tiglukpuk Creek	Late Triassic		5.53	453		151	Source rock type kerogen		68 21.347	151 52.396
OO Mu 36-2	Otuk Formation., chert member		Tiglukpuk Creek	Late Triassic		1.77	451	B ?1.49 V? 1.23	61	Source rock type kerogen		68 21.347	151 52.396
OO Mu 36-2.1	Otuk Formation., chert member		Tiglukpuk Creek	Late Triassic		1.53	451		52			68 21.347	151 52.396
OO Mu 36-4	Siksikpuk Formation		Tiglukpuk Creek	Permian?		0.48	488	V 1.94	48	Gray clay shale		68 21.347	151 52.396
	Allochthonous rocks in Disturbed Belt, from allochthons structurally higher than Endicott Mountains allochthon												
00 Mu 35	Okpikruak Formation		Tiglukpuk Creek	Neocomian		0.35	486	V. 1.62	20		Ipnavik River allochthon		
00 Mu 41	Okpikruak Formation		Kiruktagiak River	Valanginian ?	P-M20?	0.68	443	V ? 1.79	143			68 26.174	152 45.845
00 Mu 43	Okpikruak Formation		Aucella Creek	Probable Valanginian	Probable P-M20	0.69	450		161			68 27.585	152 43.606
00 Mu 44	Okpikruak Formation		Aucella Creek	Probable Valanginian	Probable P-M20	0.31	467	V 1.52	26			68 27.585	152 43.606
00 Mu 47	Okpikruak Formation		Tiglukpuk Creek	Prob Neocomian Undiff		0.54	481		65			68 25.374	151 53 714
OO Mu 37	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Upper Triassic		3.43	438	V ?1.36	101	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
OO Mu 37-1	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Probable Norian	Probable F-19b P-M26?	4.18	442		127	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
OO Mu 37-2	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Upper Triassic		1.74	444		123	Thin bedded black organic limestone	Float from above, has strong sweet gassy odor	68 29.759	152 16.825
00 Ha 29-A	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Probable Norian	Probable F-19b	3.93	442	V ?2.05	171	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
00 Ha 29-B	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Indet.		1.85	446		111	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
00 Mu 57	Imnaitchiak Chert /Otuk Formation		Tiglukpuk Creek	Upper Triassic		3.99	436	-	180	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68°30.321	152°00.628
	PICNIC CREEK ALLOCHTHON												
99 Ha 121	Okpikruak Formation		Irgnyivik Lake	Jur.- Cret. undiff.		0.53	485	1.46	13.2			68.438	151.323
85 Mu 75	Okpikruak Formation		Peregrine Ck.	Neocomian		0.88	482	1.51	32			68.390	150.313
99 Ha 117	Okpikruak Formation		Welcome Ck.	Neocomian		0.52	485	1.64	28.8			68.442	150.912

Organike geochemistry by Baseline DGSI, 1994, 1999, 2000.		Micropaleontology by Micropaleo Consultants, Inc. 1994, 1999, 2000		Data compiled and tabulated by C.G. Mull, 3/ 21/01	
TOC-total organic carbon	TMax-maximum temperature		HI--Hydrogen Index		
-- <0.5--nonsource	<435---immature for oil		HI > ~400--Type 1 kerogen, algal		
0.5-1.0--poor source rock	~435-460--mature for oil		HI 200-400--Type II kerogen, marine		
1.0-2.0--good source rock	> 460--wet and dry gas		HI < ~200--Type III kerogen, terrestrial		
2.0-4.0--very good source	Ro-- % vitrinite reflectance				
> 4.0--excellent source rock	--< 0.6 -- immature for oil				
	~0.6--1.2---mature for oil				
	> 2.0---wet and dry gas				

FOOTHILLS BELT GEOCHEMISTRY SUMMARY

C.G. Mull, 6/10/01

Station no.	Formation		Location	Paleo by Micropaleo Consultants		Geochemistry by Baseline DGSI				Lithology notes	Discussion	Lat	Long
				Age	Paleo Zone	TOC Wt%	TMax °C	Ro	HI				
	UPPER CRETACEOUS BROOKIAN MARINE SEDIMENTS												
99Mu 16-3	Schrader Bluff Fm. (?)		Ivishak River	Senonian,Campanian-Maestrichtian*		0.52	505		42	Gr silty sh.			
99Mu 16-6	Schrader Bluff Fm.		Ivishak River	Senonian,Campanian-Maestrichtian*	P-M14 to P-M13	1.18	439	1.19	59	Gr silty sh.	2.30		
99DL 40-3.4	Schrader Bluff Fm.		Ivishak River	Senonian, (Santonian-Maestrichtian)	P-M14 to P-M13	11.86	436		169			69.236	148.1494
99DL 44B-4.4	Schrader Bluff Fm.		Toolik River	Senonian (Campanian – Maestrichtian)*	P-M13 to P-M14	7.17	411		25				
99Mu 15-1	Schrader Bluff Fm. (?)		Ivishak River	Senonian, possible Santonian-Campanian*	P-M 14?	1.15	438	1.22	48	Silty mudst	2.30	69.236	148.149
99Mu 15-2	Hue Shale equivalent		Ivishak River	Senonian, possible Santonian-Campanian*	P-M 14?	2.35	429	1.17	153	Gr clay shale	2.0-2.3	69.236	148.149
99Mu 15-3	Hue Shale equivalent		Ivishak River	Senonian, possible Santonian-Campanian*	P-M 14? Probable F-6	2.46	426	1.29	284	Organic paper sh	2.0-2.3	69.236	148.149
00 TJR105-104	Seabee Formation		Shale Wall Bluff	Cretaceous undiff.		0.52	459		27	Black shale	Measured section		
00 TJR105(23)	Lower Tuluvak Fm. (Aylyak Mbr Seabee Fm.)		Shale Wall Bluff	Late Cretaceous, probable Santonian	Probable F-5 P-M14?	0.89	431	V 0.90	47				
00 TJR 105-0	Lower Tuluvak Fm. (Aylyak Mbr Seabee Fm.)		Shale Wall Bluff	Late Cretaceous undiff.		0.50	412	V 0.97	22				
	LOWER CRETACEOUS BROOKIAN DELTAIC SEDIMENTS												
00 Ha 30-A	Nanushuk Formation.		Autumn Creek			8.47	432		519		Carbonaceous siltstone		
00 Ha 33	Nanushuk Formation.		Autumn Creek			51.26	427	V 0.69	247		Coal		
99 DL 64.29.7	Nanushuk Formation.		E Rooftop Ridge	Cret. undiff.								68.844	150.557
99 DL 64.151.4	Nanushuk Formation.		E Rooftop Ridge	Prob. E. Cret. undiff.								68.844	150.557
99 Ha 123	Nanushuk Formation.		Kanayut River	Albian paly		0.81	449	0.70	28.4			68.645	150.905
99 DL47-119.4	Torok Fm.--Nanushuk Formation		Arc Mountain	Aptian-Albian		0.57	446		26.3			68.646	150.585
99 DL47-176.3	Torok Fm.--Nanushuk Formation		Arc Mountain	Prob. Aptian-Albian		1.21	440	0.50	52.1			68.646	150.585
00 HA 54	Nanushuk Fm or Torok Formation		Kayak Mountain anticline.			1.05	443	V ?0.71	44			68.5091	152.065
00 Mu 59	Torok Formation.		Cobblestone Ck	Aptian-Albian	P-M18 to P-M 17	0.65	447	V.0.88	28		Upper Torok, near base of Nanushuk.	68 34.189	150 28.048
99 Mu 80	Torok Formation		Autumn Creek	Prob. E. Cret. undiff.		0.75	440		40.0			68.713	151.917
99 Mu80-1	Torok Formation		Autumn Creek	E. Cret. undiff.		0.90	441	70.57	55.6			68.713	151.917
84 Mu 75	Torok Formation		Autumn Creek	Probable Aptian-Albian		0.79	447	0.92	67			68.689	151.988
99 Mu 79	Torok Formation		Autumn Creek	No paleo		0.56	437	B0.63	76.8			68.682	152.012
99 Mu 56	Torok -Fortress Mtn. Fm		Kanayut River	Prob. Cret. undiff.		0.75	449		52.0			68.494	150.935
99 Mu 58	Torok -Fortress Mtn. Fm		Kanayut River	Aptian-Albian		0.81	447		24.7			68.503	150.856
99 Mu 60	Torok -Fortress Mtn. Fm		Nanushuk River	Indeterminate		0.77	481	1.4	26.0			68.459	150.574
99 Mu 60-1	Torok -Fortress Mtn. Fm		Nanushuk River	Indeterminate		0.79	480		20.3			68.459	150.574
	LOWER CRETACEOUS BROOKIAN FOREDEEP SEDIMENTS												
00 Mu 51	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Confusion Ck.	Early Cret.		4.31	444	V 0.70	147	Coaly layer			
00 Mu 52	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Ck tributary	Poss Early Cret Undiff		0.41	494	V 0.77	27			68.43	151.9271
00 Mu 53	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Creek	Poss Early Cret Undiff		0.37	475		16			68 27.812	152 02.046
00 Mu 54	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Creek	Poss Early Cret Undiff		0.60	475	V 1.25	60			68 30.589	152 03.932

00 Mu 54-1	Okpikruak Fm ?/ Fortress Mtn. Fm. ?		Tiglukpuk Creek	Poss Early Cret Undiff		7.46	443		253	Carbonaceous debris		68 30.589	152 03.932
00 Mu 55	Fortress Mtn/ Torok Formation		Thumbprint syncline, west of Tiglukpuk Ck.	Hauterivian	F-13a P-M19?	0.79	451	V 0.87	56		From mudstone section just above basal Fortress Mountain conglomerate	68.5417	152.1835
00 Mu 58	Torok Formation.		Tiglukpuk Creek	Hauterivian	P-M19	0.80	449	V 1.25	64			68 35.043	152 14.368
00 Ha 51	Fortress Mtn Formation		Siksikpuk River			1.08	443	V 0.86	54			68.599	152.058
00 Ha 52	Torok Formation.		Siksikpuk River			1.02	453	V 0.97	73			68.5795	152.0633
00 Mu 61	Torok Formation.		Desolation Creek.	Aptian-Albian	P-M18 to P-M 17	0.97	436	V. 0.87	61		Part of regional terrane with scattered knockers of Imnaitchiak Chert.	68 37.510	151 45.474
00 Mu 62	Torok Formation.		Desolation Creek.	Aptian-Albian		2.03	438	-	398	Bk silic marl w organic odor, from block of Triassic Imnaitchiak Chert.	Part of regional terrane with scattered knockers of Imnaitchiak Chert.	68 35.310	151 44.894
00 Mu 62-1	Torok Formation.		Desolation Creek.	Probable Aptian-Albian	P-M18 to P-M 17	0.17	483	V 1.03	82		Part of regional terrane with scattered knockers of Imnaitchiak Chert.	68 35.310	151 44.894
00 Mu 63	Torok Formation.		Desolation Creek.	Early Cretaceous Undiff		0.79	440	V 1.06	37		Part of regional terrane with scattered knockers of Imnaitchiak Chert.	68 34.059	151 45.650
00 Ha 51	Fortress Mtn Formation		Siksikpuk River	Lower Cretaceous	Indet.	1.08	443		54			68.599	152.058
00 Ha 52	Torok Formation.		Tiglukpuk Creek	Lower Cretaceous	Indet.	1.02	453		73			68.5795	152.0633
	COBBLESTONE PARAUTOCHTHONOUS SEQUENCE, EASTERN DISTURBED BELT												
	Northern Cobblestone parautochthonous sequence												
	Ellesmerian platform deposits, Lower Cretaceous to Upper Triassic												
	Northernmost exposure of Triassic-Lower Jurassic rocks in foothills belt												
00 Mu 34-3.1	Blankenship Member of Otuk Fm.		May Creek, north of Cobblestone Hills	Lower Jurassic	Indet.	6.53	460	V ? 1.80	45	Black organic marl, contains Otapiria tailleuri	1 m above Karen Creek Ss.	68.33.440	150.15.712
00 Mu 34-3	Blankenship Member of Otuk Fm.		May Creek, north of Cobblestone Hills	Lower Jurassic	Indet.	5.41	465	V 1.91	58	Black organic shale, contains Otapiria tailleuri	1/2 m above Karen Creek Ss.	68.33.440	150.15.712
00 Mu 34-2	Otuk/Shublik Fm., limestone member		May Creek, north of Cobblestone Hills	Late Triassic		6.20	465	V 1.76	59	Black limestone	1 m below Karen Creek Ss.	68.33.440	150.15.712
00 Mu 34-1	Otuk/Shublik Fm., limestone member		May Creek, north of Cobblestone Hills	Probable Late Triassic		1.25	461	V 1.66	24	Black limestone	Beds less siliceous and more limestone than Otuk at Endicott Mtns allochthon at mountain front	68.33.440	150.15.712
00 Mu 34	Otuk/Shublik Fm., limestone member		May Creek, north of Cobblestone Hills	Upper Triassic		3.74	492		31	Bk sooty shale		68.33.440	150.15.712
00 Mu 34-4	Otuk/Shublik Fm., limestone member		May Creek, north of Cobblestone Hills	Upper Triassic		6.72	488		48	Black limestone		68.33.440	150.15.712
	Central Cobblestone parautochthonous sequence												
	Foredeep deposits, Lower Cretaceous												
99 Mu 67	Torok Formation		Cobblestone ridges	Possible Hauterivian		1.04	461	?1.24	31.7			68.529	150.323
99 Mu 68	Torok Formation		Cobblestone ridges	Possible Aptian-Albian		0.96	461		40.6			68.535	150.444
99 Mu 68-1	Torok Formation		Cobblestone ridges	Prob. E Cret. undiff		1.18	452	1.34	63.6			68.535	150.444
00 RR 104 C	Torok/manganiferous shale unit		6 km SW of Toolik Lake	Lower Cretaceous		1.49	485	V ?1.27	19		Associated with the Cobblestone ss unit	68 35.130	149 40.933
00 Mu 25	Torok/manganiferous shale unit		May Creek tributary, Cobblestone Hills area.	Lower Cretaceous	Indet.	2.77	505	B?1.51	18		Underlies Cobblestone Ss. unit	68 32.028	150 12.083
99 Mu 62	Torok, "manganiferous" shale		Kanayut River	Poss. Aptian-Albian								68.479	150.584
85 Mu 71	Lower Torok Fm., phosphatic-manganiferous shale,		Cobblestone Creek	Aptian ?-Albian		0.94	455	0.96	51			68.510	150.473
	Ellesmerian platform deposits, Lower Cretaceous to Upper Triassic												

82 Mu 67-3	Coquinoid limestone		Cobblestone Creek	Valanginian		0.30	385		10			68.423	150.227
82 Mu 79-3	Coquinoid limestone		May Creek tributary	Valanginian		0.37	444	?0.11	35				
99 Mu 44-A	Kingak Formation		Cobblestone Creek	Valanginian	F-13b P-M 20	0.26	487	V ? 1.04	38	Gray silty shale	Resample of 1999 location	68.512	-150.388
99 Mu 44-B	Kingak Formation		Cobblestone Creek	Valanginian	F-13b P-M 20	0.22	422	V ? 1.77	23	Gray silty shale	Resample of 1999 location	68.512	-150.388
00 Mu 26	Kingak Formation		May Creek tributary, Cobblestone Hills	Valanginian	F-13b	0.22	422	V ?1.16	45	Gray silty shale		68 32.114	150 12.979
00 Mu 26-1	Kingak Formation		May Creek tributary, Cobblestone Hills	Valanginian	F-13b	0.24	481		21	Gray silty shale		68 32.114	150 12.979
00 Mu 26-2	Kingak Formation		May Creek tributary, Cobblestone Hills	Probable Valanginian	F-13b P-M 20	0.90	490		11			68 32.114	150 12.979
00 Mu 26-3	Blankenship Member of Otuk Fm.		May Creek tributary, Cobblestone Hills	Lower Jurassic	Indet.	4.08	457		61	Fissile black organic shale		68 32.114	150 12.979
00 Mu 26-3.1	Blankenship Member of Otuk Fm.		May Creek tributary, Cobblestone Hills	Lower Jurassic	Indet.	2.43	461		45	Fissile black organic shale		68 32.114	150 12.979
00 Mu 26-3.2	Blankenship Member of Otuk Fm.		May Creek tributary, Cobblestone Hills	Lower Jurassic	Indet.	2.17	461	B?1.55	47	Fissile black organic shale		68 32.114	150 12.979
99 Mu 44-1	Blankenship Member of Otuk Fm.		Cobblestone Creek	Lower Jurassic		10.12	459	1.17	200.6			68.512	150.388
99 Mu 44-1.1	Blankenship Member of Otuk Fm.		Cobblestone Creek	Lower Jurassic		6.74	444	V ? 1.67	158	Fissile black organic shale	Resample of 1999 location	68.512	150.388
	Southern Cobblestone parautochthonous sequence												
		Foredeep deposits, Lower Cretaceous											
99 Mu 45	Torok Formation		Peregrine Creek	Probable Valanginian	Probable Valanginian	1.18	472	?1.22	31.4			68.477	150.372
99 Mu 45-1	Torok Formation		Peregrine Creek	Jur-Cret undiff.	Jur-Cret undiff.	0.95	473		26.3			68.477	150.372
99 Mu 45-2	Torok Formation		Peregrine Creek	Indeterminate	Indeterminate	0.46	475		30.4			68.477	150.372
99 Mu 45-3	Torok Formation		Peregrine Creek	Probable Valanginian	Probable Valanginian	0.78	476	?1.47	25.6			68.477	150.372
	ALLOCHTHONOUS ROCKS												
	ENDICOTT MOUNTAINS ALLOCHTHON AT MOUNTAIN FRONT												
00 Ha 61	Blankenship Member of Otuk Fm.		Atigun Gorge	Lower Jurassic	Indet.	5.65	447	V ?1.53	141	Fissile black organic shale, contains Otapiria tailleuri		68.47526	149.24603
00 Ha 61-1	Otuk Fm., limestone member		Atigun Gorge	Upper Ttiassic		4.52	448	V ?1.98	164	Black shale		68.47526	149.24603
	ATIGUN GORGE MEASURED SECTION	Meters	Sampled by Mike Mickey and Art Banet on 7/6/00, measured and described by Mike Whalen, 7/7/00									68.47526	149.24603
00 MCI 1-20	Coquinoid limestone	61.3	Atigun Gorge	Early Cretaceous, Valanginian	F-13b, P-M20b?	1.13	456	V 1	58			68.47526	149.24603
00 MCI 1-19	Kingak	56.6	Atigun Gorge	Early Cretaceous, Valanginian	F-13b	0.43	494	-	58			68.47526	149.24603
00 MCI 1-18	Kingak	42.5	Atigun Gorge	Indeterminate		7.80	446	V ?1.24	180	Source rock type kerogen		68.47526	149.24603
00 MCI 1-17	Blankenship Mbr., Otuk Fm.	38.8	Atigun Gorge	Indeterminate		4.03	445	V ?1.35	180	Source rock type kerogen		68.47526	149.24603
00 MCI 1-16	Blankenship Mbr., Otuk Fm.	35.2	Atigun Gorge	Probbly Early to Middle Jurassic		4.73	445	-	120	Source rock type kerogen		68.47526	149.24603
00 MCI 1-15	Blankenship Mbr., Otuk Fm.	32.8	Atigun Gorge	Indeterminate		6.50	447	-	140	Source rock type kerogen		68.47526	149.24603
00 MCI 1-14	Blankenship Mbr., Otuk Fm.	25.8	Atigun Gorge	Indeterminate		10.15	444	-	162	Source rock type kerogen		68.47526	149.24603
00 MCI 1-13	Blankenship Mbr., Otuk Fm.	25	Atigun Gorge	Indeterminate		10.59	447	-	130	Source rock type kerogen		68.47526	149.24603
00 MCI 1-12B	Otuk, ls member	21.8	Atigun Gorge	Indeterminate		0.78	450	B ?1.36	108			68.47526	149.24603
00 MCI 1-11	Otuk, ls member	19.4	Atigun Gorge	Late Triassic, Norian	F-19b	1.09	453		62			68.47526	149.24603

00 MCI 1-10	Otuk, ls member, ?	15.7	Atigun Gorge	Late Triassic, Norian	F-19b	1.63	450		121			68.47526	149.24603
00 MCI 1-9	Otuk, ls member, ?	15.4	Atigun Gorge	Late Triassic, Norian	F-19b	0.88	449	V 1.50	74			68.47526	149.24603
00 MCI 1-8	Otuk, chert member	11.8	Atigun Gorge	Late Triassic, Norian	F-19b	0.70	445		76			68.47526	149.24603
00 MCI 1-6	Otuk, chert member	9.2	Atigun Gorge	Late Triassic, Norian	F-19b	1.67	450		86			68.47526	149.24603
00 MCI 1-7	Otuk, chert member	10.6	Atigun Gorge	Late Triassic, Norian	F-19b	1.31	450	V ?1.43	69			68.47526	149.24603
00 MCI 1-5	Otuk, chert member	5.2	Atigun Gorge	Late Triassic, probable Norian	Probable F-19b	5.29	450	V ?1.43	160	Source rock type kerogen		68.47526	149.24603
00 MCI 1-4	Otuk, chert member	3.8	Atigun Gorge	Late Triassic, probable Norian	Probable F-19b	5.49	447		186	Source rock type kerogen		68.47526	149.24603
00 MCI 1-3	Otuk, chert member	3	Atigun Gorge	Late Triassic, probable Norian	Probable F-19b	1.69	447		92			68.47526	149.24603
00 MCI 1-2	Otuk, chert member	2	Atigun Gorge	Late Triassic, probable Norian	Probable F-19b	4.29	451		125	Source rock type kerogen		68.47526	149.24603
00 MCI 1-1	Otuk, chert member	0	Atigun Gorge	Late Triassic,Carnian to Norian	F 19b to F 19c	1.26	451	V ?1.62	124			68.47526	149.24603
00 Mu 31	Okpikruak Formation		May Creek, east fork	Lower Cretaceous	Indet.	0.79	482	V ?2.29	25			68 24.94	150 09.77
00 Mu 31-1	Okpikruak Formation		May Creek, east fork	Lower Cretaceous	Indet.	0.53	486		19			68 24.94	150 09.77
00 Mu 27-5	Blankenship Member of Otuk Fm.		May Creek, west fork of west fork	Lower Jurassic	Indet.	4.11	540	V ?2.17	3	Bk organic shale, contains Otapiria tailleuri	Same section as 00 MCI 3. 1m above Karen Ck.Ss.	68 24.399	150 15.152
00 Mu 27-3.2	Otuk Formation		May Creek, west fork of west fork	Probable Norian	F-13b	0.59	353		5	Bk clay shale	8 cm below Karen Ck. Ss.	68 24.399	150 15.152
00 Mu 27-3	Otuk Formation		May Creek, west fork of west fork	Probable Norian	F-13b	0.33	N.A.	V 2..15		Green gray claystone	20 cm below Karen Ck.Ss.	68 24.399	150 15.152
00 Mu 27-2	Otuk Formation, limestone member		May Creek, west fork of west fork	Upper Triassic		1.55	533	V 2.42	12	Bk shaly limstone	2 m below Karen Ck.Ss.	68 24.399	150 15.152
00 Mu 27-1	Otuk Formation., shale member		May Creek, west fork of west fork	Upper Triassic		2.88	533	B ?2.52 V ?2.23	6	Bk sooty shale		68 24.399	150 15.152
00 Mu 27	Siksikpuk Formation		May Creek, west fork of west fork	Permian		1.21	486	V 2.41	2	Gr silty shale	Near top Ps, poorly exposed, weathered.	68 24.399	150 15.152
	WEST FORK OF MAY CREEK SECTION (structurally complicated)			Sampled by Mike Whalen, Rachel Pachter, and Mike Mickey, 7/11/00									
00 MCI 3-1	Otuk Fm.		May Creek, west fork of west fork	Late Triassic, probable Norian	Probable F-19b	3.12	532	V ?2.60	10			68 24.399	150 15.152
00 MCI 3-2	Otuk Fm.		May Creek, west fork of west fork	Indeterminate	Indeterminate	1.01	539		14			68 24.399	150 15.152
00 MCI 3-3	Otuk Fm.		May Creek, west fork of west fork	Late Triassic, probable Norian	Probable F-19b	1.36	453		1			68 24.399	150 15.152
00 MCI 3-4	Otuk Fm.		May Creek, west fork of west fork	Indeterminate	Indeterminate	2.20	528	B ?2.52	4			68 24.399	150 15.152
00 MCI 3-6	Otuk Fm.		May Creek, west fork of west fork	Indeterminate	Indeterminate	0.83	534		7			68 24.399	150 15.152
00 Mu 32	Okpikruak Formation		Cobblestone Creek	Lower Cret., Indet.		0.36	517	V ?2.06	39				
00 Mu 33	Okpikruak Formation		Cobblestone Creek	Lower Cret., Indet.		0.90	529	V ?2.16	26				
00 Mu 29-3	Otuk Fm., limestone member		Cobblestone Creek	Late Triassic		1.68	540		5		Same section as 00MCI 2	68 23.954	150 19.117
00 Mu 29-2.1	Otuk Formation, limestone member		Cobblestone Creek	Upper Triassic		5.00	526	V ?2.60	6	Bk limestone		68 23.954	150 19.117
00 Mu 29-2	Otuk Formation., shale member		Cobblestone Creek	Indet.		5.37	537	V ? 2.08	4	Source rock type kerogen		68 23.954	150 19.117
82 Mu 71-4	Otuk Formation		Cobblestone Creek	Upper Triassic		3.45	495	?2.34	8	Source rock type kerogen		68.388	-150.318
82 Mu 71-1	Siksikpuk Formation		Cobblestone Creek	Permian		0.79	457	2.56	9			68.387	-150.319

00 Mu 29-1	Siksikpuk Formation		Cobblestone Creek	Probable Permian		0.54	444		13	Gray clay shale		68 23.954	150 19.117
00 Mu 29	Siksikpuk Formation		Cobblestone Creek	Probable Permian		0.56	N.A.	V 2.29		Gray clay shale		68 23.954	150 19.117
	COBBLESTONE CREEK SECTION (structurally complicated)			Measured and described by Mike Whalen, Rachel Pachter, and Mike Mickey, 7/8/00									
00 MCI 2-1	Otuk Formation	0	Cobblestone Creek	Indeterminate	Indeterminate	9.52	523	V ?2.16	9	Otuk, shale member		68 23.954	150 19.117
00 MCI 2-2	Otuk Formation	2.7	Cobblestone Creek	Indeterminate	Indeterminate	4.28	524	V ?2.18	6	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-3	Otuk Formation	4.7	Cobblestone Creek	Late Triassic, possible Carnian to Norian	F-19b? to F-19c?	4.69	523		5	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-4	Otuk Formation	7.5	Cobblestone Creek	Late Triassic, probable Norian	Probable F-19b	0.83	527		14	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-5	Otuk Formation	9.8	Cobblestone Creek	Late Triassic, Norian	F-19b	1.43	466	V 2.31	7	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-6	Otuk Formation	11.2	Cobblestone Creek	Late Triassic, probable Norian	Probable F-19b	1.13	485		11	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-7	Otuk Formation	13.8	Cobblestone Creek	Late Triassic, probable Norian	Probable F-19b	4.44	535	V ?2.22	8	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-8	Otuk Formation	28.5	Cobblestone Creek	Indeterminate	Indeterminate	2.81	495	V 2.31	8	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-9	Otuk Formation	32.2	Cobblestone Creek	Late Triassic, Norian	F-19b	2.15	519		5	Otuk Fm.		68 23.954	150 19.117
00 MCI 2-10	Otuk Formation	34	Cobblestone Creek	Indeterminate	Indeterminate	2.07	531		5	Otuk, below Karen Ck. ss.		68 23.954	150 19.117
82 Mu 75-1	Blankenship Mbr, Otuk Fm		Welcome Creek	Lower Jurassic		6.25	488	?2.02	25			68.364	150.792
00 Mu 30-6	Kingak Formation		Erratic Creek	Probable Valanginian	F-13b	0.26	478		4	Gray silty shale below coquinoid limestone	Section 00 Mu 30 is on thrust sheet of Endicott Mountains allochthon structurally higher than sections to the east	68 23.441	150 52.228
00 Mu 30-5	Kingak Formation		Erratic Creek	Valanginian	F-13b P-M 20	0.09	406	V ? 1.97	33	Gray silty shale below coquinoid limestone		68 23.441	150 52.228
00 Mu 30-4	Blankenship Member of Otuk Fm.		Erratic Creek	Early Jurassic?		7.42	493		26	Platy bk shale, contains Otapiria tailleuri		68 23.441	150 52.228
00 Mu 30-3	Blankenship Member of Otuk Fm.		Erratic Creek	Early Jurassic?		9.82	489	V ? 2.25	18	Platy bk shale, contains Otapiria tailleuri		68 23.441	150 52.228
00 Mu 30-1	Otuk Formation, top of limestone mbr		Erratic Creek	Probable Norian		0.56	442	V ? 1.93	16	Ls, dk gr-bk		68 23.441	150 52.228
00 Mu 30	Otuk Formation, shale/chert mbr.		Erratic Creek	Probable Late Triassic		4.08	492	V ?1.83	32	Sooty shale		68 23.441	150 52.228
00 Mu 36	Otuk Formation, limestone member		Tiglukpuk Creek	Late Triassic		2.13	462	V ? 1.94	128	Source rock type kerogen		68 21.347	151 52.396
00 Mu 36-1	Otuk Formation., chert member		Tiglukpuk Creek	Late Triassic		5.53	453		151	Source rock type kerogen		68 21.347	151 52.396
00 Mu 36-2	Otuk Formation., chert member		Tiglukpuk Creek	Late Triassic		1.77	451	B ?1.49 V? 1.23	61	Source rock type kerogen		68 21.347	151 52.396
00 Mu 36-2.1	Otuk Formation., chert member		Tiglukpuk Creek	Late Triassic		1.53	451		52			68 21.347	151 52.396
00 Mu 36-4	Siksikpuk Formation		Tiglukpuk Creek	Permian?		0.48	488	V 1.94	48	Gray clay shale		68 21.347	151 52.396
	Allochthonous rocks in Disturbed Belt, from allochthons structurally higher than Endicott Mountains allochthon												
00 Mu 35	Okpikruak Formation		Tiglukpuk Creek	Neocomian		0.35	486	V. 1.62	20		Ipnavik River allochthon		
00 Mu 41	Okpikruak Formation		Kiruktaglak River	Valanginian ?	P-M20?	0.68	443	V ? 1.79	143			68 26.174	152 45.845
00 Mu 43	Okpikruak Formation		Aucella Creek	Probable Valanginian	Probable P-M20	0.69	450		161			68 27.585	152 43.606
00 Mu 44	Okpikruak Formation		Aucella Creek	Probable Valanginian	Probable P-M20	0.31	467	V 1.52	26			68 27.585	152 43.606
00 Mu 47	Okpikruak Formation		Tiglukpuk Creek	Prob Neocomian Undiff		0.54	481		65			68 25.374	151 53 714

00 Mu 37	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Upper Triassic		3.43	438	V ?1.36	101	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
00 Mu 37-1	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Probable Norian	Probable F-19b P-M26?	4.18	442		127	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
00 Mu 37-2	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Upper Triassic		1.74	444		123	Thin bedded black organic limestone	Float from above, has strong sweet gassy odor	68 29.759	152 16.825
00 Ha 29-A	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Probable Norian	Probable F-19b	3.93	442	V ?2.05	171	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
00 Ha 29-B	Imnaitchiak Chert /Otuk Formation		Upper Autumn Creek.	Indet.		1.85	446		111	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68 29.759	152 16.825
00 Mu 57	Imnaitchiak Chert /Otuk Formation		Tiglukpuk Creek	Upper Triassic		3.99	436	-	180	Contains sparse Monotis or Halobia pelecypods	Ipnavik River allochthon	68°30.321	152°00.628
	Picnic Creek allochthon												
99 Ha 121	Okpikruak Formation		Irgnyivik Lake	Jur.- Cret. undiff.		0.53	485	1.46	13.2			68.438	151.323
85 Mu 75	Okpikruak Formation		Peregrine Ck.	Neocomian		0.88	482	1.51	32			68.390	150.313
99 Ha 117	Okpikruak Formation		Welcome Ck.	Neocomian		0.52	485	1.64	28.8			68.442	150.912

Organic geochemistry by Baseline DGSI, 1994, 1999, 2000.				Micropaleontology by Micropaleo Consultants, Inc. 1994, 1999, 2000						Data compiled and tabulated by C.G. Mull, 3/ 21/01			
TOC-total organic carbon		TMax-maximum temperature			HI--Hydrogen index								
-- <0.5--nonsource		<435---immature for oil			HI > ~400--Type I kerogen, algal								
0.5-1.0--poor source rock		~435-460--mature for oil			HI 200-400--Type II kerogen, marine								
1.0-2.0--good source rock		> 460--wet and dry gas			HI < ~200--Type III kerogen, terrestrial								
2.0-4.0--very good source		Ro-- % vitrinite reflectance											
> 4.0--excellent source rock		---< 0.6 -- immature for oil											
		~0.6--1.2---mature for oil											
		> 2.0---wet and dry gas											

OIL AND GAS SOURCE ROCK POTENTIAL OF TRIASSIC AND LOWER JURASSIC ROCKS, COBBLESTONE CREEK MAP AREA, CENTRAL BROOKS RANGE THRUST BELT

C.G. (Gil) Mull[1], Ellen E. Harris[2], and Paige R. Peapples[2]

Detailed stratigraphic studies and organic geochemical sampling of Triassic to Lower Cretaceous rocks across the "disturbed belt" of the northern part of the Brooks Range thrust belt shows marked contrast in the thermal maturity of the organic-rich Upper Triassic and Lower Jurassic Otuk Formation in various parts of the belt. These rocks are coeval with the Shublik Formation and lower part of the Kingak Shale of the northern Arctic Slope in the Prudhoe Bay area. At the mountain front in the Cobblestone Creek area, analyses of some of the organic-rich shales and limestones in the Upper Triassic part of the Otuk Formation on the Endicott Mountains allochthon yield measured values of from 4% to 9% total organic carbon (TOC). Regionally, the Lower Jurassic Blankenship Member of the Otuk Formation is even richer, and consists almost entirely of organic-rich shale and marl with many analyses yielding from >5% to >10% TOC. However along the mountain front in the Cobblestone Creek map area, all the Upper Triassic and Lower Jurassic rocks are thermally overmature for oil, with vitrinite reflectance (Ro) values ranging from ~2.1 to >2.5% Ro and maximum temperature (TMax) ranging from ~460° to >530°C. As a consequence of the high thermal maturity, the hydrogen index (HI) is low, generally <15, indicating that these rocks along the mountain front have generated and expelled most of their hydrocarbons.

North of the Endicott Mountains front in the Cobblestone Creek map area, a belt of thrust faulted rocks along Cobblestone Creek and May Creek, informally referred to as the Cobblestone parautochthonous sequence, contains thrust slivers of both the Upper Triassic and Lower Jurassic portions of the Otuk Formation. Measured total organic carbon (TOC) values in both the Upper Triassic part of the Otuk Formation and the Lower Jurassic Blankenship Member are comparable to those at the mountain front and range up to >10% TOC. However, the thermal maturity in the rocks in this parautochtononous belt is markedly lower than in the coeval rocks at the mountain front. Samples from the northern part of the parautochthonous belt yield vitrinite reflectance values ranging from 1.6% to 1.9% Ro and TMax values of 460° to 490°C. In the central part of the parautochthonous belt, the Blankenship Member from two different localities has vitrinite reflectance values ranging from 1.17% to 1.67% Ro and measured TMax of 444° to 461°C. In the northern part of the belt, hydrogen index (HI) values range from 24 to 59, suggesting that these rocks have generated and expelled most of their liquid hydrocarbons. However, in the central part of the belt, samples of the Blankenship Member yield HI values ranging from 45 to 200, suggesting that some of these rocks are still capable of generating liquid hydrocarbons.

This belt of parautochthonous rocks seems to be part of a regional belt of rocks of lower thermal maturity that may extend along the entire Arctic Slope and separates the northern mountain front from the southern flank of the Colville Basin. The lower thermal maturity values in the Cobblestone parautochthonous belt suggest that the Triassic and Lower Jurassic rocks were not buried under the total section of Cretaceous rocks at the southern part of the Colville Basin. We interpret emplacement of Triassic and Lower Jurassic rocks by thrusting and uplift coeval with deposition of the Aptian to Albian Fortress Mountain, Torok, and Nanushuk formations. This may result in structural and stratigraphic relationships in which organic-rich oil and gas prone source rocks in the southern foothills belt may be found in close proximity to potential Cretaceous reservoir rocks. These relationships seem to enhance both the gas and oil potential of the Brooks Range foothills belt.

2000 Foothills Project

AA1 **00 MU 25 1:** Organic matter consists of grainy-massive textured unstructured lipids with inclusions of small solid bitumen fragments. Some solid bitumen has angular shape. Reflectance is measured on solid bitumen. Maturity is estimated to be in the lower oil to mid wet-gas zone.

AA2 **00 MU 26 2:** Sample consists of a small amount of organic matter mixed in a mineral groundmass. Reflectance is measured on small, vitrinite-like fragments. Maturity is difficult to estimate because of the small amount of organic matter.

AA7 **00 MU 26-3.2 7:** Source rock type kerogen. Organic matter consists of grainy-massive textured unstructured lipids with small, angular, solid bitumen inclusions. Solid bitumen formation may raise TAI value. Reflectance is on solid bitumen. Maturity is estimated to be in the lower oil to mid wet-gas zone.

AA8 **00 MU 27 8:** Micrinized lipids with small terrestrial fragments. Several vitrinite fragments are beginning to coke. Maturity is in the lower dry-gas zone.

AA9 **00 MU 27-1 9:** Source rock type kerogen. Micrinized unstructured lipids have sponge texture with solid bitumen formation. Difficult to differentiate some vitrinite fragments from solid bitumen fragments. Solid bitumen formation may raise TAI value. Maturity is in the lower dry-gas zone.

AA10 **00 MU 27-2 10:** Organic matter consists of micrinized unstructured lipids with small terrestrial fragments. Maturity is in the lower dry-gas zone.

AA11 **00 MU 27-3 11:** Organic matter consists of micrinized unstructured lipids with small terrestrial fragments. Maturity is in the lower dry-gas zone.

AA13 **00 MU 27-5 13:** Source rock type kerogen. Micrinized lipids with solid bitumen formation. TAI may be raised. Maturity is in the lower dry-gas zone.

AA14 **00 MU 29 14:** Grainy unstructured lipids and high-rank terrestrial fragments are mixed with a mineral groundmass. Some vitrinite fragments are beginning to coke. Maturity is in the lower dry-gas zone.

AA16 **00 MU 29-2 16:** Organic matter consists of micrinized unstructured lipids with a small amount of solid bitumen formation and small terrestrial fragments. Several lipid-rich, vitrinite-like fragments may be solid bitumen. High reflectance values may be on inertinite. Maturity is in the lower dry-gas zone.

AA17 **00 MU 29-2.1 18:** Similar to previous sample. Micrinized lipids with a small amount of solid bitumen formation. Lipid-rich, vitrinite-like fragments may be solid bitumen. High reflectance values may be on inertinite. Maturity is in the lower dry-gas zone.

AA19 **00 MU 30 19:** Source rock type kerogen. Similar to samples 00 MU 29-2 and 00 MU 29-2.1, but with more solid bitumen formation. TAI may be raised. Maturity is near the bottom of the wet-gas to mid dry-gas zone.

AA20 **00 MU 30-1 21:** Grainy unstructured lipids with abundant lipid-rich vitrinite fragments. Reflectance and TAI indicate a maturity near the bottom of the wet-gas to mid dry-gas zone.

AA21 **00 MU 30-3 22:** Organic matter consists of micrinized unstructured lipids with some solid bitumen formation and high-rank terrestrial fragments. Maturity is in the lower wet-gas to mid dry gas zone.

AA23 **00 MU 30-5 24:** Unstructured lipids and very small terrestrial fragments are mixed with mineral. TAI is 3- to 3. Visual estimates indicate that maturity is in the lower portion of the wet-gas to mid dry-gas zone, but pyrolysis data indicates that organic matter is oxidized which may affect all maturity parameters.

AA25 **00 MU 31 26:** Unstructured lipids and very small terrestrial fragments are mixed with mineral. There may be a trace of solid bitumen formation. Maturity is in the lower dry-gas zone.

AA27 **00 MU 32 28:** Unstructured lipids and small terrestrial fragments are mixed with mineral. Some lipid-rich vitrinite is difficult to distinguish from solid bitumen. Maturity is at the bottom of the wet-gas zone.

AA28 **00 MU 33 29:** Organic matter is similar to that in 00 MU 32, but more abundant. Some terrestrial fragments are beginning to coke. Maturity is in the lower dry-gas zone.

AA30 **00 MU 34-1 31:** Micrinized lipids with a trace of solid bitumen formation. All vitrinite may be slightly lipid-rich and some vitrinite-like fragments may be solid bitumen. Background fluorescence is low. Maturity is in the wet-gas zone.

AA31 **00 MU 34-2 32:** Organic matter consists of micrinized lipids with a trace of solid bitumen formation and terrestrial fragments. Low background fluorescence. Maturity is in the wet-gas zone.

AA32 **00 MU 34-3 33:** Micrinized unstructured lipids have some angular solid bitumen formation and TAI value may be raised. Trace of coking lipid-rich vitrinite. Background fluorescence is higher than expected from appearance of the kerogen. Maturity is in the wet-gas zone.

AA33 **00 MU 34-3.1 35:** Micrinized lipids with some solid bitumen formation. Reflectance is measured on small vitrinite-like fragments and higher values may be on inertinite. Maturity is in the wet-gas zone.

AA35 **00 MU 35 37:** Small amount of organic matter mixed with mineral. Reflectance is measured on small, difficult to identify, vitrinite-like fragments. Maturity is in the lower wet-gas to mid dry-gas zone.

AA36 **00 MU 36 38:** Micrinized lipids with some solid bitumen formation. Reflectance is measured on small, vitrinite-like fragments. Background fluorescence is higher than expected. Pyrolysis data indicates that maturity is in the lower oil to upper wet-gas zone.

AA38 **00 MU 36-2 40:** Unstructured lipids have a grainy to micrinized texture. Small vitrinite-like fragments are difficult to identify as vitrinite, lipid-rich vitrinite, or solid bitumen. There is a trace of graphite. Maturity is in the lower oil to upper wet-gas zone.

AA40 **00 MU 36-4 44:** Organic matter consists primarily of very small, difficult to identify terrestrial fragments and some grainy unstructured material. Several terrestrial fragments are beginning to coke. Reflectance is measured on vitrinite-like material. Maturity is in the lower wet-gas to mid dry-gas zone.

AA41 **00 MU 37 45:** Abundant micrinized, unstructured lipids with a trace of solid bitumen formation. Terrestrial fragments are small, difficult to identify, and some are beginning to coke. Pyrolysis data indicates that maturity is in the oil zone, but visually, maturity appears to be in the lower oil to mid wet-gas zone.

AA45 **00 MU 41 49:** Abundant micrinized, unstructured lipids with a small amount of solid bitumen formation. Terrestrial fragments are small. Solid bitumen formation may raise the TAI value on unstructured lipids. Maturity is in the oil to mid wet-gas zone.

AA47 **00 MU 44 51:** Unstructured lipids are difficult to characterize – grainy-massive texture? Terrestrial fragments are small. Maturity is in the lower wet-gas to mid dry-gas zone.

AA49 **00 MU 51 53:** Organic matter consists primarily of large, lipid-rich vitrinite fragments. Unstructured material is mixed with small terrestrial fragments and is difficult to identify as unstructured lipids or degraded terrestrial debris. Fragments of rough textured solid bitumen with angular holes have lower reflectance than the lipid-rich vitrinite. Maturity is in the mid oil zone.

AA50 **00 MU 52 54:** Organic matter consists of grainy unstructured material and small terrestrial fragments. It is difficult to identify normal vitrinite from lipid-rich vitrinite when fragments are small. Reflectance and background fluorescence indicate a maturity in the upper oil zone.

AA52 **00 MU 54 56:** Organic matter is similar to that in sample 00 MU 52 54, but is higher rank. There is a trace of coking inertinite. Maturity is in the lower oil to mid wet-gas zone.

AA54 **00 MU 55 58:** Organic matter is a mixture of grainy, unstructured lipids and lipid-rich terrestrial fragments. Most terrestrial fragments are small and difficult to identify. There is a trace of low-rank, solid bitumen. Maturity is in the mid to lower oil zone.

AA55 **00 MU 57 59:** Fine-grained, micrinized unstructured lipids with some angular, solid bitumen formation. Small terrestrial fragments are difficult to identify and too rough textured for reflectance measurements. Maturity is in the upper to mid oil zone.

AA115 **00 MU 58:** Unstructured lipids have a grainy-massive texture. Most terrestrial fragments are very small, difficult to identify, and too rough textured for reflectance measurements. Maturity is in the lower oil to upper wet-gas zone.

AA56 **00 MU 59 61:** In reflected light, the unstructured lipids appear to be micrinized, but in transmitted light there are small masses of lower rank, unstructured lipids mixed in. Terrestrial fragments are small with a wide range of reflectance values. Some of the high-rank fragments are coking. Pyrolysis data indicates that maturity is in the mid oil zone.

AA57 **00 MU 61 62:** Unstructured lipids have grainy to massive texture. Terrestrial fragments are small to very small and have a wide range of reflectance values. Maturity is in the upper to mid oil zone.

AA58 **00 MU 62 63:** Organic matter consists primarily of unstructured lipids that are difficult to see in the epoxy mounting medium used for the reflected light sample. When observed for fluorescence, some of the unstructured lipids exhibit angular texture that indicates some solid bitumen has been formed. Maturity is in the upper oil zone.

AA59 **00 MU 62-1 64:** Unstructured lipids are mixed with mineral and are difficult to characterize. Most terrestrial fragments are small. Reflectance and background fluorescence indicate that maturity is in the mid to lower oil zone.

AA60 **00 MU 63 65:** Organic matter consists of unstructured lipids with massive texture and small terrestrial fragments. Maturity is in the mid oil zone.

AA61 **00 MU 44-A 66:** Organic matter consists primarily of grainy, unstructured lipids. Terrestrial fragments are small. Background fluorescence and TAI indicate that maturity is in the lower oil zone.

AA62 **00 MU 44-B 67:** Organic matter consists of micrinized, unstructured lipids with a trace of terrestrial material. Background fluorescence and TAI indicate that maturity is in the wet-gas to upper dry-gas zone.

AA63 **00 MU 44-1.1 68:** Micrinized lipids with some solid bitumen formation. Several isolated fragments of rough textured, lipid-rich vitrinite or solid bitumen. Bitumen may raise TAI value. Background fluorescence and pyrolysis data indicate that maturity is in the mid oil zone.

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AA64	**00 HA 29-A 69:** Source rock type kerogen - micrinized unstructured lipids with small, angular, solid bitumen fragments. Some solid bitumen is coking. Reflectance is measured on small, vitrinite-like fragments. Formation of solid bitumen may raise TAI value. Pyrolysis data indicates that maturity is in the mid oil zone, but microscopy data and appearance of kerogen suggest that maturity is in the lower oil to mid wet-gas zone.
AA67	**00 HA 33 72:** Organic matter consists of large coal fragments of laminated components. Lipid-rich vitrinite is difficult to differentiate from normal vitrinite. Maturity is in the upper oil zone. Structured lipids may lower T_{MAX} value.
AA68	**00 HA 51 73:** Small terrestrial fragments and some unstructured material are mixed with a mineral groundmass. Unstructured material may be degraded terrestrial debris. Maturity is in the mid oil zone.
AA69	**00 HA 52 74:** Organic matter consists of terrestrial fragments mixed with a mineral groundmass. Some lipid-rich vitrinite is difficult to differentiate from normal vitrinite. Maturity is in the lower oil to upper wet-gas zone.
AA70	**00 HA 54 75:** Organic matter consists of terrestrial fragments mixed with a mineral groundmass. There are several populations of vitrinite. Pyrolysis indicates that maturity is in the mid oil zone.
AA71	**00 HA 61:** Micrinized lipids with some granular, solid bitumen formation. Reflectance is measured on vitrinite-like material. Maturity is in the lower oil to upper wet-gas zone.
AA72	**00 HA 61-1:** Organic matter is similar to that in sample 00 HA 61, but with less solid bitumen formation. Maturity is in the lower oil to upper wet-gas zone.

2000 Foothills Project

AA73	**00 RR 104C 76:** Organic matter is primarily fine-grained, micrinized unstructured lipids with some solid bitumen formation and very small, difficult to identify, terrestrial fragments. Reflectance is on small, vitrinite-like fragments. Pyrolysis data indicates that maturity is in the lower wet-gas to upper dry-gas zone.
AA74	**00 TJR 105(23) 77:** Abundant terrestrial fragments with grainy unstructured lipids mixed with mineral. There is a trace of dark oxidation on some vitrinite fragments. Unstructured lipids may be oxidized and are difficult to identify in the transmitted light slide. There are several populations of vitrinite. Maturity is in the oil zone.
AA76	**00 TJR 105(0) 79:** Terrestrial material is similar to that in sample 00 TJR 105(23). Unstructured lipids appear to be micrinized, but could be oxidized. Unstructured lipids are difficult to identify in the transmitted light slide. Maturity is in the oil zone.

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AA77 **00 MCI 1-1 80 0:** Organic matter consists of fine-grained, micrinized, unstructured lipids and large, rough-textured, anisotropic fragments of non-angular solid bitumen. TAI may be raised. Pyrolysis data indicates that maturity is in the lower oil to upper wet-gas zone.

AA81 **00 MCI 1-5 84 5.2:** Fine-grained, micrinized lipids with some solid bitumen formation. There are several fragments of anisotropic solid bitumen as in 00 MCI 1-1. Reflectance is measured on small, vitrinite-like fragments. TAI may be raised by bitumen formation. Pyrolysis data indicates that maturity is in the lower oil to upper wet-gas zone.

AA83 **00 MCI 1-7 86 10.6:** Unstructured lipids are mixed with mineral. Difficult to identify structured material as lipid-rich vitrinite or non-angular solid bitumen. Reflectance indicates that maturity is in the lower wet-gas to mid dry-gas zone, but background fluorescence and pyrolysis data indicate that maturity is in the lower oil to upper wet-gas zone.

AA85 **00 MCI 1-9 88 15.4:** Unstructured lipids are mixed with mineral. Structured fragments look more like vitrinite than previously, but all may be lipid-rich. Reflectance indicates that maturity is in the lower wet-gas to mid dry-gas zone, but background fluorescence and pyrolysis data indicate that maturity is in the lower oil to upper wet-gas zone.

AA88 **00 MCI 1-12A 91 21.8:** Organic matter consists of granular unstructured lipids and moderate sized, rough-textured fragments of solid bitumen. TAI value may be raised. Pyrolysis data indicates that maturity is in the lower oil to upper wet-gas zone.

AA89 **00 MCI 1-13 92 25:** Source rock type kerogen. Micrinized lipids have abundant solid bitumen formation, which raises TAI. Pyrolysis data indicates that maturity is in the mid oil zone, but reflectance and appearance of the kerogen indicate a slightly higher maturity.

AA90 **00 MCI 1-14 93 25.8:** Source rock type kerogen. Angular solid bitumen formation in micrinized lipids, plus large, rough-textured, isolated bitumen fragments. TAI may be raised. Pyrolysis data indicates that maturity is in the mid oil zone, but visually, kerogen appears to be in the lower oil to mid wet-gas zone.

AA91 **00 MCI 1-15 94 32.8:** Source rock type kerogen. Micrinized lipids have angular solid bitumen formation that may raise TAI value. Several large fragments of lipid-rich vitrinite-like material may be solid bitumen. Maturity is in the lower oil to upper wet-gas zone.

AA92 **00 MCI 1-16 95 35.2:** Source rock type kerogen. Micrinized lipids have angular solid bitumen formation that may raise TAI value. Pyrolysis data indicates that maturity is in the upper oil zone, but visually, kerogen appears to be in the lower oil to mid wet gas zone.

AA93 **00 MCI 1-17 96 38.8:** Source rock type kerogen as in 00 MCI 1-16. Several fragments identified as lipid-rich vitrinite may be solid bitumen. T_{MAX} indicates that maturity is in the mid oil zone, but reflectance on structured fragments and visual appearance indicate that maturity is in the lower oil to upper wet-gas zone.

AA94 **00 MCI 1-18 97 42.5:** Source rock type kerogen. Micrinized lipids with angular and large masses of solid bitumen formation. Some isolated fragments of non-angular, anisotropic solid bitumen. All structured fragments may be solid bitumen. TAI may be raised. Maturity is in the lower oil to upper wet-gas zone.

AA95 **00 MCI 1-19 98 56.6:** Small amount of organic material mixed with mineral. There are several small masses of black, micrinized lipids with angular solid bitumen formation in the reflected light sample. In the transmitted light sample, lower rank unstructured material can be identified, and is mixed with the mineral groundmass. TAI of lower rank unstructured material and strong background fluorescence indicate that maturity is in the lower oil to upper wet-gas zone. Pyrolysis data indicates maturity to be in the lower wet-gas to mid dry-gas zone.

AA96 **00 MCI 1-20 99 61.3:** Organic matter consisting of brown unstructured lipids, small terrestrial fragments, and non-angular solid bitumen is mixed with a mineral groundmass. Some fragments identified as lipid-rich vitrinite may be solid bitumen. Maturity is in the lower oil to upper wet-gas zone.

2000 Foothills Project

AA97 **00 MCI 2-1 100 0:** Source rock type kerogen. Organic matter consists of micrinized lipids with angular solid bitumen formation. TAI may be raised. Fragments identified as lipid-rich vitrinite may be solid bitumen. Maturity is at the wet-gas floor to the lower dry-gas zone.

AA99 **00 MCI 2-3 102 4.7:** Organic matter consists of micrinized lipids with a small amount of angular solid bitumen formation. Reflectance is on small vitrinite-like fragments, some of which may be non-angular solid bitumen or inertinite. Maturity is at the wet-gas floor to the lower dry-gas zone.

AA101 **00 MCI 2-5 104 9.8:** Micrinized lipids with inclusions of small structured fragments are mixed with mineral. Large and small structured fragments are difficult to identify as vitrinite or lipid-rich vitrinite. Reflectance and TAI indicate that maturity is in the lower dry-gas zone. Pyrolysis data indicates that maturity is in the mid wet-gas to upper dry-gas zone.

AA103 **00 MCI 2-7 106 13.8:** Source rock type kerogen. Micrinized lipids have angular solid bitumen formation. Some large, isolated fragments of solid bitumen are anisotropic. Reflectance is measured on vitrinite-like material. Maturity is in the lower dry-gas zone.

AA104 **00 MCI 2-8 107 28.5:** Organic matter consists of micrinized lipids with some angular solid bitumen formation and high-rank inertinite and vitrinite-like material. Some vitrinite-like material may be solid bitumen and some fragments are similar to graptolites. Geological age would be helpful for identification. Maturity is just below the wet-gas floor in the lower dry-gas zone.

AA106 **00 MCI 2-10 109 34:** Organic matter consists of micrinized lipids with only a trace of angular solid bitumen formation. Reflectance is measured on vitrinite-like material. Maturity is in the lower dry-gas zone.

2000 Foothills Project
Otuk Formation Measured sections, West Fork of May Creek Section

AA107	**00 MCI 3-1 110:** Source rock type kerogen. Organic matter consists of micrinized unstructured lipids and large, anisotropic fragments that are difficult to identify as solid bitumen or high-rank, lipid-rich vitrinite. Maturity is in the lower dry-gas zone.

AA110 **00 MCI 3-4 113:** Micrinized lipids with some non-angular solid bitumen fragments. Reflectance is measured on vitrinite-like material. Maturity is in the lower dry-gas zone.

AA113 **00 MCI 3-8 116:** Source rock type kerogen. Micrinized lipids with solid bitumen formation. Reflectance is on difficult to identify, vitrinite-like material. Some graptolite-like fragments. Maturity is in the lower dry-gas zone.

2000 Foothills Project

BaselineDGSI Project: 00/0474

BaselineDGSI Number	BaselineDGSI Sample Id or Depth	Preparation/Sample Type	ORGANIC MATTER (%) LIPIDS UNSTRUCTURED Undifferentiated	Amorphous	Massive	Micrinized	LIPIDS STRUCTURED Type	Type	Type	Type	Solid Bitumen	HUMIC Inertinite	Vitrinite	OTHER Type	Type	RELATIVE ABUNDANCE Pyrite Type	Pyrite	Organic Concentration	VITRINITE Normal	Rough	Lipid-Rich	Oxidized	Coked	FLUORESCENCE / TAI REFLECTED LIPIDS UNSTR. Color	Intensity	STRU. Color	Intensity	Background Intensity	TRANSMITTED LIPIDS UNSTR. TAI	FLUOR. Color	FLUOR. Intensity	STRU. TAI	FLUOR. Color	FLUOR. Intensity	Ro Vit. Reflectance or Equiv.
	44	K					U					?	?															0							-
AA000040	00 MU 36-4	OC	10				T					20	70			MA	T	M	+	-			T	BL	0	BL	0	1	n.d.						V 1.92
Comments:	*Very small terrestrial fragments and grainy unstructured lipids are mixed with mineral. Ro on vitrinite-like material. Some coking.*																																		
	45	K					U																												-
AA000041	00 MU 37	OC				95	T				T	T	5			MA	M	+	M	M			T	BL	0	BL	0	1	3+	BL	0				V 1.75
Comments:	*Micrinized lipids with small terrestrial fragments and a trace of solid bitumen formation. Some coking.*																																		
	49	K					LD									MA													3							-
AA000045	00 MU 41	OC				90	T				5	5	T			F	M	+	M	M				BL	0			2	2+	BL	0		O	2	V 2.53
Comments:	*Micrinized lipids with some solid bitumen formation. Small terrestrial fragments. Solid bitumen formation may raise TAI value.*																																		
	51	K					LD							VL														3				O	1	-
AA000047	00 MU 44	OC	75				T					5	20	T		MA	-	+	+	-	T			BL	0			1	3+	BL	0		YO	2	V 1.52
Comments:	*Small terrestrial fragments. Unstructured lipids are difficult to characterize.*																																		
	53	K	?				U							VL																					-
AA000049	00 MU 51	OC	10				T				5	T		85		MA	T	+	N	-	+			BL	0	DO	1	3	n.d.				DO	1	V 0.70
Comments:	*Large fragments of slightly lipid-rich vitrinite. Lower-rank, angular solid bitumen.*																																		

ANALYST

X O'Connor

MICROSCOPE

X Zeiss
____ Jena
____ Leitz

SAMPLE TYPE/PREP

CTG	Cuttings
CC	Conv. Core
SWC	SideWallCore
OC	Outcrop
NI	No Inform.
C	Coal
K	Kerogen
WR	Whole Rock
n.d.	Not Determined

STRUCTURED LIPIDS

AL	Alginite
SB	Suberinite
C	Cutinite
LD	Liptodetrinite
U	Undiffer.
S	Sporinite
R	Resinite
O	Other

OTHER ORGANIC MATTER

E	Exsudatinite
G	Graptolites
VL	Lipid-Rich Vitrinite
VC	VitriniteContamination
VR	Recycled Vitrinite

PYRITE

E	Euhedral
F	Framboid
MA	Massive
RI	Replace-infill

ABUND.

N	None
T	Trace
-	Small Amt.
M	Mod. Amt.
+	Large Amt.
++	Abundant

FLUOR. INTENS.

0	None
1	Weak
2	Moderate
3	Strong
4	Intense

VIT. REFLECT. EQUIVALENCE

B	Bitumen
G	Graptolites
VL	Lipid-Rich Vitrinite
VC	Vitrinite Contam.
VR	Recycled Vitrinite

FLUOR. COLOR

W	White
G	Green
Y	Yellow
O	Orange
R	Red
B	Brown
BL	Black
L	Light
D	Dark

TAI COLOR VALUES

1-	Straw Yellow
1	Pale Yellow
1+	Yellow
2-	Yellow-Orange
2	Golden
2+	Amber
3-	Reddish Brown
3	Medium Brown
3+	Dark Brown
4-	Brown-Black
4	Black
4+	Black-Opaque

VISUAL KEROGEN ANALYSIS
Total Quality Geochemistry

2000 Foothills Project

BaselineDGSI Project: 00/0474

BaselineDGSI Number	BaselineDGSI Sample Id or Depth	Preparation/Sample Type	ORGANIC MATTER (%) LIPIDS UNSTRUCTURED Undifferentiated	Amorphous	Massive	Micrinized	LIPIDS STRUCTURED Type	Type	Type	Type	Solid Bitumen	HUMIC Inertinite	Vitrinite	OTHER Type	Type	RELATIVE ABUNDANCE Pyrite Type	Pyrite	Organic Concentration	VITRINITE Normal	Rough	Lipid-Rich	Oxidized	Coked	FLUORESCENCE / TAI REFLECTED LIPIDS UNSTR. Color	Intensity	STRU. Color	Intensity	Background Intensity	TRANSMITTED LIPIDS UNSTR. TAI Value	FLUOR. Color	FLUOR. Intensity	STRU. TAI Value	FLUOR. Color	FLUOR. Intensity	Ro Vit. Reflectance or Equiv.
	54	K					LD							VL																					
AA000050	00 MU 52	OC	50				T					5	40	5		MA	M	+	+	-	-			BL	0	O	1	4	2+ 3-	BL	0		O Y	1 2	- V 0.98
Comments:	*Grainy unstructured lipids with small terrestrial fragments.*																																		
	56	K					LD							VL																?					-
AA000052	00 MU 54	OC	50				T				T	5	40	5		MA	-	+	+	-	-		T	BL	0	O	1	3	3	BL	0				V 1.34
Comments:	*Similar to 00 MU 52 54, but more mature. Trace of coking inertinite.*																																		
	58	K					LD							VL																				1	-
AA000054	00 MU 55	OC	50				T				T	5	5	40		MA	-	+	-	M	+	T	T	B	1	O	1	4	3-	BL	0		O	2	V 1.03
Comments:	*Grainy unstructured lipids. Most terrestrial fragments are very small. Trace low-rank solid bitumen.*																																		
	59	K														F												2	3-					-
AA000055	00 MU 57	OC				95					5	T	T			MA	-	+	N	+				BL	0			3	3	BL	0				-
Comments:	*Fine-grained, micrinized lipids with some angular solid bitumen formation. Small terrestrial fragments are too rough textured for Ro measurements.*																																		
		K					LD							VL																				1	-
AA000115	00 MU 58	OC	75				T				?	T	15	10		MA	M	+	M	M	M			BL	0	O	1	3	3-	BL	0		O	2	V 1.17
Comments:	*Grainy-massive unstructured lipids with very small terrestrial fragments - most are too small for Ro measurements.*																																		

ANALYST

X O'Connor

MICROSCOPE

X Zeiss
____ Jena
____ Leitz

SAMPLE TYPE/PREP

- CTG Cuttings
- CC Conv. Core
- SWC SideWallCore
- OC Outcrop
- NI No Inform.
- C Coal
- K Kerogen
- WR Whole Rock
- n.d. Not Determined

STRUCTURED LIPIDS

- AL Alginite
- SB Suberinite
- C Cutinite
- LD Liptodetrinite
- U Undiffer.
- S Sporinite
- R Resinite
- O Other

OTHER ORGANIC MATTER

- E Exsudatinite
- G Graptolites
- VL Lipid-Rich Vitrinite
- VC VitriniteContamination
- VR Recycled Vitrinite

PYRITE

- E Euhedral
- F Framboid
- MA Massive
- RI Replace-infill

ABUND.

- N None
- T Trace
- - Small Amt.
- M Mod. Amt.
- + Large Amt.
- ++ Abundant

FLUOR. INTENS.

- 0 None
- 1 Weak
- 2 Moderate
- 3 Strong
- 4 Intense

VIT. REFLECT. EQUIVALENCE

- B Bitumen
- G Graptolites
- VL Lipid-Rich Vitrinite
- VC Vitrinite Contam.
- VR Recycled Vitrinite

FLUOR. COLOR

- W White
- G Green
- Y Yellow
- O Orange
- R Red
- B Brown
- BL Black
- L Light
- D Dark

TAI COLOR VALUES

- 1- Straw Yellow
- 1 Pale Yellow
- 1+ Yellow
- 2- Yellow-Orange
- 2 Golden
- 2+ Amber
- 3- Reddish Brown
- 3 Medium Brown
- 3+ Dark Brown
- 4- Brown-Black
- 4 Black
- 4+ Black-Opaque

VISUAL KEROGEN ANALYSIS
Total Quality Geochemistry

2000 Foothills Project

BaselineDGSI Project: 00/0474

BaselineDGSI Number	BaselineDGSI Sample Id or Depth	Preparation/Sample Type	ORGANIC MATTER (%) LIPIDS UNSTRUCTURED Undifferentiated	Amorphous	Massive	Micrinized	LIPIDS STRUCTURED Type	Type	Type	Type	Solid Bitumen	HUMIC Inertinite	Vitrinite	OTHER Type	Type	RELATIVE ABUNDANCE Pyrite Type	Pyrite	Organic Concentration	VITRINITE Normal	Rough	Lipid-Rich	Oxidized	Coked	FLUORESCENCE / TAI REFLECTED LIPIDS UNSTR. Color	Intensity	STRU. Color	Intensity	Background Intensity	TRANSMITTED LIPIDS UNSTR. TAI Value	FLUOR. Color	Intensity	STRU. TAI Value	FLUOR. Color	Intensity	Ro Vit. Reflectance or Equiv.
	61	K					LD				?			VL		F																			
AA000056	00 MU 59	OC				60	5				T	10	15	10		MA	M	+	M	M	M		-	BL	0	DB	1	4	2+	BL	0		O	3	B 0.79 V 1.53
Comments:	*Micrinized lipids and small terrestrial fragments with a wide range of reflectance values. Some high-rank vitrinite is coking.*																																		
	62	K					LD							VL																						
AA000057	00 MU 61	OC	60				5					5	20	10		MA	M	+	M	M	M		T	BL	0	O	3	4	3-	BL	0		O	2	- V 1.17
Comments:	*Grainy-massive unstructured lipids. Vitrinite has a wide range of values.*																																		
	63	K					LD				?																				DO	2			-
AA000058	00 MU 62	OC	95				T				5	T	T			MA	-	+	+					B	1	O	2	3	2+	BL	0		O	2	V 0.57
Comments:	*Unstructured lipids are difficult to see in reflected light. In fluorescent light, some small angular areas indicate that some solid bitumen was formed.*																																		
	64	K					LD							VL										DB	1				?					1	-
AA000059	00 MU 62-1	OC	50				T					5	40	5		MA	M	+	M	M	-		T	BL	0	DO	1	3	3	BL	0		O	3	V 1.32
Comments:	*Unstructured lipids are mixed with mineral and are difficult to characterize. Most terrestrial fragments are small.*																																		
	65	K					LD									F													2+						-
AA000060	00 MU 63	OC			90		T					T	10			E	+	+	+	-				BL	0			4	3-	BL	0		O	1	V 1.15
Comments:	*Massive unstructured lipids with small terrestrial fragments.*																																		

ANALYST

X O'Connor

MICROSCOPE

X Zeiss

_____ Jena

_____ Leitz

SAMPLE TYPE/PREP

CTG	Cuttings
CC	Conv. Core
SWC	SideWallCore
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C	Coal
K	Kerogen
WR	Whole Rock
n.d.	Not Determined

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AL	Alginite
SB	Suberinite
C	Cutinite
LD	Liptodetrinite
U	Undiffer.
S	Sporinite
R	Resinite
O	Other

OTHER ORGANIC MATTER

E	Exsudatinite
G	Graptolites
VL	Lipid-Rich Vitrinite
VC	VitriniteContamination
VR	Recycled Vitrinite

PYRITE

E	Euhedral
F	Framboid
MA	Massive
RI	Replace-infill

ABUND.

N	None
T	Trace
-	Small Amt.
M	Mod. Amt.
+	Large Amt.
++	Abundant

FLUOR. INTENS.

0	None
1	Weak
2	Moderate
3	Strong
4	Intense

VIT. REFLECT. EQUIVALENCE

B	Bitumen
G	Graptolites
VL	Lipid-Rich Vitrinite
VC	Vitrinite Contam.
VR	Recycled Vitrinite

FLUOR. COLOR

W	White
G	Green
Y	Yellow
O	Orange
R	Red
B	Brown
BL	Black
L	Light
D	Dark

TAI COLOR VALUES

1-	Straw Yellow
1	Pale Yellow
1+	Yellow
2-	Yellow-Orange
2	Golden
2+	Amber
3-	Reddish Brown
3	Medium Brown
3+	Dark Brown
4-	Brown-Black
4	Black
4+	Black-Opaque

VISUAL KEROGEN ANALYSIS
Total Quality Geochemistry

2000 Foothills Project

BaselineDGSI Project: 00/0474

BaselineDGSI Number	BaselineDGSI Sample Id or Depth	Preparation/Sample Type	ORGANIC MATTER (%) LIPIDS UNSTRUCTURED: Undifferentiated	Amorphous	Massive	Micrinized	LIPIDS STRUCTURED: Type	Type	Type	Type	Solid Bitumen	HUMIC: Inertinite	Vitrinite	OTHER: Type	Type	RELATIVE ABUNDANCE: Pyrite Type	Pyrite	Organic Concentration	VITRINITE: Normal	Rough	Lipid-Rich	Oxidized	Coked	FLUORESCENCE / TAI REFLECTED LIPIDS: Color	Intensity	Color	Intensity	Background Intensity	TRANSMITTED LIPIDS UNSTR. TAI: Value	UNSTR. FLUOR.: Color	Intensity	STRU. TAI: Value	STRU. FLUOR.: Color	Intensity	Ro Vit. Reflectance or Equiv.
AA000061	66 99 MU 44-A	K OC	95									5	T			MA	-	+	+	-				BL	0			3	2+	BL	0				- V 1.40
Comments:	*Grainy unstructured lipids with small terrestrial fragments.*																																		
AA000062	67 99 MU 44-B	K OC				100					?	T	T			MA	M	+	M	M				BL	0			2	3	BL	0				- V 1.77
Comments:	*Micrinized lipids.*																																		
AA000063	68 99 MU 44-1.1	K OC				90					5	5	T			MA	T	+	M	M	?			BL	0			4	3+	BL	0				- V 1.67
Comments:	*Micrinized lipids with some solid bitumen formation. Several isolated fragments of lipid-rich vitrinite or solid bitumen. Bitumen formation may raise TAI value.*																																		
Comments:																																			
Comments:																																			

ANALYST

X O'Connor

MICROSCOPE

X Zeiss
_____ Jena
_____ Leitz

SAMPLE TYPE/PREP		STRUCTURED LIPIDS		OTHER ORGANIC MATTER		PYRITE		ABUND.		FLUOR. INTENS.		VIT. REFLECT. EQUIVALENCE		FLUOR. COLOR		TAI COLOR VALUES	
CTG	Cuttings	AL	Alginite	E	Exsudatinite	E	Euhedral	N	None	0	None	B	Bitumen	W	White	1-	Straw Yellow
CC	Conv. Core	SB	Suberinite	G	Graptolites	F	Framboid	T	Trace	1	Weak	G	Graptolites	G	Green	1	Pale Yellow
SWC	SideWallCore	C	Cutinite	VL	Lipid-Rich Vitrinite	MA	Massive	-	Small Amt.	2	Moderate	VL	Lipid-Rich Vitrinite	Y	Yellow	1+	Yellow
OC	Outcrop	LD	Liptodetrinite	VC	VitriniteContamination	RI	Replace-infill	M	Mod. Amt.	3	Strong	VC	Vitrinite Contam.	O	Orange	2-	Yellow-Orange
NI	No Inform.	U	Undiffer.	VR	Recycled Vitrinite			+	Large Amt.	4	Intense	VR	Recycled Vitrinite	R	Red	2	Golden
C	Coal	S	Sporinite					++	Abundant					B	Brown	2+	Amber
		R	Resinite											BL	Black	3-	Reddish Brown
K	Kerogen	O	Other													3	Medium Brown
WR	Whole Rock															3+	Dark Brown
														L	Light	4-	Brown-Black
n.d.	Not Determined													D	Dark	4	Black
																4+	Black-Opaque

VISUAL KEROGEN ANALYSIS
Total Quality Geochemistry

2000 Foothills Project

[474 A TR1.XL4 xls(Mull & Ro)]vka_2

BaselineDGSI Project: 00/0474

BaselineDGSI	BaselineDGSI	Preparation/Sample Id or Depth		ORGANIC MATTER (%) LIPIDS UNSTRUCTURED: Amorph	Lamass	Lamcrin	STRUCTURED: Type	Type	Type	Type	Bitu	HUMIC: Inertin	Vitrin	OTHER: Type	Type	RELATIVE ABUNDANCE: Bite T	Pyrite	Conc	VITRINITE: Form	Rough	Bid-R	Oxidiz	Coke	FLUORESCENCE / TAI REFLECTED LIPIDS: UNSTR. Color	Intensi	STRU. Color	Intensi	und	TRANSMITTED LIPIDS: UNSTR. TAI Value	FLUOR. Color	Intensi	STRU. TAI Value	FLUOR. Color	Intensi	Ro Reflectance or Equiv.
		44	K				U					?	?															0							-
AA000040	00 MU 36-4		OC	10			T					20	70			MA	T	M	+	-			T	BL	0	BL	0	1	n.d.						V 1.94
Comments:	*Very small terrestrial fragments and grainy unstructured lipids are mixed with mineral. Ro on vitrinite-like material. Some coking.*																																		
		45	K				U																												-
AA000041	00 MU 37		OC			95	T				T	T	5			MA	M	+	M	M			T	BL	0	BL	0	1	3+	BL	0				V ?1.36
Comments:	*Micrinized lipids with small terrestrial fragments and a trace of solid bitumen formation. Some coking.*																																		
		49	K				LD									MA													3						-
AA000045	00 MU 41		OC			90	T				5	5	T			F	M	+	M	M				BL	0			2	2+	BL	0		O	2	V ?1.79
Comments:	*Micrinized lipids with some solid bitumen formation. Small terrestrial fragments. Solid bitumen formation may raise TAI value.*																																		
		51	K				LD							VL															3				O	1	-
AA000047	00 MU 44		OC	75			T					5	20	T		MA	-	+	+	-	T			BL	0			1	3+	BL	0		YO	2	V 1.52
Comments:	*Small terrestrial fragments. Unstructured lipids are difficult to characterize.*																																		
		53	K	?			U							VL																					-
AA000049	00 MU 51		OC	10			T				5	T		85		MA	T	+	N	-	+			BL	0	DO	1	3	n.d.				DO	1	V 0.70
Comments:	*Large fragments of slightly lipid-rich vitrinite. Lower-rank, angular solid bitumen.*																																		

ANALYST

X O'Connor

MICROSCOPE

X Zeiss

Jena

Leitz

SAMPLE TYPE/PREP

CTG	Cuttings
CC	Conv. Core
SWC	SideWallCore
OC	Outcrop
NI	No Inform.
C	Coal
K	Kerogen
WR	Whole Rock
n.d.	Not Determined

STRUCTURED LIPIDS

AL	Alginite
SB	Suberinite
C	Cutinite
LD	Liptodetrinite
U	Undiffer.
S	Sporinite
R	Resinite
O	Other

OTHER ORGANIC MATTER

E	Exsudatinite
G	Graptolites
VL	Lipid-Rich Vitrinite
VC	VitriniteContamination
VR	Recycled Vitrinite

PYRITE

E	Euhedral
F	Framboid
MA	Massive
RI	Replace-infill

ABUND.

N	None
T	Trace
-	Small Amt.
M	Mod. Amt.
+	Large Amt.
++	Abundant

FLUOR. INTENS.

0	None
1	Weak
2	Moderate
3	Strong
4	Intense

VIT. REFLECT. EQUIVALENCE

B	Bitumen
G	Graptolites
VL	Lipid-Rich Vitrinite
VC	Vitrinite Contam.
VR	Recycled Vitrinite

FLUOR. COLOR

W	White
G	Green
Y	Yellow
O	Orange
R	Red
B	Brown
BL	Black
L	Light
D	Dark

TAI COLOR VALUES

1-	Straw Yellow
1	Pale Yellow
1+	Yellow
2-	Yellow-Orange
2	Golden
2+	Amber
3-	Reddish Brown
3	Medium Brown
3+	Dark Brown
4-	Brown-Black
4	Black
4+	Black-Opaque

VISUAL KEROGEN ANALYSIS
Total Quality Geochemistry

2000 Foothills Project

BaselineDGSI Project: 00/0474

BaselineDGSI	BaselineDGSI	Preparation/Sa	ORGANIC MATTER (%) LIPIDS UNSTRUCTURED				STRUCTURED			RELATIVE ABUNDANCE HUMIC		OTHER		VITRINITE							FLUORESCENCE / TAI REFLECTED LIPIDS UNSTR.		STRU.			TRANSMITTED LIPIDS UNSTR. TAI	FLUOR.	STRU. TAI	FLUOR.		Ro
	Sample Id or Depth		Amorph	Massi	crini	Type	Type	Type	Type	Bitumen	Sertini	Itrini	Type	Type	ite T	Pyrite	Conc	orm	Rough	bid-R	xidiz	Coke	Colontensi	Colontensi	und	Value	Colontensi	Value	Colontensi	flectance or Equiv.
AA000050	54 00 MU 52	K OC	50				LD T				5	40	VL 5		MA	M	+	+	-	-			BL	0	O	1	4	2+ 3-	BL	0		O Y	1 2	- V 0.77
Comments:	*Grainy unstructured lipids with small terrestrial fragments.*																														
AA000052	56 00 MU 54	K OC	50				LD T			T	5	40	VL 5		MA	-	+	+	-	-		T	BL	0	O	1	3	? 3	BL	0				- V 1.25
Comments:	*Similar to 00 MU 52 54, but more mature. Trace of coking inertinite*																														
AA000054	58 00 MU 55	K OC	50				LD T			T	5	5	VL 40		MA	-	+	-	M	+	T	T	B	1	O	1	4	3-	BL	0		O	1 2	- V 0.87
Comments:	*Grainy unstructured lipids. Most terrestrial fragments are very small. Trace low-rank solid bitumen.*																														
AA000055	59 00 MU 57	K OC				95				5	T	T			F MA	-	+	N	+				BL	0			2 3	3- 3	BL	0				- -
Comments:	*Fine-grained, micrinized lipids with some angular solid bitumen form. Small terrestrial fragments are too rough textured for Ro measurements.*																														
AA000115	00 MU 58	K OC	75				LD T			?	T	15	VL 10		MA	M	+	M	M	M			BL	0	O	1	3	3-	BL	0		O	1 2	- V 1.26
Comments:	*Grainy-massive unstructured lipids with very small terrestrial fragme ...most are too small for Ro measurements.*																														

ANALYST

X O'Connor

MICROSCOPE

SAMPLE TYPE/PREP		STRUCTURED LIPIDS		OTHER ORGANIC MATTER		PYRITE		ABUND.		FLUOR. INTENS.		VIT. REFLECT. EQUIVALENCE		FLUOR. COLOR		TAI COLOR VALUES	
CTG	Cuttings	AL	Alginite	E	Exsudatinite	E	Euhedral	N	None	0	None	B	Bitumen	W	White	1-	Straw Yellow
CC	Conv. Core	SB	Suberinite	G	Graptolites	F	Framboid	T	Trace	1	Weak	G	Graptolites	G	Green	1	Pale Yellow
SWC	SideWallCore	C	Cutinite	VL	Lipid-Rich Vitrinite	MA	Massive	-	Small Amt.	2	Moderate	VL	Lipid-Rich Vitrinite	Y	Yellow	1+	Yellow
OC	Outcrop	LD	Liptodetrinite	VC	VitriniteContamination	RI	Replace-infill	M	Mod. Amt.	3	Strong	VC	Vitrinite Contam.	O	Orange	2-	Yellow-Orange
NI	No Inform.	U	Undiffer.	VR	Recycled Vitrinite			+	Large Amt.	4	Intense	VR	Recycled Vitrinite	R	Red	2	Golden
C	Coal	S	Sporinite					++	Abundant					B	Brown	2+	Amber
K	Kerogen	R	Resinite											BL	Black	3-	Reddish Brown
		O	Other													3	Medium Brown

X Zeiss ____ Jena ____ Leitz ____	WR Whole Rock n.d. Not Determined	[474-A_TR1-XL-4.xls(Mull & Ro)]Ve_2 **VISUAL KEROGEN ANALYSIS** **Total Quality Geochemistry**		L Light D Dark	3+ Dark Brown 4- Brown-Black 4 Black 4+ Black-Opaque

2000 Foothills Project

BaselineDGSI Project: 00/0474

BaselineDGSI	BaselineDGSI	Preparation/Sample Id or Depth		ORGANIC MATTER (%) LIPIDS UNSTRUCTURED Amorphous	Massive	Criniti	LIPIDS STRUCTURED Type	Type	Type	Type	Bitu	HUMIC Vertinite	Vitrinite	OTHER Type	Type	RELATIVE ABUNDANCE VITRINITE Pyrite	Pyrite	Conc	Conformal	Rough	Rough	Oxidiz	Coke	FLUORESCENCE / TAI REFLECTED LIPIDS UNSTR. Colour	Intensity	STRU. Colour	Intensity	Fluorescence Colour	TRANSMITTED LIPIDS UNSTR. TAI	FLUOR. Colour	Intensity	STRU. TAI	FLUOR. Colour	Intensity	Ro Reflectance or Equiv.
		61	K				LD				?			VL		F																			
	AA000056	00 MU 59	OC			60	5				T	10	15	10		MA	M	+	M	M	M		-	BL	0	DB	1	4	2+	BL	0		O	3	V 0.88
	Comments:	*Micrinized lipids and small terrestrial fragments with a wide range of reflectance values. Some high-rank vitrinite is coking.*																																	
		62	K				LD							VL																					
	AA000057	00 MU 61	OC	60			5					5	20	10		MA	M	+	M	M	M		T	BL	0	O	3	4	3-	BL	0		O	2	V 0.87
	Comments:	*Grainy-massive unstructured lipids. Vitrinite has a wide range of values.*																																	
		63	K				LD				?																1			DO	2				
	AA000058	00 MU 62	OC	95			T				5	T	T			MA	-	+	+					B	1	O	2	3	2+	BL	0		O	2	-
	Comments:	*Unstructured lipids are difficult to see in reflected light. In fluorescent light, some small angular areas indicate that some solid bitumen was formed.*																																	
		64	K				LD							VL										DB	1				?					1	
	AA000059	00 MU 62-1	OC	50			T					5	40	5		MA	M	+	M	M	-		T	BL	0	DO	1	3	3	BL	0		O	3	V 1.03
	Comments:	*Unstructured lipids are mixed with mineral and are difficult to characterize. Most terrestrial fragments are small.*																																	
		65	K				LD									F													2+						
	AA000060	00 MU 63	OC			90	T					T	10			E	+	+	+	-				BL	0			4	3-	BL	0		O	1	V 1.06
	Comments:	*Massive unstructured lipids with small terrestrial fragments.*																																	

ANALYST	SAMPLE TYPE/PREP	STRUCTURED LIPIDS	OTHER ORGANIC MATTER	PYRITE	ABUND.	FLUOR. INTENS.	VIT. REFLECT. EQUIVALENCE	FLUOR. COLOR	TAI COLOR VALUES
	CTG Cuttings	AL Alginite	E Exsudatinite	E Euhedral	N None	0 None	B Bitumen	W White	1- Straw Yellow

X O'Connor

MICROSCOPE

X Zeiss
Jena
Leitz

CC	Conv. Core
SWC	SideWallCore
OC	Outcrop
NI	No Inform.
C	Coal
K	Kerogen
WR	Whole Rock
n.d.	Not Determined

SB	Suberinite
C	Cutinite
LD	Liptodetrinite
U	Undiffer.
S	Sporinite
R	Resinite
O	Other

G	Graptolites
VL	Lipid-Rich Vitrinite
VC	Vitrinite Contamination
VR	Recycled Vitrinite

I474_A_TR1_XL4 x's(Mull & Bo)lyka_2

F	Framboid
MA	Massive
R	Replace infill

T	Trace
-	Small Amt.
M	Mod. Amt.
+	Large Amt.
++	Abundant

1	Weak
2	Moderate
3	Strong
4	Intense

G	Graptolites
VL	Lipid-Rich Vitrinite
VC	Vitrinite Contam.
VR	Recycled Vitrinite

G	Green
Y	Yellow
O	Orange
R	Red
B	Brown
BL	Black
L	Light
D	Dark

1	Pale Yellow
1+	Yellow
2-	Yellow-Orange
2	Golden
2+	Amber
3-	Reddish Brown
3	Medium Brown
3+	Dark Brown
4-	Brown-Black
4	Black
4+	Black-Opaque

VISUAL KEROGEN ANALYSIS
Total Quality Geochemistry

2000 Foothills Project

BaselineDGSI Project: 00/0474

BaselineDGSI	BaselineDGSI / Sample Id or Depth	Preparation/Sa	ORGANIC MATTER (%) LIPIDS UNSTRUCTURED: fere	orph	lassi	crini	STRUCTURED: Type	Type	Type	Type	Bitu	HUMIC: ertin	itrini	OTHER: Type	Type	RELATIVE ABUNDANCE: ite T	Pyrite	Conc	VITRINITE: orma	Roug	bid-R	xidiz	Coke	FLUORESCENCE / TAI REFLECTED LIPIDS UNSTR.: Colo	tensi	STRU.: Colo	tensi	und	TRANSMITTED LIPIDS UNSTR. TAI: Value	FLUOR.: Colo	tensi	STRU. TAI: Value	FLUOR.: Colo	tensi	Ro: flectance or Equiv.
AA000061	66 99 MU 44-A	K OC	95									5	T			MA	-	+	+	-				BL	0			3	2+	BL	0				- V ?1.40
Comments:	*Grainy unstructured lipids with small terrestrial fragments.*																																		
AA000062	67 99 MU 44-B	K OC				100					?	T	T			MA	M	+	M	M				BL	0			2	3	BL	0				- V ?1.77
Comments:	*Micrinized lipids.*																																		
AA000063	68 99 MU 44-1.1	K OC				90					5	5	T			MA	T	+	M	M	?			BL	0			4	3+	BL	0				- V ?1.67
Comments:	*Micrinized lipids with some solid bitumen formation. Several isolated fragments of lipid-rich vitrinite or solid bitumen. Bitumen formation may raise TAI value.*																																		

2000 Foothills Project

BaselineDGSI Project: 00/0474

BaselineDGSI	BaselineDGSI Sample Id or Depth	Preparation/Sample	ORGANIC MATTER (%) LIPIDS UNSTRUCTURED Amorphous	Massive	Terrigenous	LIPIDS STRUCTURED Type	Type	Type	Type	Bitumen	HUMIC Vitrinite	Vitrinite	OTHER Type	Type	RELATIVE ABUNDANCE Vitrinite Type	Pyrite	Concentration	FLUORESCENCE / TAI REFLECTED LIPIDS UNSTR. Formation	Roughness	Rapid-Reflectance	Oxidized	Coked	STRU. Colorintensity	Colorintensity	Background	TRANSMITTED LIPIDS UNSTR. TAI Value	FLUOR. Colorintensity	STRU. TAI Value	FLUOR. Colorintensity	Ro Reflectance or Equiv.
AA000010	10 00 MU 27-2	K OC			85	U T					5	10			MA F	M	+	M	M	?			BL	0	BL	0	0	3+	BL	0				- V 2.42
Comments:	*Micrinized lipids with small terrestrial fragments.*																														
AA000011	11 00 MU 27-3	K OC			85	U T					5	10			MA	M	M	+	-				BL	0	BL	0	0	3 3+	BL	0				- V 2.15
Comments:	*Similar to previous sample.*																														
AA000013	13 00 MU 27-5	K OC			70	U T				20	5	5			MA	T	+	+	T				BL	0	BL	0	0	4-	BL	0				- V ?2.17
Comments:	*Source rock type kerogen. Micrinized lipids with solid bitumen formation. TAI may be raised.*																														
AA000014	14 00 MU 29	K OC	40			U T					20	40			MA	-	M	+	T			-	BL	0	BL	0	0	3+	BL	0				- V 2.29
Comments:	*Grainy unstructured lipids and high-rank terrestrial fragments mixed mineral. Some vitrinite is coking.*																														
AA000016	16 00 MU 29-2	K OC			90					T	10	T	?VL T		MA E	M	+	+	T	T			BL	0			0	4-	BL	0				- V ?2.08
Comments:	*Micrinized lipids with a small amount of solid bitumen formation. High Ro values may be on inertinite.*																														

ANALYST

X O'Connor

MICROSCOPE

SAMPLE TYPE/PREP

CTG	Cuttings
CC	Conv. Core
SWC	SideWallCore
OC	Outcrop
NI	No Inform.
C	Coal
K	Kerogen

STRUCTURED LIPIDS

AL	Alginite
SB	Suberinite
C	Cutinite
LD	Liptodetrinite
U	Undiffer.
S	Sporinite
R	Resinite
O	Other

OTHER ORGANIC MATTER

E	Exsudatinite
G	Graptolites
VL	Lipid-Rich Vitrinite
VC	VitriniteContamination
VR	Recycled Vitrinite

PYRITE

E	Euhedral
F	Framboid
MA	Massive
RI	Replace-infill

ABUND.

N	None
T	Trace
-	Small Amt.
M	Mod. Amt.
+	Large Amt.
++	Abundant

FLUOR. INTENS.

0	None
1	Weak
2	Moderate
3	Strong
4	Intense

VIT. REFLECT. EQUIVALENCE

B	Bitumen
G	Graptolites
VL	Lipid-Rich Vitrinite
VC	Vitrinite Contam.
VR	Recycled Vitrinite

FLUOR. COLOR

W	White
G	Green
Y	Yellow
O	Orange
R	Red
B	Brown
BL	Black

TAI COLOR VALUES

1-	Straw Yellow
1	Pale Yellow
1+	Yellow
2-	Yellow-Orange
2	Golden
2+	Amber
3-	Reddish Brown
3	Medium Brown

X Zeiss Jena Leitz	WR Whole Rock n.d. Not Determined	VISUAL KEROGEN ANALYSIS Total Quality Geochemistry	[474-A_TR1.XLS]Ro(Mull & Ro)]vka_1	L Light D Dark	3+ Dark Brown 4- Brown-Black 4 Black 4+ Black-Opaque

2000 Foothills Project

BaselineDGSI Project: 00/0474

BaselineDGSI	BaselineDGSI	Preparation/Sa	ORGANIC MATTER (%) LIPIDS UNSTRUCTURED				LIPIDS STRUCTURED					HUMIC		OTHER		RELATIVE ABUNDANCE			VITRINITE					FLUORESCENCE / TAI REFLECTED LIPIDS			TRANSMITTED LIPIDS				Ro
																								UNSTR.	STRU.		UNSTR. TAI	UNSTR. FLUOR.	STRU. TAI	STRU. FLUOR.	
	Sample Id or Depth		Peremorph	Massivcrini	Type	Type	Type	Type	Bitu	Vertin	Vitrini	Type	Type	ite T	Pyrite	Conc	Form	Rough	id-R	xidiz	Coke	Colorintensi	Colorintensi	und	Value	Colorintensi	Value	Colorintensi	flectance or Equiv.
AA000017	18 00 MU 29-2.1	K OC		85					5	10	T	?VL T		MA E	M	+	+	T	T		T	BL	0		0	4-	BL	0	- V ?2.60
Comments:	Micrinized lipids with a small amount of solid bitumen formation. High reflectance values may be on inertinite.																													
AA000019	19 00 MU 30	K OC		85					10	5	T			MA	M	+	+					BL	0		0	4-	BL	0	- V ?1.83
Comments:	Source rock type kerogen. Similar to previous sample, but with more solid bitumen formation. TAI may be increased.																													
AA000020	21 00 MU 30-1	K OC		80					?	T	5	VL 15		MA E	M	+	-	M	+			BL	0		1	3+	BL	0	- V 1.93
Comments:	Grainy micrinized lipids. Abundant lipid-rich vitrinite.																													
AA000021	22 00 MU 30-3	K OC		80					5	5	10			MA E	M	+	+	T				BL	0		0	4- 4	BL	0	- V ?2.25
Comments:	Micrinized lipids with some solid bitumen formation.																													
AA000023	24 00 MU 30-5	K OC	95						5	T				MA	-	M	+					BL	0		0	3- 3	BL	0	- V ?1.97
Comments:	Unstructured lipids are mixed with mineral. Very small terrestrial fragments.																													

ANALYST	SAMPLE TYPE/PREP	STRUCTURED LIPIDS	OTHER ORGANIC MATTER	PYRITE	ABUND.	FLUOR. INTENS.	VIT. REFLECT. EQUIVALENCE	FLUOR. COLOR	TAI COLOR VALUES
	CTG Cuttings	AL Alginite	E Exsudatinite	E Euhedral	N None	0 None	B Bitumen	W White	1- Straw Yellow

X O'Connor

MICROSCOPE

X Zeiss
Jena
Leitz

Code	Meaning
CC	Conv. Core
SWC	SideWallCore
OC	Outcrop
NI	No Inform.
C	Coal
K	Kerogen
WR	Whole Rock
n.d.	Not Determined

Code	Meaning
SB	Suberinite
C	Cutinite
LD	Liptodetrinite
U	Undiffer.
S	Sporinite
R	Resinite
O	Other

Code	Meaning
G	Graptolites
VL	Lipid-Rich Vitrinite
VC	Vitrinite Contamination
VR	Recycled Vitrinite

Code	Meaning
F	Framboid
MA	Massive
RI	Replaced infill

Code	Meaning
T	Trace
-	Small Amt.
M	Mod. Amt.
+	Large Amt.
++	Abundant

Code	Meaning
1	Weak
2	Moderate
3	Strong
4	Intense

Code	Meaning
G	Graptolites
VL	Lipid-Rich Vitrinite
VC	Vitrinite Contam.
VR	Recycled Vitrinite

Code	Meaning
G	Green
Y	Yellow
O	Orange
R	Red
B	Brown
BL	Black
L	Light
D	Dark

Code	Meaning
1	Pale Yellow
1+	Yellow
2-	Yellow-Orange
2	Golden
2+	Amber
3-	Reddish Brown
3	Medium Brown
3+	Dark Brown
4-	Brown-Black
4	Black
4+	Black-Opaque

VISUAL KEROGEN ANALYSIS
Total Quality Geochemistry

2000 Foothills Project

BaselineDGSI Project: 00/0474

			ORGANIC MATTER (%) LIPIDS UNSTRUCTURED				STRUCTURED					HUMIC		OTHER		RELATIVE ABUNDANCE			VITRINITE					FLUORESCENCE / TAI REFLECTED LIPIDS UNSTR.		STRU.			TRANSMITTED LIPIDS UNSTR. TAI	FLUOR.		STRU. TAI	FLUOR.		Ro
BaselineDGSI	BaselineDGSI Sample Id or Depth	Preparation/Sa	feren	orph	lassi	crini	Type	Type	Type	Type	Bitu	ertin	itrini	Type	Type	ite T	Pyrit	Conc	orma	Roug	bid-R	xidiz	Coke	Colo	ntensi	Colo	ntensi	und	Value	Colo	ntensi	Value	Colo	ntensi	flectance or Equiv.
AA000025	00 MU 31 26	K OC	85								?	10	5			MA	-	M	+	T	?			BL	0			0	? 3+	BL	0				- V ?2.29
Comments:	Unstructured lipids are mixed with mineral. Very small terrestrial fragments.																																		
AA000027	00 MU 32 28	K OC	60								?	T	20	VL 20		MA	-	-	M	M	M			BL	0			0	3 3+	BL	0				- V ?2.06
Comments:	Unstructured lipids are mixed with mineral. Small terrestrial fragments. Some lipid-rich vitrinite is difficult to distinguish from solid bitumen.																																		
AA000028	00 MU 33 29	K OC	60								?	T	20	VL 20		MA F	-	M	M	M	M		-	BL	0			0	3+	BL	0				- V 2.16
Comments:	More organic matter, but similar to 00 MU 32. Some coking.																																		
AA000030	00 MU 34-1 31	K OC				70					T	T	25	VL 5		MA	M	+	M	M	-			BL	0			1	3+	BL,	0				- V 1.66

Comments: *Micrinized lipids with a trace of solid bitumen formation. All vitrinite may be slightly lipid-rich. Some vitrinite-like fragments may be solid bitumen.*

AA000031	32 00 MU 34-2	K OC				85	U T				T	5	[474 A 10	TR1.XL4 x VL T	s(Mull & Ro)	MA	M	lvka_1 +	+	T	T		T	BL	0	BL	0	1	3+	BL	0				- V 1.76

Comments: *Micrinized lipids with a trace of solid bitumen formation.*

ANALYST	SAMPLE TYPE/PREP	STRUCTURED LIPIDS	OTHER ORGANIC MATTER	PYRITE	ABUND.	FLUOR. INTENS.	VIT. REFLECT. EQUIVALENCE	FLUOR. COLOR	TAI COLOR VALUES
X O'Connor	CTG Cuttings	AL Alginite	E Exsudatinite	E Euhedral	N None	0 None	B Bitumen	W White	1- Straw Yellow
	CC Conv. Core	SB Suberinite	G Graptolites	F Framboid	T Trace	1 Weak	G Graptolites	G Green	1 Pale Yellow
	SWC SideWallCore	C Cutinite	VL Lipid-Rich Vitrinite	MA Massive	- Small Amt.	2 Moderate	VL Lipid-Rich Vitrinite	Y Yellow	1+ Yellow
	OC Outcrop	LD Liptodetrinite	VC VitriniteContamination	RI Replace-infill	M Mod. Amt.	3 Strong	VC Vitrinite Contam.	O Orange	2- Yellow-Orange
	NI No Inform.	U Undiffer.	VR Recycled Vitrinite		+ Large Amt.	4 Intense	VR Recycled Vitrinite	R Red	2 Golden
	C Coal	S Sporinite			++ Abundant			B Brown	2+ Amber
MICROSCOPE		R Resinite						BL Black	3- Reddish Brown
	K Kerogen	O Other							3 Medium Brown
X Zeiss	WR Whole Rock								3+ Dark Brown
Jena								L Light	4- Brown-Black
Leitz	n.d. Not Determined							D Dark	4 Black
									4+ Black-Opaque

VISUAL KEROGEN ANALYSIS
Total Quality Geochemistry

2000 Foothills Project

BaselineDGSI Project: 00/0474

BaselineDGSI	BaselineDGSI / Sample Id or Depth	Preparation/Sa	ORGANIC MATTER (%) LIPIDS UNSTRUCTURED feren	orph	lassi	crini	STRUCTURED Type	Type	Type	Type	Bitu	HUMIC ertini	itrini	OTHER Type	Type	RELATIVE ABUNDANCE ite T	Pyrite	Conc	VITRINITE orm	Roug	bid-R	xidiz	Coke	FLUORESCENCE / TAI REFLECTED LIPIDS UNSTR. Colo	tensi	STRU. Colo	tensi	und	TRANSMITTED LIPIDS UNSTR. TAI Value	FLUOR. Colo	tensi	STRU. TAI Value	FLUOR. Colo	tensi	Ro flectance or Equiv.
AA000032	33 00 MU 34-3	K OC				75					10	10	5			MA	T	+	M	M	T	T	T	BL	0			2	3+	BL	0				- V 1.91
Comments:	*Micrinized lipids with some angular solid bitumen formation. Trace of coking. Bitumen formation may raise TAI value. Background fluorescence is higher than expected.*																																		
AA000033	35 00 MU 34-3.1	K OC				85	U T				5	10	T			MA	-	+	M	M		T		BL	0	BL	0	0	3+	BL	0				- V ?1.80

Comments:	Micrinized lipids with some solid biumen formation. Ro on vitrinite-like material, higher values may be on inertinite.																																		
AA000035	00 MU 35 37	K OC	65				U T					10	? 25	VL T	[474_A TR1.XL4 x s(Mull & Ro)]vka_	MA	T	-	M	M	T			BL	0	BL	0	0	n.d.						- V ?1.62
Comments:	Small amount of organic matter mixed with mineral. Ro on small, vitrinite-like fragments.																																		
AA000036	00 MU 36 38	K OC				90	U T				5	5	T			MA F	M	+	M	M			T	BL	0	BL	0	2	3+	BL	0				- V ?1.94
Comments:	Micrinized lipids with some solid bitumen formation. Background fluorescence is higher than expected.																																		
AA000038	00 MU 36-2 40	K OC				95	U T				T	T	5	VL T		F MA	+	+	M	T	M		T	BL	0	BL	0	3	3- 3+	BL	0				B ?1.49 V ?1.23
Comments:	Unstructured lipids have grainy-micrinized texture. Small fragments are difficult to identify as vitrinite, lipid-rich vitrinite, or solid bitumen. Trace graphite.																																		

ANALYST

X O'Connor

MICROSCOPE

X Zeiss
Jena
Leitz

SAMPLE TYPE/PREP

- CTG Cuttings
- CC Conv. Core
- SWC SideWallCore
- OC Outcrop
- NI No Inform.
- C Coal
- K Kerogen
- WR Whole Rock
- n.d. Not Determined

STRUCTURED LIPIDS

- AL Alginite
- SB Suberinite
- C Cutinite
- LD Liptodetrinite
- U Undiffer.
- S Sporinite
- R Resinite
- O Other

OTHER ORGANIC MATTER

- E Exsudatinite
- G Graptolites
- VL Lipid-Rich Vitrinite
- VC VitriniteContamination
- VR Recycled Vitrinite

PYRITE

- E Euhedral
- F Framboid
- MA Massive
- RI Replace-infill

ABUND.

- N None
- T Trace
- \- Small Amt.
- M Mod. Amt.
- \+ Large Amt.
- ++ Abundant

FLUOR. INTENS.

- 0 None
- 1 Weak
- 2 Moderate
- 3 Strong
- 4 Intense

VIT. REFLECT. EQUIVALENCE

- B Bitumen
- G Graptolites
- VL Lipid-Rich Vitrinite
- VC Vitrinite Contam.
- VR Recycled Vitrinite

FLUOR. COLOR

- W White
- G Green
- Y Yellow
- O Orange
- R Red
- B Brown
- BL Black
- L Light
- D Dark

TAI COLOR VALUES

- 1- Straw Yellow
- 1 Pale Yellow
- 1+ Yellow
- 2- Yellow-Orange
- 2 Golden
- 2+ Amber
- 3- Reddish Brown
- 3 Medium Brown
- 3+ Dark Brown
- 4- Brown-Black
- 4 Black
- 4+ Black-Opaque

VISUAL KEROGEN ANALYSIS
Total Quality Geochemistry

Date: Thu, 22 Mar 2001 14:55:56 -0800
To: Project sponsors:
From: "C.G. (Gil) Mull" <ffcgm@aurora.uaf.edu>
Subject: Foothills geochemistry
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Attached is a preliminary review copy of a summary table that I have prepared containing some of the critical TOC and maturity date from our geochemical sampling across the foothills belt. You have seen some of these data previously; this table includes all of the geochem data from our 1999 and 2000 field programs, plus a few samples collected in some of our preliminary studies in the area back in the 1980s. Following is a brief summary of some of the important aspects I see in the data, some of which we have discussed before. We will release a more complete report later, but wanted you to have some of the raw data now. On the copy of the table that I am sending, the more significant looking samples are in bold.

The data show what we have seen before--that the Upper Triassic and Lower Jurassic rocks in the foothills belt are excellent oil- and gas-prone source rocks, with a number of 4% to 10% TOC values in the Lower Jurassic, and up to over 6% TOC in some beds in the Upper Triassic Otuk Formation. This is no big surprise, because the Triassic has long been recognized as a major source in the subsurface of the North Slope. What is nice to see is that the organic richness persists southward to these more distal facies that are exposed in the allchthonous rocks along the Brooks Range mountain front and in the foothills disturbed belt. This suggests that there are abundant oil- and gas-prone source rocks present in the cooker at the base of the Colville Basin--although many of these rocks at depth have undoubtedly already generated and expelled and migrated their hydrocarbons..

Although both the Triassic and Jurassic parts of the Otuk Formation are relatively thin in outcrop, and are generally structurally complicated and not well exposed, the data set shows at least 18 m (>55 ft) of rich Lower Jurassic source rock in the Blankenship Member of the Otuk in Atigun Gorge, and an interval of 22 m (nearly 60 ft) of Upper Triassic Otuk containing source rocks. The section at Atigun Gorge is nearly flat-lying and is not structurally complicated. Both the Jurassic and Triassic portions of the Otuk Formation consist of distal facies of the Shublik and Kingak Formations that are present in the subsurface of the northern Arctic Slope. I think it is safe to say that the thickness of these units in the subsurface to the north is likely to be substantially thicker than we see in the outcrop belt.

The other interesting thing that the combined data set continues to show is that there is a belt of these Triassic and Jurassic rocks in the foothills disturbed belt north of the mountain front in which the level of thermal maturity in the Lower Jurassic and Upper Triassic is notably lower than in coeval rocks on the Endicott Mountains allochthon at a number of places along the mountain front. You will notice that Lower Jurassic

samples from what I term the central Cobblestone parautochthonous belt have maturity levels that are still within what is commonly considered the upper part of the oil window. Both the Lower Jurassic and Upper Triassic in the northern Cobblestone parautochthonous sequence are good source rocks but are at a somewhat higher level of thermal maturity that would generally be considered to be within the wet gas zone. But in both cases, the thermal maturity is considerably lower than for the coeval rocks in the Endicott Mountains allochthon immediately to the south at Cobblestone and May Creek, which have vitrinite reflectance values >2.0 and are clearly overmature and well into the dry gas zone. It is interesting to note that the Jurassic and Triassic section on the Endicott Mountains allochthon at Atigun Gorge to the east is at a lower level of thermal maturity and is still within the oil window.

I have not fully absorbed all the possible ramifications of the maturity data. However, as we've discussed before, one possible interpretation is that the leading edge of the Endocott Mountains allochthon may have been emplaced and uplifted simultaneously with the development of the southern part of the Colville Basin and deposition of the mid-Cretaceous foredeep deposits of the Fortress Mountain and Torok Formations. This would have prevented burial of some of the rocks to the depths and associated thermal effects that are apparently indicated by the vitrinite data along part of the mountain front. As such, it seems to be analogous to the relationships we have observed in the Surprise Creek area of the western DeLong Mountains.

My conclusion is that there is a case to be made for potential oil as well as gas sources for hydrocarbons in both the thrust faulted rocks of the disturbed belt and within the less disturbed rocks of the southern part of the Colville Basin. Both are areas in which previous data have suggested mostly gas potential.

We will have a more lengthy report out containing maps and other diagrams later this spring, but wanted you to have these data available now.

Inasmuch as this note presents preliminary data for your review, I would greatly appreciate any comments, addititions, criticisms, suggestions that you might make. Again, thanks for your ongoing support for our work in the foothills belt, without your contributions, this study would have been impossible.

Cheers---Gil

FOOTHILLS GEOCHEMISTRY SUMMARY.

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"Geologists inhabit scenes that no one ever saw, scenes of global sweep, gone and gone again, including seas, mountains, rivers, forests, and archipelagos of aching beauty, rising in volcanic violence to settle down quietly and forever disappear---almost disappear"

John McPhee
Annals of the Former World