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MICROPALEONTOLOGY OF CRETACEOUS AND JURASSIC SHALES FROM THE NORTHWESTERN DELONG MOUNTAINS, WESTERN BROOKS RANGE, ALASKA, 1994-1997

by
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This report contains analytical data on the micropaleontology of 8 collections of shale samples from the northwestern DeLong Mountains of the western Brooks Range, collected as part of a regional study of the hydrocarbon potential of the northwestern Arctic Slope. Individual reports here included are:

Mickey, M.B., Haga, Hideyo, Micropaleo Consultants, Inc., 1994, Biostratigraphic report on 22 outcrop samples from western Brooks Range, Alaska, January 21, 1994, 24 pages.

Haga, Hideyo, 1996, Re-examination of some palynology preparations from outcrop samples in January 21, 1994 report., December 2, 1996, 4 pages.

Mickey, M.B., Haga, Hideyo, Micropaleo Consultants, Inc., 1994, Biostratigraphic report of 12 outcrop samples from North Slope, Alaska, April 11, 1994, 9 pages.

Mickey, M.B., Haga, Hideyo, Micropaleo Consultants, Inc., 1994, Biostratigraphic report of 3 outcrop samples from North Slope, Alaska, May 24, 1994, 6 pages.

Mickey, M.B., Haga, Hideyo, Micropaleo Consultants, Inc., 1995, Biostratigraphy report of 16 outcrop samples from the Tingmerkpuk project area North Slope, Alaska, July 12, 1995, 17 pages.

Mickey, M.B., Haga, Hideyo, Micropaleo Consultants, Inc., 1995, Biostratigraphic report of 11 outcrop samples from North Slope, Alaska, March 21, 1995, 12 pages.

Mickey, M.B., Haga, Hideyo, Micropaleo Consultants, Inc., 1996, Biostratigraphy report, 109 outcrop samples, western DeLong Mountains field party, North Slope, Alaska, December 4, 1996, 121 pages.

Mickey, M.B., Haga, Hideyo, Micropaleo Consultants, Inc. , 1997, Biostratigraphy report, 74 outcrop samples, western DeLong Mountains, field party, North Slope, Alaska, March 20, 1997, 54 pages.

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Wartes, M.A., and Reifenstuhl, R.R.,1997, Preliminary petrography and provenance of six Lower Cretaceous sandstones, northwestern Brooks Range, Alaska, in Clough, J.G., (editor), Short Notes on Alaska Geology, 1997, Alaska Division of Geological and Geophysical Surveys Professional Report PR 118 (in press).

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STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

BIOSTRATIGRAPHIC REPORT

OF

22 OUTCROP SAMPLES FROM NORTH SLOPE, ALASKA

(D.O. 214826)

Job No. 94-101 January 21, 1994

January 21, 1994

TO: Gill Mull
State of Alaska, Department of Natural Resources
Division of Geological and Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, Alaska 99709-3645

SUBJECT: Biostratigraphic Report - Twenty-two (22) outcrop samples from western Brooks Range, Alaska (D.O. #214826)

Introductory Summary

Twenty-two (22) outcrop samples from the western Brooks Range in Alaska were processed and analyzed for Foraminifera and palynomorphs.

The rock material was crushed prior to processing for microfossil extraction.

The foraminiferal preparation was made with standard procedures. This process involved boiling the material in Quaternary-O and washing over 20 and 200 mesh screens. A representative fauna and washed lithology were then picked into slides for examination.

The palynology preparation was made using hydrochloric and hydrofluoric acid treatments. The resultant organic residues were further concentrated by a heavy liquid separation, sonification and a sieving/panning technique. Permanent slide mounts were made for each sample.

Results

The interpretations for the age, zone and environment of deposition are given for each discipline. A list of the recovered microfossils is provided for each sample. The foraminiferal analysis also includes the washed lithology description. The palynological analysis also includes the thermal alteration index (T.A.I.).

The foraminiferal abundances reported in this section represent the following quantities: V = very rare (single specimen), R = rare (2-10 specimens), F = frequent (11-32 specimens), C = common (33-99) specimens) and A = abundant (100+ specimens).

The reported palynomorph abundances represent the following quantities: V = very rare (single specimen), R = rare (2-5 specimens), F = frequent (6-15 specimens), C = common (16-30 specimens) and A = abundant (greater than 30 specimens).

MCI #	DGGS SAMPLE NO.	FORMATION	LOCATION	PALEONTOLOGIC AGE	ENVIRONMENT	QUADRANGLE	LAT	LONG
		APTIAN-ALBIAN STRATA						
		TOROK FORMATION, MT. KELLY GRAYWACKE, LOWER BROOKIAN						
16	93 Mu 99	Torok Fm.	Upper Eagle Ck.	Foraminifera- Probable Hauterivian to Barremian Palynology- Indeterminate	Marine (Undiff.) Indeterminate	Delong Mtn C1	68.702	-162.486
17	93 Mu 100	Torok Fm.	Upper Eagle Ck.	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Indeterminate	Delong Mtn C1	68.684	-162.542
18	93 Mu 101	Torok Fm.	Eagle Creek	Foraminifera- Indeterminate Palynology- Possible Neocomian (Undiff.)	Indeterminate Marine?	Delong Mtn C2	68.739	-162.896
19	93 Mu 101-1	Torok Fm.	Eagle Creek	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Indeterminate	Delong Mtn C2	68.739	-162 896
2	93 RKC 23	Lower Brookian	Kukpowruk R.	Foraminifera- Probable Hauterivian to Barremian Palynology- Possible Neocomian (Undiff.)	Distal (Starved Basin) Marine	Delong Mtn D2	68 505	-162 881
				NEOCOMIAN STRATA				
9	93 Ha 153	ML Kelly Graywacke	Eagle Creek	Foraminifera- Possible Neocomian (Undiff.) Palynology- Hauterivian to Barremian	Distal (Starved Basin) Marine	Delong Mtn C1	68 61	162 599
13	93 Mu 87	Lower Brookian	Upper Eagle Ck.	Foraminifera- Possible Neocomian (Undiff.) Palynology- Indeterminate	Distal (Starved Basin) No evidence of marine	Delong Mtn C1	68 514	-162 551
14	93 Mu 93	Lower Brookian	S side Tingmerkpuk Mtn.	Foraminifera- Possible Neocomian (Undiff.) Palynology- Probable Berriasian-Valanginian	Distal (Starved Basin) Marine	Delong Mtn C1	68.554	-162.419
15	93 Mu 93-1	Lower Brookian	S side Tingmerkpuk Mtn.	Foraminifera- Possible Neocomian (Undiff.) Palynology- Early Cretaceous Undifferentiated	Distal (Starved Basin) Marine	Delong Mtn C1	68.554	-162.419
		TINGMERKPUK SANDSTONE						
8	93 RKC 22-153-A	Tingmerkpuk Ss.	Tingmerkpuk Mtn section	Foraminifera- Possible Neocomian (Undiff.) Palynology- Probable Hauterivian to Barremian	Distal (Starved Basin) Marine	Delong Mtn C1	68.567	-162.463
7	93 RKC 22-138-A	Tingmerkpuk Ss.	Tingmerkpuk Mtn section	Foraminifera- Possible Neocomian (Undiff.) Palynology- Probable Hauterivian to Barremian	Distal (Starved Basin) Marine	Delong Mtn C1	68.567	-162.463
6	93 RKC 22-72A	Tingmerkpuk Ss.	Tingmerkpuk Mtn section	Foraminifera- Possible Neocomian (Undiff.) Palynology- Valanginian	Distal (Starved Basin) Marine	Delong Mtn C1	68 567	-162.463
5	93 RKC 22-71B	Tingmerkpuk Ss.	Tingmerkpuk Mtn section	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
4	93 RKC 22-43A	Tingmerkpuk Ss.	Tingmerkpuk Mtn section	Foraminifera- Possible Neocomian (Undiff.) Palynology- Valanginian	Distal (Starved Basin) Marine	Delong Mtn C1	68.567	-162.463
		KINGAK SHALE						
3	93 RKC 22-36-A	Kingak Shale	Tingmerkpuk Mtn section	Foraminifera- Possible Neocomian (Undiff.) Palynology- Probable Hauterivian to Barremian	Distal (Starved Basin) Marine	Delong Mtn C1	68.567	-162.463
1	93 RKC 22-12-A	Kingak Shale	Tingmerkpuk Mtn section	Foraminifera- Probable Hauterivian to Barremian Palynology- Indeterminate	Distal (Starved Basin) Indeterminate	Delong Mtn C1	68.567	-162.463
11	93 Mu 84	Kingak Shale	SW Tingmerkpuk Mtn.	Foraminifera- Probable Berriasian to Valanginian Palynology- Berriasian-Valanginian	Outer Neritic to Bathyal Marine	Delong Mtn C1	68.559	-162.468

NOTE: Table compiled by C.G.Mull 12/97

12	93 Mu 86-1	Kingak Shale	Upper Eagle Creek	Foraminifera- Indeterminate Palynology- Neocomian (Undiff.)	Indeterminate Marine	Delong Mtn C1	68.52	-162.566
10	93 Mu 80	Kingak Shale	Surprise Ck.	Foraminifera- Indeterminate Palynology- Possible Neocomian (Undiff.)	Indeterminate Marine	Delong Mtn D2	68.907	-162.834
20	93 Mu 104	Kingak Shale	Kukpowruk River	Foraminifera- Probable Neocomian (Undiff.) Palynology- Possible Neocomian (Undiff.)	Marine (Undiff.) Marine	Delong Mtn C2	68.506	-162.883
22	93 Mu 104-5	Kingak Shale	Kukpowruk River	Foraminifera- Probable Hauterivian to Barremian Palynology- Indeterminate	Probable Outer Neritic to Bathyal Marine?	Delong Mtn C2	68.506	-162.883
				TRIASSIC STRATA				
21	93 Mu 104-3	Otuk Fm.	Kukpowruk River	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Marine	Delong Mtn C2	68.506	-162.883

NOTE: Table compiled by C.G.Mull 12/97

01) 93-RKC-22-12-A

FORAMINIFERA

Age.	Early Cretaceous Probable Hauterivian to Barremian
Zone.	F-12 to F-13
Environment.	Distal (Starved Basin)
Forams.	Ammobaculites erectus (X) Arenaceous spp. (R) Trochamminoides sp. (R) Paper shale (A) Rounded frosted quartz floaters (R)
Washed lith.	Dark reddish-gray hematitic? paper shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Essentially barren of palynomorphs.
Remarks.	Essentially barren of organics. TAI = ?

02) 93-RKC-23

FORAMINIFERA

Age.	Early Cretaceous Probable Hauterivian to Barremian
Zone.	F-12 to F-13
Environment.	Distal (Starved Basin)
Forams.	Bathysiphon granulocoelia (X) Glomospirella arctica (X) Trochamminoides sp. (R) Paper shale (C)
Washed lith.	Dark gray silty paper shale.

PALYNOLOGY

Age.	Early Cretaceous Possible Neocomian (Undiff.)
Environment.	Marine
Palynomorphs.	Undifferentiated gymnosperm pollen (V) Oligosphaeridium complex (F) Sentusidinium rioultii (R)
Remarks.	TAI = 3.0

03) 93-RKC-22-36-A

FORAMINIFERA

Age.	Early Cretaceous Possible Neocomian (Undiff.)
Environment.	Distal (Starved Basin)
Forams.	Barren of Foraminifera. Paper shale (F)
Washed lith.	Dark brownish-gray to black paper shale.
Discussion.	Based on lithology only.

PALYNOLOGY

Age.	Early Cretaceous Probable Hauterivian - Barremian
Zone.	Probable P-M19
Environment.	Marine
Palynomorphs.	Undifferentiated gymnosperm pollen (A) Cicatricosisporites australiensis (R) Classopollis classoides (C) Gleicheniidites senonicus (F) Hymenozonotriletes lepidophytus (R) reworked Lycopodiumsporites sp. (R) Trilobosporites cf. T. apiverrucatus (R) Gardodinium trabeculosum (V) Cochteodinia villosa (F) probably reworked

Microdinium opacum (V)
Nelchinopsis kostromiensis (R) probably reworked
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (V)
Sentusidinium rioultii (V)
Tubotuberella apatela (V)

Remarks. Frequent reworked Berriasian - Valanginian (P-M20) dinocysts.
TAI = 3.0 - 3.5

04) 93-RKC-22-43A

FORAMINIFERA

Age. Early Cretaceous
Possible Neocomian (Undiff.)

Environment. Distal (Starved Basin)

Forams. Barren of Foraminifera.
Paper shale (F)

Washed lith. Dark brownish-gray to black paper shale.

Discussion. Based on lithology only.

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian - Barremian

Zone. Probable P-M19

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Cicatricosisporites sp. (R)
Classopollis classoides (F)
Deltoidospora spp. (R)
Exesipollenites tumulus (R)
Gleicheniidites senonicus (F)
Hymenozonotriletes lepidophytus (V) reworked
Osmundacidites sp. (R)
Taxodiaceae (V)
Trilobosporites cf. T. apiverrucatus (R)
Cardodinium trabeculosum (V)
Cochteodinia villosa (V) probably reworked
Nelchinopsis kostromiensis (V) probably reworked
Oligosphaeridium complex (F)
Sirmiodinium grossi (V)

Remarks. Some reworked Berriasian - Valanginian (P-M20) dinocysts.

TAI = 3.0 - 3.5

05) 93-RKC-22-71B

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Forams. Barren of Foraminifera.
Pyrite (R)

Washed lith. Dark brownish-gray to gray well indurated sandstone.

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian - Barremian

Zone. Probable P-M19

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Classopollis classoides (F)
Gleicheniidites senonicus (R)
Hymenozonotriletes lepidophytus (R) reworked
Lycopodiumsporites spp. (R)
Borecysta butticula (V)
Cochteodinia villosa (V) probably reworked
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (R)
Sentusidinium rioultii (R)

Remarks. Minor amount of reworked Berriasian - Valanginian (P-M20) dinocysts.

TAI = 3.0 - 3.5

06) 93-RKC-22-72A

FORAMINIFERA

Age. Early Cretaceous
Possible Neocomian (Undiff.)

Environment. Distal (Starved Basin)

Forams. Barren of Foraminifera.

Paper shale (A)

Washed lith. Dark brownish-gray to black paper shale.

Discussion. Based on lithology only.

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian - Barremian

Zone. Probable P-M19

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Classopollis classoides (F)
Excsipollenites tumulus (R)
Lycopodiumsporites spp. (R)
Taxodiaceae (R)
Boreocysta butticula (R)
Cleistosphaeridium spp. (F)
Discorsia nanna (V)
Gochteodinia judilentiniae (V) probably reworked
Nannoceratopsis gracilis (V) reworked
Nannoceratopsis pellucida (R) reworked
Nelchinopsis kostromiensis (F) probably reworked
Oligosphaeridium complex (A)
Sirmiodinium grossi (R) probably reworked
Tubotuberella apatela (R)

Remarks. Frequent reworked Berriasian - Valanginian (P-M20) and some Jurassic (P-M23 and P-M22) dinocysts.
TAI = 3.0 - 3.5

07) 93-RKC-22-138-A

FORAMINIFERA

Age. Early Cretaceous
Possible Neocomian (Undiff.)

Environment. Distal (Starved Basin)

Forams. Barren of Foraminifera.
Paper shale (F)

Washed lith. Dark brownish-gray to black paper shale.

Discussion. Based on lithology only.

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian - Barremian

Zone. Probable P-M19

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Aequitriradites spinulosus (V)
Cicatricosisporites australiensis (R)
Cicatricosisporites spp. (R)
Classopollis classoides (F)
Densosporites sp. (V) reworked
Exesipollenites tumulus (R)
Gleicheniidites senonicus (R)
Lycopodiumsporites spp. (R)
Osmundacidites spp. (R)
Cardodinium trabeculosum (F)
Hystrichodinium voigtii (V)
Nannoceratopsis gracilis (V) reworked
Nannoceratopsis pellucida (R) reworked
Nelchinopsis kostromiensis (R) probably reworked
Oligosphaeridium complex (A)

Remarks. Some reworked Berriasian - Valanginian (P-M20) and Jurassic (P-M23 and P-M22) dinocysts.

TAI = 3.0 - 3.5

08) 93-RKC-22-153-A

FORAMINIFERA

Age. Early Cretaceous
Possible Neocomian (Undiff.)

Environment. Distal (Starved Basin)

Forams. Barren of Foraminifera.
Paper shale (F)

Washed lith. Dark brownish-gray to black paper shale.

Discussion. Based on lithology only.

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian - Barremian

Zone. Probable P-M19

Environment. Marine

Palynomorphs.
Undifferentiated gymnosperm pollen (A)
Classopollis classoides (F)
Contignisporites cooksonii (R)
Densosporites spp. (R) reworked
Lycopodiumsporites spp. (R)
Trilobosporites cf. T. apiverrucatus (V)
Borecysta butticula (C)
Chytroeisphaeridia pericompsa (F) reworked
Cleistosphaeridium spp. (R)
Cyclonephelium distinctum (C)
Discorsia nanna (V)
Cardodinium trabeculosum (R)
Hystrichodinium voigtii (F)
Micrhystridium spp. (F)
Muderongia tetracantha (R)
Nannoceratopsis gracilis (V) reworked
Nelchinopsis kostromiensis (F) probably reworked
Oligosphaeridium complex (A)
Sentusidinium rioultii (V)

Remarks.
Frequent reworked Berriasian - Valanginian (P-M20) and Jurassic (P-M23 and P-M22) dinocysts.
TAI = 3.0 - 3.5

09) 93-Ha-153

FORAMINIFERA

Age.
Early Cretaceous
Possible Neocomian (Undiff.)

Environment. Distal (Starved Basin)

Forams.
Barren of Foraminifera.
Paper shale (C)

Washed lith.
Dark brownish-gray to black paper shale.

Discussion.
Based on lithology only.

PALYNOLOGY

Age.
Early Cretaceous
Hauterivian - Barremian

Zone.
P-M19

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (F)
Classopollis classoides (R)
Taxodiaceae (R)
Cardodinium trabeculosum (R)
Oligosphaeridium complex (F)

Remarks. TAI = 3.0

10) 93-Mu-80

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Forams. Barren of Foraminifera.
Megaspores (R)
Paper shale (F)

Washed lith. Dark brownish-gray to black shale.

PALYNOLOGY

Age. Early Cretaceous
Possible Neocomian (Undiff.)

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Classopollis classoides (V)
Lycopodiumsporites sp. (V)
Cyclonephelium distinctum (V)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (V)

Remarks. TAI = 2.3 - 2.5

11) 93-Mu-84

FORAMINIFERA

Age. Early Cretaceous
Probable Berriasian to Valanginian

Zone. F-13 to F-14

Environment. Outer Neritic to Bathyal

Forams.	Gaudryina milleri (R) Haplophragmoides coronis (R) Trochamminoides sp. (X)
Washed lith.	Dark gray shale and dark red hematitic? shale.

PALYNOLOGY

Age.	Early Cretaceous Berriasian - Valanginian
Zone.	P-M20
Environment.	Marine
Palynomorphs.	Gleicheniidites senonicus (R) Bourkidinium sp. (V) Cyclonephelium distinctum (A) Gonyaulacysta sp. G (granular) (A) Nelchinopsis kostromiensis (F) Oligosphaeridium complex (thick-wall) (F) Sverdrupiella usitata (V) reworked
Remarks.	TAI = 2.5 - 3.0

12) 93-Mu-86-1

FORAMINIFERA

Age.	Indeterminate
Environment.	Indeterminate
Forams.	Barren of Foraminifera. Megaspores (R)
Washed lith.	Dark red hematitic? shale.

PALYNOLOGY

Age.	Early Cretaceous Neocomian (Undiff.)
Environment.	Marine
Palynomorphs.	Cyclonephelium distinctum (A) Oligosphaeridium complex (thick-wall) (A)

Tanyosphaeridium cf. T. variecalamum (F)

Remarks. TAI = 3.0

13) 93-Mu-87

FORAMINIFERA

Age. Early Cretaceous
Possible Neocomian (Undiff.)

Environment. Distal (Starved Basin)

Forams. Barren of Foraminifera.
Paper shale (F)
Pyrite (F)

Washed lith. Dark brownish-gray to black paper shale.

Discussion. Based on lithology only.

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Classopollis classoides (V)
Stereisporites sp. (V)

Remarks. Relatively sparse organics.
TAI = 3.0?

14) 93-Mu-93

FORAMINIFERA

Age. Early Cretaceous
Possible Neocomian (Undiff.)

Environment. Distal (Starved Basin)

Forams. Barren of Foraminifera.
Paper shale (A)
Mica (F)

Washed lith. Dark brownish-gray to black slightly silty paper shale.

Discussion. Based on lithology only.

PALYNOLOGY

Age.	Early Cretaceous Probable Berriasian - Valanginian
Zone.	Probable P-M20
Environment.	Marine
Palynomorphs.	Undifferentiated gymnosperm pollen (F) Cyclonephelium distinctum (R) Conyaulacysta sp. G (granular) (R) Sverdrupiella usitata (V) reworked Tanyosphaeridium cf. T. variecalamum (V)
Remarks.	TAI = 2.3 - 2.5

15) 93-Mu-93-1

FORAMINIFERA

Age.	Early Cretaceous Possible Neocomian (Undiff.)
Environment.	Distal (Starved Basin)
Forams.	Barren of Foraminifera. Paper shale (A) Mica (F) Tar (R)
Washed lith.	Dark brownish-gray to black paper shale.
Discussion.	Based on lithology only.

PALYNOLOGY

Age.	Early Cretaceous Undifferentiated
Environment.	Marine
Palynomorphs.	Densosporites spp. (R) reworked Cyclonephelium distinctum (V) Oligosphaeridium complex (R)
Remarks.	TAI = 2.3 - 2.5

16) 93-Mu-99

FORAMINIFERA

Age.	Early Cretaceous Probable Hauterivian to Barremian
Zone.	F-12 to F-13
Environment.	Marine (Undiff.)
Forams.	Bathysiphon granulocoelia (X) Haplophragmoides coronis (R) Haplophragmoides duoflatis (R) Fecal pellets? (F)
Washed lith.	Dark gray to black slightly silty shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Undifferentiated gymnosperm pollen (F)
Remarks.	TAI = 3.0 - 3.5

17) 93-Mu-100

FORAMINIFERA

Age.	Indeterminate
Environment.	Indeterminate
Forams.	Barren of Foraminifera.
Washed lith.	Dark gray to black slightly silty shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Essentially barren of palynomorphs.
Remarks.	Relatively sparse organics. TAI = 3.0?

18) 93-Mu-101

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Forams. Barren of Foraminifera.

Washed lith. Dark gray to black slightly silty shale.

PALYNOLOGY

Age. Possible Early Cretaceous
Possible Neocomian (Undiff.)

Environment. Marine?

Palynomorphs. Undifferentiated gymnosperm pollen (R)
Oligosphaeridium complex (thick-wall) (V)

Remarks. TAI = 3.0

19) 93-Mu-101-1

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Forams. Barren of Foraminifera.
Paper shale (F)

Washed lith. Dark gray to black shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. ?Densosporites spp. (R)

Remarks. TAI = 3.5?

20) 93-Mu-104

FORAMINIFERA

Age.	Early Cretaceous Probable Neocomian (Undiff.)
Environment.	Marine (Undiff.)
Forams.	Glomospirella arctica (R) Paper shale (F) Slickensides (C)
Washed lith.	Dark gray to black slickensided shale.

PALYNOLOGY

Age.	Possible Early Cretaceous Possible Neocomian (Undiff.)
Environment.	Marine
Palynomorphs.	Oligosphaeridium complex (thick-wall) (V)
Remarks.	Very sparse organics. TAI = 3.5?

21) 93-Mu-104-3

FORAMINIFERA

Age.	Indeterminate
Environment.	Indeterminate
Forams.	Barren of Foraminifera. Paper shale (C)
Washed lith.	Dark gray shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Marine
Palynomorphs.	Classopollis classoides (R) Taeniaesporites spp. (C) probably reworked Micrhystridium spp. (A)
Remarks.	TAI = 3.0 - 3.5. The apparently reworked grains are Triassic-age striated bisaccate forms.

22) 93-Mu-104-5

FORAMINIFERA

Age.	Early Cretaceous Probable Hauterivian to Barremian
Zone.	F-12 to F-13
Environment.	Probable Outer Neritic to Bathyal
Forams.	Ammobaculites reophacoides (R) Ammodiscus sp. (small, thin) (R) Bathysiphon granulocoelia (F) Gravellina sp. (small) (X) Haplophragmoides coronis (R) Haplophragmoides duoflatis (X) Trochammina conicominuta (X) Fish debris (R) Paper shale (F) Rounded frosted quartz floaters (A)
Washed lith.	Dark red sandy hematitic? shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Marine?
Palynomorphs.	Micrhystridium spp. (R)
Remarks.	Very sparse organics. TAI = 3.0?

Interpreted by:

Michael B. Mickey	Hideyo Haga
Foraminifera	Palynology
MICROPALEO CONSULTANTS, INC.	MICROPALEO CONSULTANTS, INC.

MBM:HH:be

December 2, 1996

TO: Gil Mull
State of Alaska, Department of Natural Resources
Division of Geological and Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, Ak 99709-3645

SUBJECT: Re-examination of some palynology preparations from outcrop samples in January 21, 1994 report.

Introductory Summary

This report summarizes the findings from the re-examination of selected palynology slides from an earlier study conducted by Micropaleo Consultants, Inc. The pervious report was dated January 21, 1994 and included 22 outcrop samples. Four(4) samples were re-studied from the 93RKC series. These samples are plotted on Figure 3 in the D.G.G.S. Public Data File 95-31.

Results

The reported palynomorph abundances represent the following quantities: V = very rare (single specimen), R = rare (2-5 specimens), F = frequent (6-15 specimens), C = common (16-30 specimens) and A = abundant (greater than 30 specimens). An asterisk (*) denotes reworked forms.

PALYNOLOGY

04) 93-RKC-22-43A

Age. Early Cretaceous
Valanginian

Zone. P-M20

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Cicatricosisporites sp. (R)
Classopollis classoides (F)
Deltoidospora spp. (R)
Densosporites sp. (V)*
Exesipollenites tumulus (R)
Gleicheniidites senonicus (F)
Hymenozonotriletes lepidophytus (V)*

Lycopodiumsporites sp. (V)
Osmundacidites sp. (R)
Taxodiaceae (V)
Trilobosporites cf. *T. apiverrucatus* (R)
?*Gardodinium trabeculosum* (V)
Gochteodinia villosa (R)
Nelchinopsis kostromiensis (R)
Oligosphaeridium complex (F)
Sirmiodinium grossi (V)

Remarks. Rare reworked Paleozoic spores.

TAI = 3.0 - 3.5

05) 93-RKC-22-71B

Age. Early Cretaceous
Valanginian

Zone. P-M20

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Classopollis classoides (F)
Gleicheniidites senonicus (R)
Hymenozonotriletes lepidophytus (R)*
Lycopodiumsporites spp. (R)
Boreocysta butticula (V)
Clathroctenocystis elegans (V)
Cleistosphaeridium spp. (R)
Osmundacidites spp. (R)
Cleistosphaeridium sp. (V)
Gochteodinia villosa (V)
Gonyaulacysta sp. G (V)
Nannoceratopsis gracilis (V)*
Nannoceratopsis pellucida (V)*
?*Nelchinopsis kostromiensis* (R) poor preservation
Oligosphaeridium complex (F)
O. complex (thick-wall) (R)
Sentusidinium rioultii (R)

Remarks. Some reworked Paleozoic spores and Jurassic dinocysts.

TAI = 3.0+

06) 93-RKC-22-72A

Age. Early Cretaceous
Valanginian

Zone. P-M20

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Classopollis classoides (F)
Densosporites spp. (R)*
Exesipollenites tumulus (R)
Lycopodiumsporites spp. (R)
Taxodiaceae (R)
Trilobosporites spp. (R)
Clathroctenocystis elegans (R)
Cleistosphaeridium spp. (F)
Discorsia nanna (V)
Cleistosphaeridium sp. (V)
Gochteodinia judilentiniae (V)
Gonyaulacysta sp. G (V)
Nannoceratopsis gracilis (V)*
Nannoceratopsis pellucida (R)*
Nelchinopsis kostromiensis (F)
Oligosphaeridium complex (A)
Sirmiodinium grossi (R)
Tubotuberella apatela (R)

Remarks. Some reworked Paleozoic spores and Jurassic dinocysts.

TAI = 3.0+

07) 93-RKC-22-138-A

Age. Early Cretaceous
Probable Hauterivian - Barremian

Zone. Probable P-M19

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Aequitriradites spinulosus (V)
Cicatricosisporites australiensis (R)
Cicatricosisporites spp. (F)
Classopollis classoides (F)
Contignisporites cooksonii (V)
Deltoidospora spp. (R)
Densosporites spp. (F)*
Exesipollenites tumulus (R)
Gleicheniidites senonicus (R)
Lycopodiumsporites spp. (R)
Osmundacidites spp. (R)
Trilobosporites spp. (R)
Chytroeisphaeridia pericompsa (R)*
Clathroctenocystis elegans (R)

Cleistosphaeridium spp. (R)
Gardodinium trabeculosum (F)
Hystrichodinium voigtii (V)
Micrhystridium spp. (R)
Nannoceratopsis gracilis (V)*
Nannoceratopsis pellucida (R)*
Nelchinopsis kostromiensis (R)*?
Oligosphaeridium complex (A)
?*Suessia swabiana* (V)*

Remarks. Some reworked Paleozoic spores and Triassic(?), Jurassic, and possibly Valanginian dinocysts.

Overall palynomorph assemblage appears to be Berriasian-Valanginian, however, the frequent presence of *G. trabeculosum* suggests a Hauterivian-Barremian age.

TAI = 3.0+

Hideyo Haga

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

BIOSTRATIGRAPHIC REPORT

OF

12 OUTCROP SAMPLES FROM NORTH SLOPE, ALASKA

(D.O. 214873)

Job No. 93-101 April 11, 1994

April 11, 1994

TO: State of Alaska, Department of Natural Resources
Division of Geological and Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, Alaska 99709-3645

Attention: Gill Mull

SUBJECT: Biostratigraphic Report - Twelve (12) Outcrop Samples from Tingmerkpuk Area, Alaska. (D.O. #214873)

Introductory Summary

A total of 12 outcrop samples from the Tingmerkpuk Area in the Western Brooks Range were processed and analyzed for Foraminifera or palynomorphs.

The rock material was crushed prior to processing for microfossil extraction.

The foraminiferal preparation was made with standard procedures. This process involved boiling the material in Quaternary-O and washing over 20 and 200 mesh screens. A representative fauna and washed lithology were then picked into slides for examination.

The palynology preparation was made using hydrochloric and hydrofluoric acid treatments. The resultant organic residues were further concentrated by a heavy liquid separation, sonification and a sieving/panning technique. Permanent slide mounts were made for each sample.

Results

The interpretations for the age, zone and environment of deposition are given for each discipline. A list of the recovered microfossils is provided for each sample. The foraminiferal analysis also includes the washed lithology description. The palynological analysis also includes the thermal alteration index (T.A.I.).

The foraminiferal abundances reported in this section represent the following quantities: X = very rare (single specimen), R = rare (2-10 specimens), F = frequent (11 - 32 specimens), C = common (33-99) specimens) and A = abundant (100+ specimens).

The reported palynomorph abundances represent the following quantities: V = very rare (single specimen), R = rare (2-5 specimens), F = frequent (6-15 specimens), C = common (16-30 specimens) and A = abundant (greater than 30 specimens).

MCI #	DGGS SAMPLE NO.	PALEONTOLOGIC AGE	ENVIRONMENT	LOCATION	FORMATION	QUADRANGLE	LAT	LONG
1	93 Mu-88-1	Foraminifera- Probable Barremian to Aptian	Probable Bathyal (Slope)	Tingmerkpuk River	Kt	Delong Mtn C1	68.686	-162.258
2	93 Mu-89	Foraminifera- Probable Barremian to Aptian	Probable Bathyal (Slope)	Tingmerkpuk River	Kto	Delong Mtn C1	68.681	-162.332
3	93 Mu-95	Foraminifera- Indeterminate	Indeterminate	Eagle Creek	K1	Delong Mtn C1	68.685	-162 663
4	93 Mu-96	Foraminifera- Probable Barremian to Aptian	Probable Bathyal (Slope)	Tingmerkpuk River tributary	Kto	Delong Mtn C1	68.688	-162.42
5	93 Mu-97	Foraminifera- Probable Barremian to Aptian	Probable Bathyal (Slope)	Tingmerkpuk River gully	Kto	Delong Mtn C1	68 677	-162.363
6	93 Mu-99-1	Foraminifera- Indeterminate	Indeterminate	Eagle Creek	Kto	Delong Mtn C1	68.702	-162.486
7	93 Mu-100-1	Foraminifera- Probable Barremian to Aptian	Probable Bathyal (Slope)	Eagle Creek	Kto	Delong Mtn C1	68.684	-162.542
8	93 MM 15-A	Palynology- Indeterminate	Indeterminate	Kukpowruk River	Torok	Delong Mtn C2	68 507	-162 89
9	93 MM 15-B	Palynology- Early Cretaceous Undifferentiated	Marine	Kukpowruk River	Torok	Delong Mtn C2	68 507	-162.89
10	93 MM 15-C	Palynology- Early Cretaceous Undifferentiated	Marine	Kukpowruk River	Torok	Delong Mtn C2	68.507	-162 89
11	93 MM 15-D	Palynology- Indeterminate	Indeterminate	Kukpowruk River	Torok	Delong Mtn C2	68.507	-162.89
12	93 MM 15-E	Palynology- Indeterminate	Indeterminate	Kukpowruk River	Torok	Delong Mtn C2	68 507	-162.89

NOTE: Table compiled by C.G.Mull 12/97

01) 93Mu-88-1

FORAMINIFERA

Age.	Early Cretaceous Probable Barremian to Aptian
Zone.	F-11
Environment.	Probable Bathyal (Slope)
Fauna.	Ammobaculites fragmentarius (R) arenaceous spp. (F) Bathysiphon vitta (R)
Washed lith.	Dark brownish-gray slightly silty shale.

02) 93Mu-89

FORAMINIFERA

Age.	Early Cretaceous Probable Barremian to Aptian
Zone.	F-11
Environment.	Probable Bathyal (Slope)
Fauna.	Ammobaculites fragmentarius (F) arenaceous spp. (F) Bathysiphon granulocoelia (R) Haplophragmoides topagorukensis (F)
Washed lith.	Dark brownish-gray slightly silty shale.

03) 93Mu-95

FORAMINIFERA

Age.	Indeterminate
Environment.	Indeterminate
Fauna.	Barren of Foraminifera.
Washed lith.	Dark gray shale.

04) 93Mu-96

FORAMINIFERA

Age.	Early Cretaceous Probable Barremian to Aptian
Zone.	F-11
Environment.	Probable Bathyal (Slope)
Fauna.	arenaceous spp. (R) Bathysiphon granulocoelia (R) Bathysiphon vitta (F)
Washed lith.	Dark brownish-gray shale.

05) 93Mu-97

FORAMINIFERA

Age.	Early Cretaceous Probable Barremian to Aptian
Zone.	F-11
Environment.	Probable Bathyal (Slope)
Fauna.	arenaceous spp. (R) Haplophragmoides excavata (X)
Washed lith.	Dark brownish-gray shale.

06) 93Mu-99-1

FORAMINIFERA

Age.	Indeterminate
Environment.	Indeterminate
Fauna.	Barren of Foraminifera.
Washed lith.	Dark brownish-gray shale.

07) 93Mu-100-1

FORAMINIFERA

Age.	Early Cretaceous Probable Barremian to Aptian
Zone.	F-11
Environment.	Probable Bathyal (Slope)
Fauna.	arenaceous spp. (F) Bathysiphon granulocoelia (R) Haplophragmoides gigas (X) Hippocrepina barksdalei (X)
Washed lith.	Dark gray shale.

Interpreted by:

Michael B. Mickey
Foraminifera
MICROPALEO CONSULTANTS, INC.

08) 93-MM-15-A

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Undifferentiated gymnosperm pollen (F) Densosporites spp. (R) reworked Indeterminate spores (poor preservation) (F)
Remarks.	Sparse organics. TAI = 2.3 - 2.5

09) 93-MM-15-B

PALYNOLOGY

Age.	Early Cretaceous Undifferentiated
Environment.	Marine
Palynomorphs.	Undifferentiated gymnosperm pollen (A) Camarozonosporites insignis (V) Densosporites spp. (R) ?Bourkidinium sp. (V) Oligosphaeridium complex (V) Tubotuberella apatela (V)
Remarks.	TAI = 2.3 - 2.5

10) 93-MM-15-C

PALYNOLOGY

Age.	Early Cretaceous Undifferentiated
Environment.	Marine
Palynomorphs.	Undifferentiated gymnosperm pollen (R) Densosporites spp. (F) Cyclonephelium distinctum (V) Cardodinium trabeculosum (V) Oligosphaeridium complex (V)
Remarks.	TAI = 2.3 - 2.5

11) 93-MM-15-D

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Barren of palynomorphs.
Remarks.	Sparse organics. TAI = ?

12) 93-MM-15-E

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Indeterminate spores (R)
Remarks.	Thick fusinitic organics. TAI = ?

Interpreted by:

Hideyo Haga
Palynology
MICROPALEO CONSULTANTS, INC.

MBM:HH:be

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

BIOSTRATIGRAPHIC REPORT

OF

3 OUTCROP SAMPLES FROM NORTH SLOPE, ALASKA

(D.O. 214873)

Job No. 94-101 May 24, 1994

May 24, 1994

TO: Gill Mull
State of Alaska, Department of Natural Resources
Division of Geological and Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, Alaska 99709-3645

SUBJECT: Biostratigraphic Report - Three (3) Outcrop Samples from Tingmerkpuk Area, Alaska. (D.O. #214873)

Introductory Summary

Three (3) outcrop samples from the Tingmerkpuk Mountain area in Alaska were processed and analyzed for Foraminifera and palynomorphs.

The rock material was crushed prior to processing for microfossil extraction.

The foraminiferal preparation was made with standard procedures. This process involved boiling the material in Quaternary-O and washing over 20 and 200 mesh screens. A representative fauna and washed lithology were then picked into slides for examination.

The palynology preparation was made using hydrochloric and hydrofluoric acid treatments. The resultant organic residues were further concentrated by a heavy liquid separation, sonification and a sieving/panning technique. Permanent slide mounts were made for each sample.

Results

The interpretations for the age, zone and environment of deposition are given for each discipline. A list of the recovered microfossils is provided for each sample. The foraminiferal analysis also includes the washed lithology description. The palynological analysis also includes the thermal alteration index (T.A.I.).

The foraminiferal abundances reported in this section represent the following quantities: V = very rare (single specimen), R = rare (2-10 specimens), F = frequent (11 - 32 specimens), C = common (33-99) specimens) and A = abundant (100+ specimens).

The reported palynomorph abundances represent the following quantities: V = very rare (single specimen), R = rare (2-5 specimens), F = frequent (6-15 specimens), C = common (16-30 specimens) and A = abundant (greater than 30 specimens).

MCI #	DGGS SAMPLE NO.	PALEONTOLOGIC AGE	ENVIRONMENT	LOCATION	FORMATION	QUADRANGLE	LAT	LONG
1	93 RKC 22-71A	Foraminifera- Indeterminate Palynology- Hauterivian-Barremian	Indeterminate Marine	Tingmerkpuk Mtn	Kti	Delong Mt C1	68 567	-162.463
2	93 RKC 22-10	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Indeterminate	Tingmerkpuk Mtn	Kti	Delong Mt C1	68.567	-162.463
3	93 RKC 22-129.5	Foraminifera- Indeterminate Palynology- Probable Neocomian (Undiff.)	Indeterminate Marine	Tingmerkpuk Mtn	Kti	Delong Mt C1	68.567	-162.463

NOTE: Table compiled by C.G.Mull 12/97

01) 93RKC-22-71A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed lith. Dark brownish-gray very fine grained quartzitic sandstone or siltstone.

PALYNOLOGY

Age. Early Cretaceous
Hauterivian - Barremian

Zone. P-M19

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Cicatricosisporites sp. (V)
Classopollis classoides (R)
Densosporites sp. (V) reworked
Hymenozonotriletes lepidophytus (V) reworked
Trilobosporites sp. (V)
Clathroctenocystis elegans (V)
Gonyaulacysta sp. G. (granular) (R) reworked
Muderongia cf. M. simplex (R) reworked
Nelchinopsis kostromiensis (R) reworked
Oligosphaeridium complex (C)
Oligosphaeridium complex (thick-wall) (R)
Sentusidinium rioultii (F)

Remarks. Frequent reworked Berriasian - Valanginian (P-M20) dinocysts.

TAI = 2.7

02) 93RKC-22-10

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Pyrite (R)

Washed lith. Dark maroon siliceous shale.

PALYNOMORPHS

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of identifiable palynomorphs.

Remarks. Organic material is very poorly preserved.

TAI = 3.0

03) 93RKC-129.5

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed lith. Dark brownish-gray quartzitic siltstone or siliceous shale.

PALYNOLOGY

Age. Early Cretaceous
Probable Neocomian (Undiff.)

Zone. Probable P-M19 or P-M20

Environment. Marine

Palynomorphs. Oligosphaeridium complex (R)
Sentusidinium rioultii (R)

Remarks. Poor preservation of organics.

TAI = 2.5

Interpreted by:

Michael B. Mickey
Foraminifera
MICROPALEO CONSULTANTS, INC.

Hideyo Haga
Palynology
MICROPALEO CONSULTANTS, INC.

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

BIOSTRATIGRAPHY REPORT

OF

16 OUTCROP SAMPLES FROM THE TINGMERKPUK PROJECT AREA

NORTH SLOPE, ALASKA

Job No. 95-101July 12, 1995

July 12, 1995

TO: Gil Mull
State of Alaska, Department of Natural Resources
Division of Geological and Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, Alaska 99709-3645

SUBJECT: Biostratigraphy Report - Tingmerkpuk Project Outcrop Samples from North Slope, Alaska.

Introductory Summary

A total of 16 outcrop samples from the Tingmerkpuk Project Area were submitted for biostratigraphic analysis. Of this total, 10 samples were prepared for Foraminifera and 16 samples were prepared for palynomorph analyses.

The rock material was crushed prior to processing for microfossil extraction.

The foraminiferal preparation was made with standard procedures. This process involved boiling the material in Quaternary-O and washing over 20 and 200 mesh screens. A representative fauna and washed lithology were then picked into slides for examination.

The palynology preparation was made using hydrochloric and hydrofluoric acid treatments. The resultant organic residues were further concentrated by a heavy liquid separation, sonification and a sieving/panning technique. Permanent slide mounts were made for each sample.

Results

The interpretations for the age, zone and environment of deposition are given for each discipline. A list of the recovered microfossils is provided for each sample. The foraminiferal analysis also includes a washed lithology description. The palynological analysis also includes the thermal alteration index (T.A.I.) estimate.

The foraminiferal abundances represent the following quantities: X = very rare (single specimen), R = rare (2 - 5 specimens), F = few (6 - 25 specimens), C = common (26 - 100) specimens), A = abundant (101 - 999 specimens) and P = prolific (1000+ specimens).

The reported palynomorph abundances represent the following quantities: V = very rare (single specimen), R = rare (2 - 5 specimens), F = frequent (6 - 15 specimens), C = common (16 - 30 specimens) and A = abundant (greater than 30 specimens). An asterisk (*) denotes reworked forms.

MCI #	DGGS SAMPLE NO.	LOCATION	FORMATION	PALEONTOLOGIC AGE	ENVIRONMENT	QUADRANGLE	LAT	LONG
1	94 Mu 48	W. of Kokolik River	K?	Palynology- Possible Aptian-Albian	Marine	Delong Mtn C1	68.576	-162.18
2	94 Mu 51	Spike Ck.	Kmk	Palynology- Indeterminate	Indeterminate	Misheguk Mtn C5	68.693	-161.76
3	94 Mu 55	Iligluruk Ck.	Kb	Palynology- Indeterminate	Indeterminate	Misheguk Mtn C5	68.678	-161.549
4	94 Mu 56	Spike Ck.	Kb	Palynology- Indeterminate	Indeterminate	Misheguk Mtn C5	68.639	-161.775
5	94 Mu 42	S.E. Tingmerkpuk	Kbl	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Indeterminate	Delong Mtn C1	68 554	-162 419
6	94 Mu 43	Tingmerkpuk	Kbl	Foraminifera- Indeterminate Palynology- Jurassic-Cretaceous Undifferentiated	Indeterminate Nonmarine?	Delong Mtn C1	68 562	-162 376
7	94 Mu 43-1	Tingmerkpuk	Kbl	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Indeterminate	Delong Mtn C1	68 562	-162 376
8	94 Mu 50	Iligluruk Ck.	Kb	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Indeterminate	Misheguk Mtn C5	68.684	-161 692
9	94 Mu 60	Kukpowruk Tributary	Kbl	Foraminifera- Indeterminate Palynology- Possible Hauterivian-Barremian	Indeterminate Marginal Marine	Delong Mtn C1	68.484	-162.775
10	94 RR 67A	1 mi. E. Kukpowruk R.	Kb	Palynology- Possible Hauterivian-Barremian	Marine	Delong Mtn C1	68.483	-162.786
11	94 RR 68A	3/4 mi. E. Kukpowruk R.	Kb	Palynology- Probable Hauterivian-Barremian	Marine	Delong Mtn C1	68.48	-162 79
12	94 Mu 53-1	Ilingnorak Ridge		Foraminifera- Possible Neocomian Palynology- Indeterminate	Indeterminate Nonmarine?	Misheguk Mtn C5	68.71	-161.503
13	94 Mu 64	N. Tingmerkpuk Mtn.	KJk	Foraminifera- Probable Hauterivian to Barremian Palynology- Neocomian (Undifferentiated)	Outer Neritic to Bathyal Marine	Delong Mtn C1	68.566	-162.473
14	94 Mu 47	W. Kokolik	Tr or J?	Foraminifera- Indeterminate Palynology- Jurassic-Cretaceous Undifferentiated	Indeterminate Marginal Marine	Delong Mtn C1	68.58	-162.122
15	94 Mu 47-1	W. of Kokolik River	KJk?	Foraminifera- Indeterminate Palynology- Possible Jurassic-Cretaceous Undiff.	Indeterminate Marginal Marine	Delong Mtn C1	68.58	-162.122
16	94 Mu 47-2	W. of Kokolik	Kjk?	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Marginal Marine	Delong Mtn C1	68.58	-162.122

NOTE: Table compiled by C.G.Mull 12/97

01) 94 Mu 48

PALYNOLOGY

Age. Probable Early Cretaceous
Possible Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (C)
Calamospora sp. (V) *
Densosporites spp. (F) *
Endosporites spp. (R) *
Hymenozonotriletes lepidophytus (R) *
Lycospora sp. (V) *
Vitreisporites pallidus (R)
Cyclonephelium distinctum (R)
Gonyaulacysta sp. C (V) *
Odontochitina operculata (R)
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (C) *?
Sverdrupiella usitata (V) *

Remarks. T.A.I. = 2.5

The palynomorph assemblage represents a mixture of ages, and most of the forms appear to be reworked.

By selecting particular dinocyst forms as being indigenous, a possible Hauterivian - Barremian may be assigned. However, this assemblage would differ from the typically diverse assemblages that are recovered from Hauterivian - Barremian strata.

The mixture seen here is more commonly recovered from the Torok Formation.

02) 94 Mu 51

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Essentially barren of palynomorphs.

Remarks. Mostly thick, coaly organic fragments.

T.A.I. = 2.5?

03) 94 Mu 55

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Undifferentiated gymnosperm pollen (V)

Remarks. Mostly thick, coaly organics.

T.A.I. = 2.5?

04) 94 Mu 56

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

Remarks. Mostly thick, coaly organics.

T.A.I. = ?

05) 94 Mu 42

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed lith. Dark brownish-gray to black micaceous shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Indeterminate spore fragment (V)

Remarks. Mostly thick, coaly organics.

T.A.I. = 3.0?

06) 94 Mu 43

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed lith. Dark brownish-gray slightly micaceous shale.

PALYNOLOGY

Age. Jurassic - Cretaceous Undifferentiated

Environment. Nonmarine?

Palynomorphs. Undifferentiated gymnosperm pollen (V)
Classopollis classoides (F)
Gleicheniidites senonicus (R)
Indeterminate psilate spore (R)

Remarks. Mostly thick, coaly organics.

T.A.I. = 2.5

07) 94 Mu 43-1

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Slickensides (F)

Washed lith. Dark brownish-gray slightly micaceous slickensided shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

Remarks. Mostly thick, coaly organics.

T.A.I. = 3.0?

08) 94 Mu 50

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed lith. Dark brownish-gray to black slightly micaceous shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

Remarks. Mostly thick, coaly organics.

T.A.I. = 2.5?

09) 94 Mu 60

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Slickensides (F)

Washed lith. Dark brownish-gray to black slightly micaceous slickensided shale.

PALYNOLOGY

Age. Early Cretaceous
Possible Hauterivian - Barremian

Environment. Marginal Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Densosporites spp. (F) *
Lycopodiumsporites sp. (V)
Rogalskaisporites cicatricosus (V)
Tubotuberella apatela (V) *?
Tubotuberella uncinatum (R) *?

Remarks. If the recorded dinocysts are reworked, then an Aptian - Albian age would be probable. The very sparse assemblage may be an indication that these dinocysts are reworked.

Organics consist mainly of gymnosperm pollen.

T.A.I. = 2.7

10) 94 RR 67A

PALYNOLOGY

Age. Early Cretaceous
Possible Hauterivian - Barremian

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Classopollis classoides (R)
Densosporites spp. (R) *
Hymenozonotriletes lepidophytus (V) *
Cyclonephelium distinctum (R)
Gardodinium trabeculosum (R)
Herendeenia alaskaensis (V)
Sentusidinium cuculliformis (R)
Sverdrupiella usitata (V) *

Remarks. The relatively sparse dinocyst assemblage is comprised of species that suggest a Hauterivian -Barremian age, but these species do not represent a complete assemblage. It is possible that most of this assemblage consists of reworked species.

The organic recovery consists mainly of palynomorphs.

T.A.I. = 2.4

11) 94 RR 68A

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian - Barremian

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Densosporites spp. (R) *
Osmundacidites spp. (F)
Gardodinium trabeculosum (A)
Herendeenia alaskaensis (R)
Oligosphaeridium complex (R)

Remarks. The palynomorph recovery in this sample is similar to the above sample. The species diversity is low, however, the abundance of *Gardodinium trabeculosum* and the presence

of *Herendeenia alaskaensis* are consistent with a Hauterivian -Barremian age. The abundance seems to make the possibility of reworking less likely.

The organic recovery consists mainly of palynomorphs.

T.A.I. = 2.4

12) 94 Mu 53-1

FORAMINIFERA

Age. Probable Early Cretaceous
Possible Neocomian

Zone. F-12? to F-14?

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Rounded frosted quartz floating sand grains (R)

Washed lith. Dark gray to black slightly silty shale.

PALYNOLOGY

Age. Indeterminate

Environment. Nonmarine?

Palynomorphs. Undifferentiated gymnosperm pollen (V)

Remarks. Mostly thick, coaly organics.

T.A.I. = 2.5?

13) 94 Mu 64

FORAMINIFERA

Age. Early Cretaceous
Probable Hauterivian to Barremian

Zone. F-12 to F-13

Environment. Outer Neritic to Bathyal

Fauna. *Gaudryina tailleuri* (R)
Haplophragmoides duoflatis (R)

Washed lith. Medium to dark gray shale.

PALYNOLOGY

Age. Early Cretaceous
Neocomian (undifferentiated)

Environment. Marine

Palynomorphs. *Oligosphaeridium complex* (thick-wall) (R)

Remarks. Mostly thick, coaly organics.

T.A.I. = 3.0

14) 94 Mu 47

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Pyrite (R)
Gypsum (F)

Washed lith. Dark brownish-gray to black shale.

PALYNOLOGY

Age. Jurassic - Cretaceous
Undifferentiated

Environment. Marginal Marine

Palynomorphs. Undifferentiated gymnosperm pollen (V)
Indeterminate spore(?) fragments (A)
Classopollis classoides (R)

Densosporites spp. (V) *
Micrhystridium spp. (F)

Remarks. Poorly preserved palynomorphs.

Abundant thick, coaly organics.

T.A.I. = 3.5

15) 94 Mu 47-1

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Gypsum (F)

Washed lith. Dark brownish-gray iron-stained shale.

PALYNOLOGY

Age. Possible Jurassic - Cretaceous Undifferentiated

Environment. Marginal Marine

Palynomorphs. Indeterminate spore(?) fragments (A)
?*Classopollis classoides* (R)
Micrhystridium spp. (F)

Remarks. Poorly preserved palynomorphs.

Abundant thick, coaly organics.

T.A.I. = 3.0+

16) 94 Mu 47-2

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed lith. Dark brownish-gray iron-stained shale.

PALYNOLOGY

Age. Indeterminate

Environment. Marginal Marine

Palynomorphs. Indeterminate spore(?) fragments (A)
Lycospora sp. (V) *
?*Micrhystridium* spp. (R)

Remarks. Poorly preserved palynomorphs.

Mostly woody-fusinitic organics.

T.A.I. = 3.0+

Interpreted by:

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STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

BIOSTRATIGRAPHIC REPORT

OF

OUTCROP SAMPLES FROM NORTH SLOPE, ALASKA

(D.O. 214873)

Job No. 95-101

March 21, 1995

March 21, 1995

TO: Gil Mull
State of Alaska, Department of Natural Resources
Division of Geological and Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, Alaska 99709-3645

SUBJECT: Biostratigraphic Report - Eleven (11) outcrop samples from the western Arctic Slope area, Alaska. (D.O. #214873)

Introductory Summary

A total of 11 outcrop samples from the DeLong Mountain quadrangle of the western Arctic Slope were processed and analyzed for Foraminifera and palynomorphs.

The rock material was crushed prior to processing for microfossil extraction.

The foraminiferal preparation was made with standard procedures. This process involved boiling the material in Quaternary-O and washing over 20 and 200 mesh screens. A representative fauna and washed lithology were then picked into slides for examination.

The palynology preparation was made using hydrochloric and hydrofluoric acid treatments. The resultant organic residues were further concentrated by a heavy liquid separation, sonification and a sieving/panning technique. Permanent slide mounts were made for each sample.

Results

The interpretations for the age, zone and environment of deposition are given for each discipline. A list of the recovered microfossils is provided for each sample. The foraminiferal analysis also includes the washed lithology description. The palynological analysis also includes the thermal alteration index (T.A.I.).

The foraminiferal abundances represent the following quantities: X = very rare (single specimen), R = rare (2 - 5 specimens), F = few (6 - 25 specimens), C = common (26 - 100) specimens), A = abundant (101 - 999 specimens) and P = prolific (1000+ specimens).

The reported palynomorph abundances represent the following quantities: V = very rare (single specimen), R = rare (2 - 5 specimens), F = frequent (6 - 15 specimens), C = common (16 - 30 specimens) and A = abundant (greater than 30 specimens). An asterisk (*) denotes reworked forms.

MCI #	DGGS SAMPLE NO.	PALEONTOLOGIC AGE	ENVIRONMENT	FORMATION	LOCATION	QUADRANGLE	LAT	LONG
1	94 Mu 44	Foraminifera- Probable Berriasian to Valanginian Palynology- Berriasian-Valanginian	Outer Neritic to Bathyal Marine	Kti	Kukpowruk River	Delong Mtn C2	68.485	-162.857
2	94 Mu 59	Foraminifera- Neocomian (Undiff.) Palynology- Indeterminate	Outer Neritic to Bathyal Indeterminate	Kc	Upper Pitmegea	Delong Mtn C4	68.611	-163.847
3	94 Mu 59-1	Foraminifera- Probable Valanginian Palynology- Neocomian (Undifferentiated)	Middle to Outer Neritic Marginal Marine(?)	Kc	Upper Pitmegea	Delong Mtn C4	68.611	-163.847
4	94 Mu 59-2	Foraminifera- Probable Berriasian to Valanginian Palynology- Indeterminate	Middle Neritic to Bathyal Indeterminate		Upper Pitmegea	Delong Mtn C4	68.611	-163.847
5	94 Mu 64-1	Foraminifera- Neocomian (Undiff.) Palynology- Indeterminate	Marine (Undiff.) Indeterminate	Kjk	N. Tingmerkpuk Mtn	Delong Mtn C1	68 566	-162 473
6	94 Mu 72	Foraminifera- Indeterminate Palynology- Hauterivian-Campanian	Indeterminate Marine		Ipewik River	Delong Mtn C5	68.595	-164 425
7	94 Mu 72-1	Foraminifera- Probable Neocomian (Undiff.) Palynology- Probable Hauterivian-Campanian	Indeterminate Marine	Pebble Shale	Ipewik River	Delong Mtn C5	68.595	-164.425
8	94 RR 73-A	Foraminifera- Probable Neocomian (Undiff.) Palynology- Berriasian-Valanginian	Marine (Undiff.) Marginal Marine	Kti	Tingmerkpuk Mtn	Delong Mtn C1	68.569	-162.455
9	94 RR 73-C	Foraminifera- Valanginian to Hauterivian Palynology- Indeterminate	Middle Neritic to Bathyal Indeterminate	Kti	Tingmerkpuk Mtn	Delong Mtn C1	68.569	-162.455
10	94 RR 73-E	Foraminifera- Valanginian to Hauterivian Palynology- Indeterminate	Outer Neritic to Bathyal Probable Marine	Kti	Tingmerkpuk Mtn	Delong Mtn C1	68 569	-162 455
11	94 RR 73-G	Foraminifera- Indeterminate Palynology- Probable Hauterivian-Barremian	Indeterminate Marine	Kti	N. Tingmerkpuk Mtn	Delong Mtn C1	68.569	-162.455

NOTE: Table compiled by C.G.Mull 12/97

01) 94Mu 44

FORAMINIFERA

Age. Early Cretaceous
Probable Berriasian to Valanginian

Zone. Probable F-13 to F-14

Environment. Outer Neritic To Bathyal

Fauna. Bathysiphon granulocoelia (X)
Gaudryina milleri (X)
Haplophragmoides coronis (X)
Haplophragmoides duoflatis (X)

Washed lith. Dark brownish-gray to black shale.

PALYNOLOGY

Age. Early Cretaceous
Berriasian - Valanginian

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Classopollis classoides (F)
Densosporites spp. (R) *
Gleicheniidites senonicus (F)
Kraeuselisporites sp. (V) *
Pilosisporites trichopapillosus (R)
Trilobosporites spp. (R)
Gochteodinia villosa (R)
Gonyaulacysta sp. G (F)
Micrhystridium spp. (F)
Oligosphaeridium complex (F)
Sirmiodinium grossi (R)

Remarks. T.A.I. = 2.3 - 2.5

02) 94Mu 59

FORAMINIFERA

Age. Early Cretaceous
Neocomian (Undiff.)

Zone. F-12 to F-14

Environment. Outer Neritic To Bathyal

Fauna. Glomospira subarctica (X)

Haplophragmoides coronis (R)
Haplophragmoides duoflatis (R)
Haplophragmoides inflatigrandis (X)
Fish debris (F)

Washed lith. Dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Gleicheniidites senonicus (V)

Remarks. Mostly thick, coaly organic fragments.

T.A.I. = 2.4?

03) 94Mu 59-1

FORAMINIFERA

Age. Early Cretaceous
Probable Valanginian

Zone. Probable F-13

Environment. Middle to Outer Neritic

Fauna. Ammodiscus cf. asperus (R)
Bathysiphon scintillata (R)
Conorboides umiatensis (X)
Dentalina praecommunis (X)
Frondicularia ampulla (X)
Gaudryinella irregularis (X)
Gravellina 1 (X)
Globulina canadensis (X)
Glomospira subarctica (F)
Glomospira arctica (R)
Haplophragmoides coronis (R)
Haplophragmoides duoflatis (R)
Lenticulina muensteri (F)
Lingulina loryi (X)
Nodosaria cf. concinna (X)
Oolina apiculata (R)
Vaginulinopsis grata (R)
Inoceramus prisms (F)
Shell fragments (C)

Washed lith. Dark brownish-gray shelly shale.

PALYNOLOGY

Age. Early Cretaceous
Neocomian (undifferentiated)

Environment. Marginal Marine(?)

Palynomorphs. Oligosphaeridium complex (thick-wall) (F)

Remarks. Mostly thick, coaly organics.

T.A.I. = 2.4 - 2.7

(04) 94Mu 59-2

FORAMINIFERA

Age. Early Cretaceous
Probable Berriasian to Valanginian

Zone. Probable F-13 to F-14

Environment. Middle Neritic to Bathyal

Fauna. Ammodiscus cf. asperus (X)
Gaudryina milleri (X)
Glomospira subarctica (R)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (R)
Inoceramus prisms (R)
Shell fragments (R)

Washed lith. Dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

Remarks. Very sparse organics.

T.A.I. = 2.5?

05) 94Mu 64-1

FORAMINIFERA

Age. Early Cretaceous
Neocomian (Undiff.)

Zone. F-12 to F-14

Environment. Marine (Undiff.)

Fauna. Bathysiphon scintillata (R)
Haplophragmoides coronis (R)
Haplophragmoides duoflatis (R)

Washed lith. Medium to dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs

Remarks. Sparse organics.

T.A.I. = 2.5?

06) 94Mu 72

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed lith. Dark gray to black shale.

PALYNOLOGY

Age. Cretaceous
Hauterivian - Campanian

Environment. Marine

Palynomorphs. Odontochitina operculata (F)

Remarks. Abundant, mostly amorphous, organics.

T.A.I. = 2.3

The limited assemblage provides evidence for only a broad age assignment.

07) 94Mu 72-1

FORAMINIFERA

Age. Probable Early Cretaceous
Probable Neocomian (Undiff.)

Zone. Probable F-12 to F-14

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Tar (F)
Rounded frosted quartz floating sand grains (F)

Washed lith. Black oil? stained shale.

PALYNOLOGY

Age. Cretaceous
Probable Hauterivian - Campanian

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (F)
?Cyclonephelium distinctum (V)
Odontochitina operculata (V)
Oligosphaeridium complex (R)

Remarks. Abundant amorphous and coaly organics.

T.A.I. = 2.3

08) 94RR 73-A

FORAMINIFERA

Age. Probable Early Cretaceous
Probable Neocomian (Undiff.)

Zone. Probable F-12 to F-14

Environment. Marine (Undiff.)

Fauna. Ammobaculites erectus (R)
Inoceramus prisms (R)
Rounded frosted quartz floating sand grains (R)

Washed lith. Dark brownish-gray to black slightly silty shale.

PALYNOLOGY

Age. Early Cretaceous
Berriasian - Valanginian

Environment. Marginal Marine

Palynomorphs. Undifferentiated gymnosperm pollen (F)
Nelchinopsis kostromiensis (R)
?Dingodinium cerviculum (R)

Remarks. T.A.I. = 2.8

09) 94RR 73-C

FORAMINIFERA

Age. Early Cretaceous
Valanginian to Hauterivian

Zone. F-13

Environment. Middle Neritic to Bathyal

Fauna. Ammobaculites erectus (F)
Gaudryina cf. milleri (F)
Gaudryina tailleuri (R)
Glomospirella arctica (R)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (R)
Fish debris (R)

Rounded frosted quartz floating sand grains (R)

Washed lith. Medium to dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Stereisporites sp. (V)

Remarks. Sparse organics.

T.A.I. = 2.8 - 3.0?

10) 94RR 73-E

FORAMINIFERA

Age. Early Cretaceous
Valanginian to Hauterivian

Zone. F-13

Environment. Outer Neritic to Bathyal

Fauna. Ammobaculites fragmentarius (R)
Bathysiphon scintillata (C)
Bathysiphon granulocoelia (F)
Haplophragmoides coronis (R)
Haplophragmoides inflatigrandis (R)

Washed lith. Medium to dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. Probable Marine

Palynomorphs. Undifferentiated gymnosperm pollen (R)
Gleicheniidites senonicus (V)
?Gonyaulacysta sp. fragment (V)

Remarks. Sparse organics.

T.A.I. = 3.0?

11) 94RR 73-G

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Shell fragments (F)

Washed lith. Dark gray shale.

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian - Barremian

Environment. Marine

Palynomorphs. Undifferentiated gymnosperm pollen (A)
Densosporites spp. (C) *
Gleicheniidites senonicus (R)
Lycopodiumsporites spp. (R)
Osmundacidites spp. (R)
Cleistosphaeridium sp. (V)
Cyclonephelium distinctum (R)
Gardodinium trabeculosum (R)
Odontochitina operculata (P)
Oligosphaeridium complex (R)
?Prionodinium alaskense (V)

Remarks. T.A.I. = 2.4

Interpreted by:

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MBM:HH:bc

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

BIOSTRATIGRAPHY REPORT

109 OUTCROP SAMPLES

WESTERN DELONG MOUNTAINS FIELD PARTY

NORTH SLOPE, ALASKA

Job No. 96-118December 4, 1996

December 4, 1996

TO: Gil Mull
State of Alaska, Department of Natural Resources
Division of Geological and Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, Alaska 99709-3645

SUBJECT: Biostratigraphy Report - Western Delong Mountains Field Party Outcrop Samples from North Slope, Alaska.

INTRODUCTORY SUMMARY

A total of 109 outcrop samples from the Western Delong Mountains Field Party was submitted for biostratigraphic analysis of both Foraminifera and palynomorphs. In general, recoveries were much better this year than in past years. We were able to date 99 of the 109 samples (91%) submitted for analysis. We were able to obtain specific dates on 82 (75%) of this year's outcrop samples. Only 17 samples (16%) have "possible" ages or ages spread over more than two stages.

The rock material was crushed prior to processing for microfossil extraction.

The foraminiferal preparation was made with standard procedures. This process involved boiling the material in Quaternary-O and washing over 20 and 200 mesh screens. A representative fauna and washed lithology were then picked into slides for examination.

The palynology preparation was made using hydrochloric and hydrofluoric acid treatments. The resultant organic residues were further concentrated by a heavy liquid separation, sonification and a sieving/panning technique. Permanent slide mounts were made for each sample.

RESULTS

The interpretations for the age, zone and environment of deposition are given for each discipline. A list of the recovered microfossils is provided for each sample. The foraminiferal analysis also includes a washed lithology description.

The palynological analysis also includes the visual estimate of the thermal alteration index (T.A.I.). The relationship of organic alteration parameters to hydrocarbon generation is shown in Figure 1.

The T.A.I. estimations are usually tentative when examining surface sample material. Past studies (Haga, H., unpublished report) have shown that weathered samples taken near the ground surface can contain significantly different organic constituent percentages when compared to unweathered samples taken from the same stratigraphic unit. The weathering can also alter palynomorph coloration through chemical processes. Often the chemical alteration will darken sporomorph walls.

Having stated the above caveats, it appears that most of the T.A.I. values seen in these

MCI #	DGGS SAMPLE NO.	LOCATION	FORMATION	PALEONTOLOGIC AGE	ENVIRONMENT	QUADRANGLE	LAT	LONG
				APTIAN-ALBIAN STRATA				
				TOROK FORMATION, MT. KELLY GRAYWACKE, LOWER BROOKIAN				
69	96 Mu 5	NW of Poko Mtn	Klo ss	Foraminifera- Indeterminate Palynology- Probable Neocomian Undiff.	Indeterminate Marine	Delong Mtn D1	68.883	-162.512
1	96 Ha 4			Foraminifera- Barremian to Aptian Palynology- Probable Aptian-Albian	Marine (Undiff.) Marine	Delong Mtn D2	68.886	-162.827
2	96 Ha 6			Foraminifera- Barremian to Aptian Palynology- Probable Aptian-Albian	Marine (Undiff.) Marine	Delong Mtn D2	68.877	-162.976
3	96 Ha 9	W. of Surprise C.	Klo	Foraminifera- Indeterminate Palynology- Probable Aptian-Albian	Indeterminate Marine	Delong Mtn D2	68 853	-162.953
4	96 Ha 14	W. of Surprise C.	Klo	Foraminifera- Barremian to Aptian Palynology- Cretaceous Undifferentiated	Possible Bathyal-Turbid (Slope) Marine	Delong Mtn D2	68 801	-162.765
5	96 Ha 18	W. of Surprise C.	Klo	Foraminifera- Barremian to Aptian Palynology- Cretaceous Undifferentiated	Possible Bathyal-Turbid (Slope) Marine	Delong Mtn D2	68.854	-162.888
6	96 Ha 21	Eagle Ck.	Klo	Foraminifera- Barremian to Aptian Palynology- Cretaceous Undifferentiated	Possible Bathyal-Turbid (Slope) Marine	Delong Mtn C2	68.738	-163.087
23	96 Ha 66	Spike Creek	Kbl	Foraminifera- Indeterminate Palynology- Probable Aptian-Albian	Indeterminate Marine	Misheguk Mtn C5	68.62	-161.799
70	96 Mu 14	S. flank Driftwood anticline	Klo	Foraminifera- Indeterminate Palynology- Possible Aptian-Albian	Indeterminate Marine	Misheguk Mtn D4	68.837	-161.271
7	96 Ha 22	S. flank Driftwood anticline	Klo	Foraminifera- Indeterminate Palynology- Probable Aptian-Albian	Indeterminate Marine	Misheguk Mtn D4	68.84	-161.255
101	96 TM 25	S. flank Driftwood anticline		Foraminifera- Indeterminate Palynology- Probable Aptian-Albian	Indeterminate Marine	Misheguk Mtn D4	68.838	-161.263
89	96 Mu 38	Lower Iligluruk Ck	Klo	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate No evidence of marine	Misheguk Mtn C5	68.735	-161.822
90	96 Mu 38-1	Lower Iligluruk Ck	Klo	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate No evidence of marine	Misheguk Mtn C5	68.735	-161.822
91	96 Mu 42	Lower Iligluruk Ck	Klo	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate No evidence of marine	Delong Mtn C4	68.64	-164.04
96	96 Mu 54	Upper Pitmegea	Klo	Foraminifera- Probable Barremian to Aptian Palynology- Possible Aptian-Albian	Marine (Undiff.) Marine	Delong Mtn C3	68.681	-163.54
97	96 TM 20A			Foraminifera- Indeterminate Palynology- Cretaceous Undifferentiated	Indeterminate Marine	Delong Mtn D2	68.784	-163.117

NOTE: Table compiled by C.G.Mull 12/97

98	96 TM 21B			Foraminifera- Probable Aptian Palynology- Cretaceous Undifferentiated	Probable Neritic (Undifl.) -(Probable Shelf) Marine	Delong Mtn D2	68.786	-163.128
99	96 TM 21C			Foraminifera- Indeterminate Palynology- Possible Cretaceous Undifferentiated	Indeterminate Marine	Delong Mtn D2	68.786	-163 128
100	96 TM 22A			Foraminifera- Indeterminate Palynology- Cretaceous Undifferentiated	Indeterminate Marine	Delong Mtn D2	68.751	-163.102
102	96 TM 28A	SW of Igloo Mtn,		Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate No evidence of marine	Delong Mtn C2	68.739	-162.874
103	96 TM 28B	SW of Igloo Mtn,		Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate No evidence of marine	Delong Mtn C2	68.737	-162 878
104	96 TM 40A			Foraminifera- Valanginian Palynology- Indeterminate	Outer Neritic to Upper Bathyal-Turbid -(Outer Shelf to Upper Slope) Indeterminate	Delong Mtn C5	68 646	164 616
105	96 TM 41A			Foraminifera- Probable Oxfordian to Valanginian Palynology- Oxfordian	Marine (Undifl.) Marine	Delong Mtn C5	68 639	-164 6
106	96 TM 42A			Foraminifera- Prob. Valanginian to Hauterivian Palynology- Indeterminate	Indeterminate Marine	Delong Mtn C5	68.632	-164 589
8	96 Ha 33	Pitmegea tributary	KJk	Foraminifera- Valanginian Palynology- Valanginian	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Marine	Delong Mtn C4	68.596	-163.835
9	96 Ha 36	Pitmegea tributary	KJk	Foraminifera- Possible Valanginian Palynology- Indeterminate	Possible Mid to Outer Neritic-Turbid -(Possible Middle to Outer Shelf) Indeterminate	Delong Mtn C4	68.611	-163.847
18	96 Ha 37	Pitmegea tributary	KJk	Foraminifera- Indeterminate Palynology- Indeterminate	Distal (Starved Basin) No evidence of marine	Delong Mtn C4	68.608	-163.857
19	96 Ha 39	Pitmegea tributary	KJk	Foraminifera- Possible Valanginian Palynology- Indeterminate	Possible Mid to Outer Neritic-Turbid -(Possible Middle to Outer Shelf) Indeterminate	Delong Mtn C4	68.617	-163.849
20	96 Ha 46			Foraminifera- Indeterminate Palynology- Possible Hauterivian	Indeterminate Marine	Delong Mtn C5	68.697	-164.521
21	96 Ha 47			Foraminifera- Indeterminate Palynology- Probable Aptian-Albian	Indeterminate Marine	Delong Mtn C5	68.702	-164.496
22	96 Ha 60			Foraminifera- Indeterminate Palynology- Probable Aptian-Albian	Indeterminate Marine	Delong Mtn C1	68.607	-162.6
24	96 Ha 67			Foraminifera- Indeterminate Palynology- Probable Early Cretaceous Undiff.	Indeterminate Marine?	Misheguk Mtn C5	68.627	-161.776
25	96 Ha 75	E. of Merk	Kbl	Foraminifera- Indeterminate Palynology- Cretaceous Undifferentiated	Indeterminate Marine	Delong Mtn C2	68.555	-162.807

NOTE: Table compiled by C.G.Mull 12/97

26	96 Ha 92	Kukpowruk River	Kbl/Tro	Foraminifera- Indeterminate Palynology- Cretaceous Undifferentiated	Indeterminate Marine	Delong Mtn C3	68.529	-163.266
38	96 MAW 22A	Surprise Creek measured section	Kingak Shale	Foraminifera- Indeterminate Palynology- Possible Aptian-Albian	Indeterminate Marine	Delong Mtn D2	68.907	-162.834
37	96 MAW 21.5A	Surprise Creek measured section	Kingak Shale	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Indeterminate	Delong Mtn D2	68.907	-162.834
36	96 MAW 21A	Surprise Creek measured section	Kingak Shale	Foraminifera- Possible Oxfordian to Valanginian Palynology- Indeterminate	Possible Mid to Outer Neritic-Turbid -(Possible Middle to Outer Shelf) No evidence of marine	Delong Mtn D2	68.907	-162.834
35	96 MAW 20.5A	Surprise Creek measured section	Kingak Shale	Foraminifera- Indeterminate Palynology- Kimmeridgian-Tithonian(?)	Indeterminate Marine	Delong Mtn D2	68.907	-162 834
34	96 MAW 20D	Surprise Creek measured section	Kingak Shale	Foraminifera- Oxfordian to Valanginian Palynology- Prob. Kimmeridgian-Tithonian(?)	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Marine	Delong Mtn D2	68.907	-162.834
33	96 MAW 19A	Surprise Creek measured section	Kingak Shale	Foraminifera- Indeterminate Palynology- Oxfordian	Indeterminate Marine	Delong Mtn D2	68.907	-162 834
32	96 MAW 18A	Surprise Creek measured section	Kingak Shale	Foraminifera- Oxfordian Palynology-Oxfordian	Possible Inner to Middle Neritic-Turbid -(Possible Inner to Middle Shelf) Marine	Delong Mtn D2	68.907	-162.834
31	96 MAW 17A	Surprise Creek measured section	Kingak Shale	Foraminifera- Indeterminate Palynology- Oxfordian	Indeterminate Marine	Delong Mtn D2	68.907	-162.834
30	96 MAW 16A	Surprise Creek measured section	Kingak Shale	Foraminifera- Probable Oxfordian Palynology- Oxfordian	Prob. Middle Neritic to Bathyal-Turbid -(Probable Middle Shelf to Slope) Marine	Delong Mtn D2	68.907	-162.834
29	96 MAW 15A	Surprise Creek measured section	Kingak Shale	Foraminifera- Indeterminate Palynology- Oxfordian	Indeterminate Marine	Delong Mtn D2	68.907	-162.834
28	96 MAW 14	Surprise Creek measured section	Kingak Shale	Foraminifera- Probable Oxfordian Palynology- Oxfordian	Probable Middle Neritic to Bathyal -(Probable Middle Shelf to Slope) Marine	Delong Mtn D2	68.907	-162 834
27	96 MAW 12	Surprise Creek measured section	Otuk Formation	Foraminifera- Carnian to Norian Palynology- Indeterminate	Middle Neritic (Middle Shelf) Indeterminate	Delong Mtn D2	68.907	-162 834
61	96 Mi-1 23	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
60	96 Mi-1 22	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
59	96 Mi-1 21	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
58	96 Mi-1 20	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463

NOTE: Table compiled by C.G.Mull 12/97

57	96 Mi-1 19	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
56	96 Mi-1 18	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
55	96 Mi-1 17	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
54	96 Mi-1 16	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
53	96 Mi-1 15	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Probable Neocomian (Undif.) Palynology- Valanginian	Marine (Undif.) Marine	Delong Mtn C1	68.567	-162.463
52	96 Mi-1 14	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
51	96 Mi-1 13	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
50	96 Mi-1 12	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Probable Neocomian (Undif.) Palynology- Valanginian	Marine (Undif.) Marine	Delong Mtn C1	68.567	-162.463
49	96 Mi-1 11	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
48	96 Mi-1 10	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Probable Neocomian (Undif.) Palynology- Valanginian	Marine (Undif.) Marine	Delong Mtn C1	68.567	-162.463
47	96 Mi-1 9	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
46	96 Mi-1 8	Tingmerkpuk Mtn. section (resampled)	Tingmerkpuk Sandstone	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
45	96 Mi-1 7	Tingmerkpuk Mtn. section (resampled)	Kingak Shale	Foraminifera- Probable Valanginian Palynology- Valanginian	Probable Middle to Outer Neritic-Turbid (Probable Middle to Outer Shelf) Marine	Delong Mtn C1	68.567	-162.463
44	96 Mi-1 6	Tingmerkpuk Mtn. section (resampled)	Kingak Shale	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
43	96 Mi-1 5	Tingmerkpuk Mtn. section (resampled)	Kingak Shale	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.567	-162.463
42	96 Mi-1 4	Tingmerkpuk Mtn. section (resampled)	Kingak Shale	Foraminifera- Valanginian Palynology- Indeterminate	Outer Neritic to Upper Bathyal-Turbid -(Outer Shelf to Upper Slope) Marine?	Delong Mtn C1	68.567	-162.463
41	96 Mi-1-3	Tingmerkpuk Mtn. section (resampled)	Kingak Shale	Foraminifera- Probable Valanginian Palynology- Probable Valanginian	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Marine	Delong Mtn C1	68.567	-162.463
40	96 Mi-1-2	Tingmerkpuk Mtn. section (resampled)	Kingak Shale	Foraminifera- Valanginian Palynology- Valanginian	Outer Neritic to Upper Bathyal-Turbid -(Outer Shelf to Upper Slope) Marine	Delong Mtn C1	68.567	-162.463
39	96 Mi-1-1	Tingmerkpuk Mtn. section (resampled)	Kingak Shale	Foraminifera- Probable Valanginian Palynology- Indeterminate	Middle Neritic to Upper Bathyal-Turbid -(Middle Shelf to Upper Slope) Indeterminate	Delong Mtn C1	68.567	-162.463

NOTE: Table compiled by C.G.Mull 12/97

62	94 Mu 65-1A	Thetis Creek section	Kingak Shale	Foraminifera- Valanginian Palynology- Indeterminate	Middle to Outer Neritic -(Middle to Outer Shelf) Indeterminate	Delong Mtn C5??	68.651	-164.751
63	94 Mu 65-1	Thetis Creek section	Kingak Sh, limestone coquina interval	Foraminifera- Valanginian Palynology- Indeterminate	Middle to Outer Neritic -(Middle to Outer Shelf) Indeterminate	Delong Mtn C5??	68.651	-164.751
64	94 Mu 65-2	Thetis Creek section	Kingak Sh, limestone coquina interval	Foraminifer- Valanginian Palynology- Probable Valanginian	Middle to Outer Neritic -(Middle to Outer Shelf) Marine	Delong Mtn C5??	68.651	-164.751
65	94 Mu 65-3	Thetis Creek section	Kingak Sh, limestone coquina interval	Foraminifera- Probable Valanginian Palynology- Indeterminate	Probable Neritic (Probable Shelf) Indeterminate	Delong Mtn C5??	68.651	-164.751
66	94 Mu 65-4	Thetis Creek section	Kingak Sh, limestone coquina interval	Foraminifer- Valanginian Palynology- Valanginian	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Marine	Delong Mtn C5??	68.651	-164.751
67	94 Mu 65-5	Thetis Creek section	Kingak Sh, limestone coquina interval	Foraminifera- Probable Valanginian Palynology- Indeterminate	Possible Middle to Outer Neritic-Turbid -(Possible Middle to Outer Shelf) Indeterminate	Delong Mtn C5??	68.651	-164.751
73	96 Mu 28	Upper Ipewik River section	Kingak Sh, limestone coquina interval	Foraminifer- Valanginian Palynology- Valanginian	Middle to Outer Neritic -(Middle to Outer Shelf) Marine	Delong Mtn	68.554	-163.696
74	96 Mu 28-1	Upper Ipewik River section	Kingak Sh, limestone coquina interval	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Indeterminate	Delong Mtn	68.554	-163.696
75	96 Mu 28-2	Upper Ipewik River section	Kingak Sh, limestone coquina interval	Foraminifera- Probable Valanginian Palynology- Indeterminate	Probable Middle to Outer Neritic-Turbid (Probable Middle to Outer Shelf) Indeterminate	Delong Mtn	68.554	-163.696
76	96 Mu 28-3	Upper Ipewik River section	Kingak Sh, limestone coquina interval	Foraminifera- Valanginian Palynology- Indeterminate	Inner to Middle Neritic -(Inner to Middle Shelf) Indeterminate	Delong Mtn	68.554	-163.696
77	96 Mu 28-4	Upper Ipewik River section	Kingak Sh, limestone coquina interval	Foraminifera- Valanginian Palynology- Indeterminate	Inner to Middle Neritic -(Inner to Middle Shelf) Indeterminate	Delong Mtn	68.554	-163.696
78	96 Mu 28-5	Upper Ipewik River section	Kingak Sh, limestone coquina interval	Foraminifera- Valanginian Palynology- Indeterminate	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Indeterminate	Delong Mtn	68.554	-163.696
79	96 Mu 28-6	Upper Ipewik River section	Kingak Sh, limestone coquina interval	Foraminifera- Valanginian Palynology- Neocomian Undifferentiated	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Marine	Delong Mtn	68.554	-163.696
80	96 Mu 28-7	Upper Ipewik River section	Kingak Sh, limestone coquina interval	Foraminifera- Probable Valanginian Palynology- Neocomian Undifferentiated	Probable Middle to Outer Neritic-Turbid (Probable Middle to Outer Shelf) Marine	Delong Mtn	68.554	-163.696
10	96 Ha 36-37 1	Pitmegea tributary measured section	Kingak Sh, limestone coquina interval	Foraminifera- Valanginian Palynology- Probable Valanginian	Middle to Outer Neritic -(Middle to Outer Shelf) Marine	Delong Mtn C4	68.611	-163.847
11	96 Ha 36-37 2	Pitmegea tributary measured section	Kingak Sh, limestone coquina interval	Foraminifera- Valanginian Palynology- Indeterminate	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Indeterminate	Delong Mtn C4	68.611	-163.847
12	96 Ha 36-37 3	Pitmegea tributary measured section	Kingak Sh, limestone coquina interval	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate Indeterminate	Delong Mtn C4	68.611	-163.847

NOTE: Table compiled by O.G.Mull 12/97

13	96 Ha 36-37 4	Pitmegea tributary measured section	Kingak Sh, limestone coquina interval	Foraminifera- Possible Valanginian Palynology- Indeterminate	Marine (Undiff.) Indeterminate	Delong Mtn C4	68.611	-163.847
14	96 Ha 36-37 5	Pitmegea tributary measured section	Kingak Sh, limestone coquina interval	Foraminifera- Probable Valanginian Palynology- Neocomian Undifferentiated	Probable Middle to Outer Neritic-Turbid -(Probable Middle to Outer Shelf) Marine	Delong Mtn C4	68.611	-163.847
15	96 Ha 36-37 6	Pitmegea tributary measured section	Kingak Sh, limestone coquina interval	Foraminifera- Valanginian Palynology- Indeterminate	Middle to Outer Neritic -(Middle to Outer Shelf) Indeterminate	Delong Mtn C4	68.611	-163.847
16	96 Ha 36-37 7	Pitmegea tributary measured section	Kingak Sh, limestone coquina interval	Foraminifera- Valanginian Palynology- Indeterminate	Probable Middle to Outer Neritic-Turbid -(Probable Middle to Outer Shelf) Indeterminate	Delong Mtn C4	68.611	-163.847
17	96 Ha 36-37 8	Pitmegea tributary measured section	Kingak Sh, limestone coquina interval	Foraminifera- Valanginian Palynology- Valanginian	Middle to Outer Neritic -(Middle to Outer Shelf) Marine	Delong Mtn C4	68.611	-163.847
71	96 Mu 27	Upper Ipewik River	Kingak Shale	Foraminifera- Valanginian Palynology- Indeterminate	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Indeterminate	Delong Mtn C3	68.558	-163.711
72	96 Mu 27-1	Upper Ipewik River	Kingak Shale	Foraminifera- Valanginian Palynology- Indeterminate	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Nonmarine?	Delong Mtn C3	68.558	-163.71
68	94 Mu 72-1	Ipewik River	Pebble Shale	Foraminifera- Probable Neocomian (Undiff.) Palynology- Hauterivian-Albian	Indeterminate Marine	Delong Mtn C5	68.595	-164.425
81	96 Mu 30	Pitmegea tributary	KJk	Foraminifera- Indeterminate Palynology- Possible Aptian-Albian	Indeterminate Marine	Delong Mtn C4	68.634	-163.861
82	96 Mu 30-1	Pitmegea tributary	KJk	Foraminifera- Indeterminate Palynology- Possible Aptian-Albian	Indeterminate Marine	Delong Mtn C4	68.634	-163.861
83	96 Mu 30-2	Pitmegea tributary	KJk	Foraminifera- Indeterminate Palynology- Probable Aptian-Albian	Indeterminate Marine	Delong Mtn C4	68.634	-163.861
84	96 Mu 30-3	Pitmegea tributary	KJk	Foraminifera- Valanginian Palynology- Indeterminate	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Indeterminate	Delong Mtn C4	68.634	-163.861
85	96 Mu 33	Thetis Creek	KJk	Foraminifera- Indeterminate Palynology- Cretaceous Undifferentiated	Indeterminate Marine	Delong Mtn C5	68.667	-164.768
86	96 Mu 33-1	Thetis Creek	KJk	Foraminifera- Indeterminate Palynology- Indeterminate	Indeterminate No evidence of marine	Delong Mtn C5	68.667	-164.768
87	96 Mu 33-2	Thetis Creek	KJk	Foraminifera- Oxfordian to Valanginian Palynology- Kimmeridgian-Tithonian(?)	Outer Neritic to Upper Bathyal-Turbid -(Outer Shelf to Upper Slope) Marine	Delong Mtn C5	68.667	-164.768

NOTE: Table compiled by C.G.Mull 1997

88	96 Mu 33-7	Thetis Creek	KJk	Foraminifera- Oxfordian to Valanginian Palynology- Oxfordian	Probable Middle to Outer Neritic-Turbid (Probable Middle to Outer Shelf) Marine	Delong Mtn C5	68 672	-164.78
92	96 Mu 43	Pitmegea tributary	Kto	Foraminifera- Barremian to Aptian Palynology- Probable Cretaceous Undiff.	Middle to Outer Neritic -(Middle to Outer Shelf) Marine	Delong Mtn C4	68.667	-164.055
93	96 Mu 46-2	Tingmerkpuk River	KJk	Foraminifera- Probable Barremian to Aptian Palynology- Probable Neocomian Undiff.	Marine (Undiff.) Marine	Delong Mtn C1	68.562	-162 376
94	96 Mu 46-3	Tingmerkpuk River	Kti	Foraminifera- Indeterminate Palynology- Valanginian	Indeterminate Marine	Delong Mtn C1	68.562	-162 376
95	96 Mu 52	Horseshoe Bend	KJk	Foraminifera- Probable Oxfordian to Valanginian Palynology- Oxfordian	Probable Neritic (Undiff.) -(Probable Shelf) Marine	Delong Mtn C4	68.613	-164.178
107	96 TM 46B	Thetis Creek	Kmk	Foraminifera- Indeterminate Palynology- Possible Early Cretaceous Undiff.	Indeterminate Marine	Delong Mtn C5	68.639	-164.739
108	96 TM 48C	Thetis Creek	KJk	Foraminifera- Probable Aptian Palynology- Possible Early Cretaceous Undiff.	Marine (Undiff.) Marine	Delong Mtn C5	68.645	-164.746
109	96 TM 49A	Thetis Creek	KJk	Foraminifera- Indeterminate Palynology- Probable Cretaceous Undiff.	Indeterminate Marine	Delong Mtn C5	68.65	-164 751

NOTE: Table compiled by C.G.Mull 12/97

samples are within the mature range for hydrocarbon generation.

A listing of integrated ages is presented below for the reader's convenience in Table 1.

The foraminiferal abundances represent the following quantities: V = very rare (single specimen), R = rare (2 - 5 specimens), F = frequent (6 - 25 specimens), C = common (26 - 100) specimens), A = abundant (101 - 999 specimens) and P = prolific (1000+ specimens).

The reported palynomorph abundances represent the following quantities: V = very rare (single specimen), R = rare (2 - 5 specimens), F = frequent (6 - 15 specimens), C = common (16 - 30 specimens) and A = abundant (greater than 30 specimens). An asterisk (*) denotes reworked forms.

01) 96HA 4

FORAMINIFERA

Age. Early Cretaceous
Barremian to Aptian

Zone. F-11 to F-12

Environment. Marine (Undiff.)

Fauna. *Bathysiphon scintillata* (R)

Washed Lithology. Dark gray silty slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Osmundacidites spp. (F)
Polycingulatisporites reduncus (V)
Taeniaesporites spp. (R) *
Gardodinium cf. *G. trabeculosum* (V)
Odontochitina operculata (F)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (V) *
Veryhachium sp. (V)

T.A.I. 2.6

02) 96HA 6

FORAMINIFERA

Age. Early Cretaceous
Barremian to Aptian

Zone. F-11 to F-12

Environment. Marine (Undiff.)

Fauna. *Bathysiphon scintillata* (R)

Washed Lithology. Dark gray slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (R) *
Lycopodiumsporites sp. (V)
Gardodinium deflandrei (R)
Imbatodinium jaegeri (R)
?Muderongia tetracantha (V)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (R) *
Palaeoperidinium cretaceum (V)

T.A.I. 2.5

03) 96HA 9

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Pyrite (R)

Washed Lithology. Dark gray slightly silty slightly micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites sp. (V)
Densosporites spp. (F) *
Gleicheniidites senonicus (R)
Osmundacidites spp. (R)
Vitreisporites pallidus (V)
Muderongia sp. 5 (V)
Odontochitina operculata (V)
Oligosphaeridium complex (R)
Palaeoperidinium cretaceum (R)

T.A.I. 2.5

04) 96HA 14

FORAMINIFERA

Age. Early Cretaceous
Barremian to Aptian

Zone. F-11 to F-12

Environment. Possible Bathyal - Turbid
(Slope)

Fauna. *Ammobaculites fragmentarius* (R)
arenaceous spp. (large, coarse) (F)
Bathysiphon granulocoelia (F)

Washed Lithology. Dark gray slightly micaceous shale.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (R) *
Osmundacidites spp. (F)
Oligosphaeridium complex (R)

T.A.I. 2.6

05) 96HA 18

FORAMINIFERA

Age. Early Cretaceous
Barremian to Aptian

Zone. F-11 to F-12

Environment. Possible Bathyal - Turbid
(Slope)

Fauna. *Bathysiphon scintillata* (F)
Shell fragments? (C)

Washed Lithology. Dark gray slightly micaceous shelly? shale.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Taeniaesporites sp. (V) *
Odontochitina operculata (R)
Oligosphaeridium complex (R)

T.A.I. 2.6

06) 96HA 21

FORAMINIFERA

Age. Early Cretaceous

Barremian to Aptian

Zone. F-11 to F-12

Environment. Possible Bathyal - Turbid (Slope)

Fauna. arenaccous spp. (large, coarse) (R)

Washed Lithology. Dark gray slightly silty slightly micaceous shale.

PALYNOLOGY

Age. Cretaceous Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (R) *
Cyclonephelium distinctum (V)
Odontochitina operculata (R)
Oligosphaeridium complex (R)

T.A.I. 2.6

07) 96HA 22

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray slightly micaceous silty shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Classopollis classoides (V)
Muderongia sp. 5 (V)
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (R) *
?Palaeoperidinium cretaceum (V)

T.A.I. 2.5

08) 96HA 33

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic - Turbid
(Middle to Outer Shelf)

Fauna. *Ammobaculites reophacoides* (V)
Bathysiphon scintillata (R)
Fish debris (R)
Gaudryina milleri (V)
Glomospira subarctica (R)
Glomospirella arctica (F)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (R)
Shell fragments? (C)

Washed Lithology. Light and dark gray shelly? shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. *?Gonyaulacysta* sp. G (F)
Nelchinopsis kostromiensis (R)
Oligosphaeridium complex (thick-wall) (F)
Sentusidinium rioultii (A)

T.A.I. 2.8 - 3.0

09) 96HA 36

FORAMINIFERA

Age.	Early Cretaceous Possible Valanginian
Zone.	Possible F-13
Environment.	Possible Middle to Outer Neritic - Turbid (Possible Middle to Outer Shelf)
Fauna.	*Haplophragmoides goodenoughensis* (V) Pyrite (R) Rounded frosted quartz floaters (C)
Washed Lithology.	Dark gray sandy shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Barren of palynomorphs.
T.A.I.	2.8?
Remarks.	Sparse organic recovery. Thick coaly fragments.

10) 96HA 36-37 1

FORAMINIFERA

Age.	Early Cretaceous Valanginian
Zone.	F-13
Environment.	Middle to Outer Neritic (Middle to Outer Shelf)
Fauna.	*Astacolus incrassatus* (V) *Astacolus* sp. (R) *Bathysiphon scintillata* (F) *Citharina acuminata* (V)

Dentalina sp. (R)
Gaudryinella irregularis (R)
Globulina canadensis (F)
Glomospirella arctica (R)
Inoceramus prisms (F)
Lenticulina muensteri (F)
Lenticulina topagorukensis (R)
Lingulina loryi (R)
Lingulina rediviva (V)
Nodosaria sp. (R)
Oolina apiculata (F)
Saracenaria projectura (R)
Shell fragments (A)
Tristix alcima (V)

Washed Lithology. Dark gray shelly shale.

PALYNOLOGY

Age. Early Cretaceous
Probable Valanginian

Environment. Marine

Palynomorphs. *Gonyaulacysta* sp. G (V)
Oligosphaeridium complex (thick-wall) (C)
Sentusidinium rioultii (R)

T.A.I. 3.0+

11) 96HA 36-37 2

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic - Turbid
(Middle to Outer Shelf)

Fauna. *Ammobaculites erectus* (F)
Ammobaculites reophacoides (R)
Ammodiscus asperus (R)
arenaceous spp. (large, coarse) (F)
Bathysiphon granulocoelia (F)
Bathysiphon scintillata (F)
Gaudryina milleri (F)

Haplophragmoides coronis (F)
Haplophragmoides duoflatis (R)
Rounded frosted quartz floaters (F)

Washed Lithology. Dark gray sandy shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. ?

Remarks. Sparse organic recovery. Mostly thick coaly fragments.

12) 96HA 36-37 3

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray to black shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. ?

Remarks. Extremely sparse organics. Essentially barren of organics.

13) 96HA 36-37 4

FORAMINIFERA

Age.	Early Cretaceous Possible Valanginian
Zone.	Possible F-13
Environment.	Marine (Undiff.)
Fauna.	*Bathysiphon granulocoelia* (V)
Washed Lithology.	Dark gray to black shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Barren of palynomorphs.
T.A.I.	2.8?
Remarks.	Sparse organics. Mainly thick coaly fragments.

14) 96HA 36-37 5

FORAMINIFERA

Age.	Early Cretaceous Probable Valanginian
Zone.	Probable F-13
Environment.	Probable Middle to Outer Neritic - Turbid (Probable Middle to Outer Shelf)
Fauna.	*Glomospirella arctica* (V) *Inoceramus* prisms (F) Shell fragments (A)
Washed Lithology.	Dark gray shelly shale.

PALYNOLOGY

Age. Neocomian
Undifferentiated

Environment. Marine

Palynomorphs. *Cyclonephelium distinctum* (R)
Oligosphaeridium complex (thick-wall) (F)

T.A.I. 3.0

Remarks. Relatively sparse organic recovery.

15) 96HA 36-37 6

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic
(Middle to Outer Shelf)

Fauna. *Astacolus* sp. (R)
Bathysiphon scintillata (F)
Epistomina cf. *caracolla* (V)
Gaudryinella irregularis (V)
Globulina canadensis (R)
Glomospirella arctica (R)
Haplophragmoides coronis (F)
Lenticulina muensteri (F)
Marginulinopsis phragmites (V)
Oolina apiculata (R)
Saracenaria projectura (R)
Shell fragments (A)
Trochammina kosyrevae (V)

Washed Lithology. Dark gray shelly shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. 3.0?

Remarks. Very sparse organics. Few thick coaly fragments.

16) 96HA 36-37 7

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Probable Middle to Outer Neritic - Turbid
(Probable Middle to Outer Shelf)

Fauna. *Gaudryina tailleuri* (R)
Gaudryinella irregularis (V)
Glomospira subarctica (C)
Glomospirella arctica (R)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (R)
Tar (R)

Washed Lithology. Dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. ?

Remarks. Very sparse organics. Few thick coaly fragments.

17) 96HA 36-37 8

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic
(Middle to Outer Shelf)

Fauna. *Gaudryinella irregularis* (V)
Glomospira subarctica (R)
Haplophragmoides coronis (R)
Inoceramus prisms (F)
Lenticulina muensteri (R)
Lingulina rediviva (V)
Oolina apiculata (R)
Shell fragments (P)

Washed Lithology. Dark gray shell hash or shelly shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. *Gochteodinia villosa* (V)
Gonyaulacysta sp. G (R)
Oligosphaeridium complex (thick-wall) (C)
Oligosphaeridium sp. (F)
Sentusidinium rioultii (R)
Undescribed P-M20 dinocyst (R)

T.A.I. 3.0+

18) 96HA 37

FORAMINIFERA

Age. Indeterminate

Environment. Distal
(Starved Basin)

Fauna. Barren of Foraminifera.
Paper shale (A)

Washed Lithology. Dark gray to black paper shale.

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (R)
?Osmundacidites spp. (R)
Indeterminate small spores (A)

T.A.I. 3.0

19) 96HA 39

FORAMINIFERA

Age. Early Cretaceous
Possible Valanginian

Zone. Possible F-13

Environment. Possible Middle to Outer Neritic - Turbid
(Possible Middle to Outer Shelf)

Fauna. *Glomospira subarctica* (R)
Gypsum (F)
Oil Staining (C)
Rounded frosted quartz floaters (C)
Tar (F)

Washed Lithology. Black sandy shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of identifiable palynomorphs.

T.A.I. 3.0

Remarks. Abundant degraded organics. Mostly sapropelitized.

20) 96HA 46

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Gypsum (R)

Washed Lithology. Dark gray shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Early Cretaceous
Possible Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Chytroeisphaeridia pericompsa (V) *
Cyclonephelium distinctum (F)
Herendeenia alaskensis (V)
Odontochitina operculata (V)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (R)
Palaeoperidinium cretaceum (V)
Pareodinia ceratophora (V)
Sirmiodinium grossi (V) *

T.A.I. 2.6

21) 96HA 47

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Lycospora sp. (V) *
Semiretisporis sp. (V) *
Cyclonephelium distinctum (F)
Gardodinium deflandrei (V)
Microdinium opacum (V)
Muderongia sp. 5 (R)
Odontochitina operculata (V)
Oligosphaeridium complex (R)
Palaeoperidinium cretaceum (R)

T.A.I. 2.6

22) 96HA 60

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Gypsum (F)

Washed Lithology. Dark gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (R) *
Taxodiaceae (R)
Cyclonephelium distinctum (R)
Gardodinium trabeculosum (R) *

Muderongia sp. 5 (V)
Oligosphaeridium complex (A)

T.A.I. 2.7

23) 96HA 66

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Classopollis classoides (R)
Densosporites spp. (R) *
Gleicheniidites senonicus (V)
Taeniaesporites sp. (V) *
Vitreisporites pallidus (V)
Cyclonephelium distinctum (R)
Gardodinium cf. *deflandrei* (R) *
Muderongia tetracantha (V)
Oligosphaeridium complex (F)
Odontochitina operculata (V)

T.A.I. 2.7

24) 96HA 67

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Pyrite (R)

Washed Lithology. Dark gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Probable Early Cretaceous
Undifferentiated

Environment. Marine?

Palynomorphs. Undifferentiated bisaccates (R)
Classopollis classoides (V)
Densosporites spp. (R) *
Gleicheniidites senonicus (R)
Indeterminate spores and fragments highly corroded (A)
?*Gardodinium* sp. (R) poor preservation

T.A.I. 3.0+

Remarks. All palynomorphs are poorly preserved.

25) 96HA 75

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Deltoidospora spp. (R)
Oligosphaeridium complex (V)

T.A.I. 2.7

26) 96HA 92

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray to black micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites cf. *hallei* (V)
Cicatricosisporites sp. (V)
Densosporites spp. (F) *
Oligosphaeridium complex (R)
?*Odontochitina operculata* (V)

T.A.I. 2.6

Remarks. All palynomorphs are poorly preserved.

27) 96MAW 12

FORAMINIFERA

Age. Late Triassic
Carnian to Norian

Zone. F-19

Environment. Middle Neritic
(Middle Shelf)

Fauna. *Astacolus connudatus* (F)
Bathysiphon anomalocoelia (R)
Cenosphaera spp. (F)
Conodonts (R)
Cyrtocapsa sp. (R)
Echinoid spines (F)
Marginulina prisca (R)
Nodosaria larina (F)
Pyrite (R)
Spongodiscus spp. (F)
Trochammina contornata (R)
Trochammina helicta (R)
Trochamminoides vertens (R)
Vaginulinopsis acrulus (R)

Washed Lithology. Buff tan siliceous shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of identifiable palynomorphs.

T.A.I. 2.8

Remarks. Abundant degraded organics. Mostly thick red-red-brown fragments.

28) 96MAW 14

FORAMINIFERA

Age. Probable Late Jurassic
Probable Oxfordian

Zone. Probable F-16

Environment. Probable Middle Neritic to Bathyal
(Probable Middle Shelf to Slope)

Fauna. *Bathysiphon anomalocoelia* (R)
Cenosphaera spp. (pyritized) (R)
Gypsum (F)
Haplophragmoides spp. (F)
Nodosaria regularis (V)

Spongodiscus sp. (pyritized) (R)
Thuramminoides sp. (R)
Trochamminoides sp. (small, thin) (F)

Washed Lithology. Dark brownish-gray shale.

PALYNOLOGY

Age. Late Jurassic
Oxfordian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Classopollis classoides (F)
Densosporites spp. (C) *
Chytroeisphaeridia pericompsa (R)
Endoscrinium galeritum (F)
Micrhystridium spp. (R)
Nannoceratopsis pellucida (F)
Pareodinia alaskensis (R)
Pareodinia osmingtonensis (V)

T.A.I. 2.5?

Remarks. Very little woody organics. Abundant palynomorphs all very poorly preserved.

29) 96MAW 15A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Tar (F)

Washed Lithology. Dark gray to black shale.

PALYNOLOGY

Age. Late Jurassic
Oxfordian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Densosporites spp. (F) *
Hymenozonotriletes lepidophytus (V) *
?Acanthaulax senta (R)
Atopodinium prostatum (R)
Chytroeisphaeridia pericompsa (R)
Gonyaulacysta cladophora (R)
Gonyaulacysta jurassica (F)
Pareodinia osmingtonensis (F)
Sirmiodinium grossi (C)

T.A.I. 2.7

Remarks. Very little woody organics.

30) 96MAW 16A

FORAMINIFERA

Age. Probable Late Jurassic
Probable Oxfordian

Zone. Probable F-16

Environment. Probable Middle Neritic to Bathyal - Turbid
(Probable Middle Shelf to Slope)

Fauna. *Bathysiphon anomalocoelia* (V)
Haplophragmoides spp. (F)
Pyrite sticks (V)
Tar (V)

Washed Lithology. Dark gray to black shale.

PALYNOLOGY

Age. Late Jurassic
Oxfordian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Densosporites spp. (F) *
Lycopodiumsporites spp. (R)
Taeniaesporites sp. (V) *
Gonyaulacysta jurassica (C)
Kalyptea diceras (F)
Nannoceratopsis pellucida (F)

Ovoidinium waltonii (V)
Pareodinia osmingtonensis (F)
Sirmiodinium grossi (F)
Stephanelytron redcliffense (F)

T.A.I. 2.6

Remarks. Very little woody organics.

31) 96MAW 17A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray to black shale.

PALYNOLOGY

Age. Late Jurassic
Oxfordian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Densosporites spp. (R) *
Gleicheniidites senonicus (V)
Atopodinium prostatum (R)
Chytroeisphaeridia pericompsa (F)
Gonyaulacysta cladophora (R)
Gonyaulacysta jurassica (C)
Nannoceratopsis pellucida (R)
Ovoidinium waltonii (R)
Pareodinia osmingtonensis (F)
Stephanelytron redcliffense (F)

T.A.I. 2.6

Remarks. Very little woody organics.

32) 96MAW 18A

FORAMINIFERA

Age. Late Jurassic
Oxfordian

Zone. F-16

Environment. Possible Inner to Middle Neritic - Turbid
(Possible Inner to Middle Shelf)

Fauna. *Ammodiscus asperus* (R)
Ammodiscus cheradospirus (V)
arenaceous spp. (large, coarse) (V)
Bathysiphon anomalocoelia (R)
Haplophragmoides spp. (R)
Rounded frosted quartz floaters (V)

Washed Lithology. Dark gray slightly paper shale.

PALYNOLOGY

Age. Late Jurassic
Oxfordian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)
Calamospora sp. (V) *
Classopollis classoides (R)
Densosporites spp. (F) *
Kraeuselisporites spp. (R) *
Lycopodiumsporites spp. (R)
Punctatisporites sp. (F) *
Chytroeisphaeridia pericompsa (F)
Chytroeisphaeridia "granulosa" (C)
Gonyaulacysta cf. *G. cladophora* (V)
Gonyaulacysta jurassica (V)
Micrhystridium spp. (R)
Pareodinia osmingtonensis (R)

T.A.I. 2.5

Remarks. Increase in woody and coaly organics.

The dinocyst *Chytroeisphaeridia* "granulosa" was recorded in the sample. This form represents a subsurface datum that has been recognized within the Oxfordian section in a number of wells in the North Slope region.

33) 96MAW 19A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark brownish-gray shale.

PALYNOLOGY

Age. Late Jurassic
Oxfordian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Convolutispora sp. (R) *
Densosporites spp. (F) *
Hymenozonotriletes lepidophytus (R) *
Lophozonotriletes rarituberculatus (V) *
Lycopodiumsporites spp. (R)
Punctatisporites sp. (F) *
Reticulatisporites sp. (V) *
Chytroeisphaeridia pericompsa (F)
Gonyaulacysta cladophora (R)
Gonyaulacysta jurassica (C)
Kalyptea diceras (R)
Micrhystridium spp. (R)
Ovoidinium waltonii (V)
Pareodinia osmingtonensis (A)
Sirmiodinium grossi (R)
Stephanelytron redcliffense (F)

T.A.I. 2.6

34) 96MAW 20D

FORAMINIFERA

Age. Late Jurassic to Early Cretaceous
Oxfordian to Valanginian

Zone. F-13 to F-16

Environment. Middle to Outer Neritic - Turbid
(Middle to Outer Shelf)

Fauna. *Ammobaculites erectus* (R)
arenaceous spp. (large, coarse) (R)
Gaudryina leffingwelli (R)
Glomospira subarctica (F)
Glomospirella arctica (R)
Rounded frosted quartz floaters (F)

Washed Lithology. Dark gray bentonitic? shale.

PALYNOLOGY

Age. Probable Late Jurassic
Probable Kimmeridgian - Tithonian(?)

Environment. Marine

Palynomorphs. *Pareodinia osmingtonensis* (V)

T.A.I. 2.6?

Remarks. Very sparse organics. Mainly thick coaly fragments.

35) 96MAW 20.5A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray to black shale.

PALYNOLOGY

Age. Late Jurassic
Kimmeridgian - Tithonian(?)

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (F) *

Gleicheniidites senonicus (V)
Hymenozonotriletes lepidophytus (V) *
Kraeuselisporites sp. (V) *
Lycopodiumsporites spp. (R)
Punctatisporites sp. (F) *
Taeniaesporites sp. (V) *
Gonyaulacysta cf. *G. cladophora* (R)
Gonyaulacysta jurassica (R)
?Leptodinium subtile (F)
Pareodinia ceratophora (R)
Pareodinia osmingtonensis (R)
Sirmiodinium grossi (F)

T.A.I. 2.6

36) 96MAW 21A

FORAMINIFERA

Age. Late Jurassic to Early Cretaceous
Possible Oxfordian to Valanginian

Zone. Possible F-13 to F-16

Environment. Possible Middle to Outer Neritic - Turbid
(Possible Middle to Outer Shelf)

Fauna. *Glomospira subarctica* (V)
Rounded frosted quartz floaters (F)

Washed Lithology. Dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. *?Densosporites* sp. (V)
Nondescript spore(?) (R)

T.A.I. 3.0+

Remarks. Mainly thick "coaly" organics. The single questionable densospore specimen may be reworked.

37) 96MAW 21.5A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray to black shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. 3.0+

Remarks. All organics are highly degraded. Most are sapropelitized. Some thick woody fragments recognizable.

38) 96MAW 22A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Pyrite (R)

Washed Lithology. Dark gray slightly silty micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Possible Early Cretaceous

Possible Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
?*Odontochitina operculata* (V)
?*Muderongia* sp. 5 (V)

T.A.I. 2.4

Remarks. All palynomorphs are poorly preserved.

39) 96MI-1 1

FORAMINIFERA

Age. Early Cretaceous
Probable Valanginian

Zone. Probable F-13

Environment. Middle Neritic to Upper Bathyal - Turbid
(Middle Shelf to Upper Slope)

Fauna. *Haplophragmoides coronis* (V)
Haplophragmoides duoflatis (V)
Rounded frosted quartz floaters (F)

Washed Lithology. Light and dark gray speckled slightly sandy shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. ?

Remarks. Very sparse organics. Few coaly fragments.

40) 96MI-1 2

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Outer Neritic to Upper Bathyal - Turbid
(Outer Shelf to Upper Slope)

Fauna. *Ammobaculites erectus* (R)
arenaceous spp. (large, coarse) (R)
Gaudryina leffingwelli (F)
Gaudryina milleri (F)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (R)
Haplophragmoides goodenoughensis (R)
Rounded frosted quartz floaters (F)

Washed Lithology. Light and dark gray speckled slightly sandy shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. *Cyclonephelium distinctum* (A)
Gonyaulacysta sp. G (F)
Oligosphaeridium complex (V)

T.A.I. 3.0+

Remarks. Dark red-brown to brown organics.

41) 96MI-1 3

FORAMINIFERA

Age. Early Cretaceous
Probable Valanginian

Zone. Probable F-13

Environment. Middle to Outer Neritic - Turbid
(Middle to Outer Shelf)

Fauna. *Ammobaculites erectus* (R)
Bathysiphon granulocoelia (F)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (F)
Rounded frosted quartz floaters (R)

Washed Lithology. Light and dark gray slightly sandy shale.

PALYNOLOGY

Age. Probable Early Cretaceous
Probable Valanginian

Environment. Marine

Palynomorphs. *Cyclonephelium distinctum* (R)
Gonyaulacysta sp. C (R)

T.A.I. 3.0+

Remarks. Sparse organics. Mainly thick coaly fragments.

The sparse recovery permits only a tentative age assignment.

42) 96MI-1 4

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Outer Neritic to Upper Bathyal - Turbid
(Outer Shelf to Upper Slope)

Fauna. *Ammobaculites erectus* (R)
Fish debris (R)
Gaudryina milleri (R)
Glomospirella arctica (V)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (R)
Haplophragmoides goodenoughensis (R)
Haplophragmoides inflatigrandis (R)

Washed Lithology. Light and dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. Marine?

Palynomorphs. Undifferentiated bisaccates (V)
Oligosphaeridium complex (V)

T.A.I. 3.0?

Remarks. Sparse organics. Mainly thick coaly fragments.

The two palynomorph specimens recovered can easily be derived from contamination.

43) 96MI-1 5

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)

Washed Lithology. Dark gray to black somewhat paper shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites australiensis (R)
Cicatricosisporites spp. (F)
Classopollis classoides (F)
Deltoidospora spp. (F)
Densosporites spp. (R) *
Gleicheniidites senonicus (R)
Lycopodiumsporites spp. (R)
Rogalskaisporites cicatricosus (V)
Cyclonephelium distinctum (R)
Gochteodinia villosa (V)
Gonyaulacysta sp. G (F)
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (V)
Sentusidinium rioultii (R)
Veryhachium spp. (R)

T.A.I. 2.6

44) 96MI-1 6

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark brownish-gray micaceous? siltstone.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Classopollis classoides (R)
Gonyaulacysta sp. G (F)
Oligosphaeridium complex (A)
Oligosphaeridium complex (thick-wall) (R)
Sentusidinium rioultii (V)

T.A.I. 2.7

45) 96MI-1 7

FORAMINIFERA

Age. Early Cretaceous
Probable Valanginian

Zone. Probable F-13

Environment. Probable Middle to Outer Neritic - Turbid
(Probable Middle to Outer Shelf)

Fauna. *Bathysiphon granulocoelia* (R)
Gaudryina milleri (V)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (R)

Washed Lithology. Light and dark gray slightly sandy shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Pilosisporites trichopapillosus (V)
Gochteodinia villosa (V)
Gonyaulacysta sp. C (R)
Oligosphaeridium complex (F)

T.A.I. 3.0

46) 96MI-1 8

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (R)

Washed Lithology. Dark brownish-gray micaceous? shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Classopollis classoides (R)
Densosporites spp. (F) *
Reticulatisporites sp. (V) *
Trilobosporites spp. (R)
Vitreisporites pallidus (R)
Gonyaulacysta sp. C (R)
Oligosphaeridium complex (F)
Sentusidinium rioultii (V)

Pareodinia osmingtonensis (V) *
Tubotuberella apatela (V)

T.A.I. 2.7

47) 96MI-1 9

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)

Washed Lithology. Dark gray to black somewhat paper shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Classopollis classoides (F)
Densosporites sp. (V) *
Hymenozonotriletes lepidophytus (R) *
Lycopodiumsporites spp. (R)
Trilobosporites spp. (R)
Cochteodinia villosa (V)
Nelchinopsis kostromiensis (R)
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (R)

T.A.I. 2.7

48) 96MI-1 10

FORAMINIFERA

Age. Early Cretaceous
Probable Neocomian (Undiff.)

Zone. Probable F-12 to F-13

Environment. Marine (Undiff.)

Fauna. *Bathysiphon granulocoelia* (V)
Paper shale (F)
Pyrite sticks (F)

Washed Lithology. Dark gray to black silty slightly paper shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Classopollis classoides (F)
Densosporites sp. (V) *
Hymenozonotriletes lepidophytus (R) *
Trilobosporites spp. (R)
Discorsia nanna (V)
Gochteodinia villosa (V)
Gonyaulacysta sp. G (R)
Nelchinopsis kostromiensis (F)
Oligosphaeridium complex (F)
Tubotuberella apatela (V)
Undescribed P-M20 dinocyst (V)

T.A.I. 2.6

49) 96MI-1 11

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (R)

Washed Lithology. Dark gray to black siltstone or silty shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Classopollis classoides (F)
Deltoidospora spp. (R)
Trilobosporites spp. (R)
Apteodinium spongiosum (F)
Gochteodinia villosa (R)
Gonyaulacysta serrata (R)
Nelchinopsis kostromiensis (R)
Oligosphaeridium complex (C)

T.A.I. 2.7

50) 96MI-1 12

FORAMINIFERA

Age. Early Cretaceous
Probable Neocomian (Undiff.)

Zone. Probable F-12 to F-13

Environment. Marine (Undiff.)

Fauna. *Bathysiphon granulocoelia* (V)
Paper shale (F)

Washed Lithology. Dark gray to black somewhat paper shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Classopollis classoides (F)
Deltoidospora spp. (R)
Hymenozonotriletes lepidophytus (V) *
Lycopodiumsporites spp. (R)
Apteodinium spongiosum (F)
?Clathroctenocystis elegans (F)
Micrhystridium spp. (R)
Nelchinopsis kostromiensis (F)

Oligosphaeridium complex (F)
Sentusidinium rioultii (R)
Undescribed P-M20 dinocyst (R)
Microforam test-lining (R)

T.A.I. 2.7

51) 96MI-1 13

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)
Pyrite sticks (V)

Washed Lithology. Dark gray to black somewhat paper shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Classopollis classoides (F)
Densosporites spp. (R) *
Kraeuselisporites sp. (V) *
Lophozonotriletes rarituberculatus (V) *
Lycopodiumsporites spp. (R)
Apteodinium spongiosum (F)
Gochteodinia villosa (R)
Gonyaulacysta sp. G (R)
Nelchinopsis kostromiensis (R)
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (R)
Parvocysta cracens (V) *
Sentusidinium rioultii (R)

T.A.I. 2.7

52) 96MI-1 14

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)
Pyrite sticks (R)

Washed Lithology. Dark gray to black slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Classopollis classoides (F)
Densosporites spp. (F) *
Exesipollenites tumulus (F)
Kraeuselisporites sp. (V) *
Lycopodiumsporites spp. (R)
Trilobosporites spp. (R)
Apteodinium spongiosum (F)
Boreocysta butticula (R)
Gonyaulacysta cladophora (R) *
Gonyaulacysta sp. G (R)
Gonyaulacysta jurassica (V) *
Nannoceratopsis gracilis (R) *
Oligosphaeridium complex (C)
Sentusidinium rioultii (F)
Sirmiodinium grossi (R)

T.A.I. 2.7

53) 96MI-1 15

FORAMINIFERA

Age. Early Cretaceous
Probable Neocomian (Undiff.)

Zone. Probable F-12 to F-13

Environment. Marine (Undiff.)

Fauna. *Haplophragmoides duoflatis* (V)
Paper shale (F)
Pyrite sticks (R)

Washed Lithology. Dark gray to black slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Classopollis classoides (F)
Deltoidospora sp. (V)
Densosporites spp. (R) *
Exesipollenites tumulus (R)
Gleicheniidites senonicus (R)
Lycopodiumsporites spp. (F)
Murospora sp. (V) *
Taxodiaceae (R)
Trilobosporites spp. (V)
Apteodinium spongiosum (R)
Boreocysta butticula (V)
Gochteodinia villosa (V)
Nelchinopsis kostromiensis (F)
Nannoceratopsis gracilis (V) *
Nannoceratopsis pellucida (V) *
Oligosphaeridium complex (F)
Sentusidinium rioultii (R)
Sirmiodinium grossi (V)

T.A.I. 2.7

54) 96MI-1 16

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (R)

Washed Lithology. Dark gray to black slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Classopollis classoides (F)
Densosporites sp. (R) *
Exesipollenites tumulus (R)
Kraeuselisporites sp. (V) *
Trilobosporites sp. (V)
Apteodinium spongiosum (R)
Boreocysta butticula (R)
Gochteodinia villosa (R)
Muderongia simplex (V)
Nannoceratopsis gracilis (R) *
Nannoceratopsis pellucida (V) *
Oligosphaeridium complex (F)
Sentusidinium rioultii (R)
Undescribed P-M20 dinocyst (R)

T.A.I. 2.7

55) 96MI-1 17

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)

Washed Lithology. Dark gray to black slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)

Cicatricosisporites spp. (R)
Classopollis classoides (F)
Densosporites spp. (R) *
Lycopodiumsporites spp. (R)
Taeniaesporites sp. (V) *
Boreocysta butticula (R)
Gochteodinia villosa (R)
Nannoceratopsis gracilis (V) *
Nannoceratopsis pellucida (V) *
Oligosphaeridium complex (F)
Pareodinia ceratophora (V)
Sirmiodinium grossi (R)

T.A.I. 2.7

56) 96MI-1 18

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (R)

Washed Lithology. Dark brownish-gray to black silty shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Classopollis classoides (R)
Densosporites spp. (R) *
Gonyaulacysta sp. C (R)
Muderongia tetracantha (V)
Nannoceratopsis pellucida (V) *
Oligosphaeridium complex (F)
Sentusidinium rioultii (R)
Sirmiodinium grossi (R)

T.A.I. 2.7

Remarks. Palynomorphs are very poorly preserved.

57) 96MI-1 19

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)

Washed Lithology. Dark gray to black somewhat paper shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Classopollis classoides (F)
Deltoidospora spp. (R)
Densosporites spp. (F) *
Exesipollenites tumulus (R)
Clathroctenocystis elegans (R)
Boreocysta butticula (R)
Gochteodinia villosa (R)
Microdinium opacum (R)
Nannoceratopsis gracilis (V) *
Nannoceratopsis pellucida (R) *
Nelchinopsis kostromiensis (R)
Oligosphaeridium complex (C)
Sentusidinium rioultii (F)
Sirmiodinium grossi (R)

T.A.I. 2.6

58) 96MI-1 20

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)

Washed Lithology. Dark gray to black somewhat paper shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Classopollis classoides (F)
Deltoidospora spp. (R)
Densosporites sp. (R) *
Kraeuselisporites sp. (V) *
Punctatisporites spp. (R) *
Trilobosporites spp. (R)
Clathroctenocystis elegans (R)
Boreocysta buttlcula (R)
Gochteodinia villosa (R)
Gonyaulacysta sp. G (R)
Nannoceratopsis pellucida (R) *
Oligosphaeridium complex (F)
Parvocysta cracens (V) *
Sentusidinium rioultii (R)
Sirmiodinium grossi (R)
Undescribed P-M20 dinocyst (V)

T.A.I. 2.6

59) 96MI-1 21

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (R)

Washed Lithology. Dark gray to black slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites australiensis (V)
Classopollis classoides (F)
Deltoidospora spp. (R)
Densosporites sp. (R) *
Gleicheniidites senonicus (R)
Trilobosporites spp. (R)
Clathroctenocystis elegans (R)
Cleistosphaeridium sp. (F)
Cyclonephelium distinctum (R)
Boreocysta butticula (R)
Gonyaulacysta cladophora (V) *
Gonyaulacysta sp. C (R)
Muderongia tetracantha (R)
Nannoceratopsis pellucida (R) *
Nelchinopsis kostromiensis (V)
Oligosphaeridium complex (F)
Sentusidinium rioultii (R)
Sirmiodinium grossi (R)

T.A.I. 2.6

60) 96MI-1 22

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)

Washed Lithology. Dark gray to black somewhat paper shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Classopollis classoides (F)
Deltoidospora spp. (R)
Exesipollenites tumulus (R)
Gleicheniidites senonicus (R)
Trilobosporites spp. (R)
Apteodinium spongiosum (R)
Boreocysta butticula (R)
Clathroctenocystis elegans (V)
Hystrichodinium lanceatum (V) *
Nelchinopsis kostromiensis (R)
Oligosphaeridium complex (F)
Sentusidinium rioultii (F)
Sirmiodinium grossi (R)
Ternia cf. *T. balmei* (V) *
Undescribed P-M20 dinocyst (R)

T.A.I. 2.6

61) 96MI-1 23

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)

Washed Lithology. Dark gray to black somewhat paper shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Densosporites spp. (R) *
Exesipollenites tumulus (R)
Trilobosporites spp. (R)
Clathroctenocystis elegans (R)
Gonyaulacysta cladophora (V) *
Micrhystridium spp. (F)
Muderongia simplex (V)
Nelchinopsis kostromiensis (C)

Oligosphaeridium complex (F)
Sentusidinium rioultii (C)
Tuberculodinium apatela (V)
Undescribed P-M20 dinocyst (R)
Microforam test-lining (V)

T.A.I. 2.6

62) 94MU 65-1A

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic
(Middle to Outer Shelf)

Fauna. *Astacolus strombecki* (V)
Dentalina praecommunis (V)
Globulina canadensis (R)
Glomospira subarctica (R)
Lenticulina muensteri (F)
Shell fragments (A)
Tristix alcima (V)

Washed Lithology. Dark gray speckled shell hash or shelly shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. ?

Remarks. Very poor recovery. Essentially barren of organics.

63) 94MU 65-1

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic
(Middle to Outer Shelf)

Fauna. *Dentalina* sp. (V)
Globulina canadensis (R)
Glomospira subarctica (R)
Lenticulina muensteri (C)
Lenticulina topagorukensis (V)
Oolina apiculata (R)
Shell fragments (P)

Washed Lithology. Gray shell hash or shelly shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. ?

Remarks. Very poor recovery. Essentially barren of organics.

64) 94MU 65-2

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic
(Middle to Outer Shelf)

Fauna. *Bathysiphon scintillata* (V)
Dentalina praecommunis (V)
Frondicularia cushmani (V)
Globulina canadensis (R)
Glomospira subarctica (F)
Glomospirella arctica (F)

Inoceramus prisms (R)
Lenticulina muensteri (R)
Saracenaria projectura (V)
Shell fragments (F)
Trochammina squamata (R)
Vaginulina sp. (V)

Washed Lithology. Dark red and gray shelly shale.

PALYNOLOGY

Age. Early Cretaceous
Probable Valanginian

Environment. Marine

Palynomorphs. *?Cleistosphaeridium* sp. KE McIntyre & Brideaux, 1980 (F)
?Cyclonephelium distinctum (A)
Oligosphaeridium complex (thick-wall) (F)
Sentusidinium rioultii (R)

T.A.I. 2.8

65) 94MU 65-3

FORAMINIFERA

Age. Early Cretaceous
Probable Valanginian

Zone. Probable F-13

Environment. Probable Neritic
(Probable Shelf)

Fauna. *Lenticulina erecta* (V)
Lenticulina muensteri (R)
Shell fragments (P)

Washed Lithology. Dark gray shell hash or shelly shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Essentially barren of palynomorphs.

T.A.I. 2.8?

Remarks. Sparse organics. Mostly brown-black coaly fragments.

66) 94MU 65-4

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic - Turbid
(Middle to Outer Shelf)

Fauna. *Bathysiphon scintillata* (R)
Fish debris (R)
Glomospira subarctica (C)
Glomospirella arctica (F)
Haplophragmoides coronis (V)
Trochammina squamata (R)

Washed Lithology. Dark gray shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. ?*Cleistosphaeridium* sp. KE (F)
?*Cyclonephelium distinctum* (F)
Oligosphaeridium complex (thick-wall) (F)
Nelchinopsis kostromiensis (F)
Sentusidinium rioultii (C)
Pterospermopsis sp. (R)

T.A.I. 2.8

Remarks. Sparse organics.

67) 94MU 65-5

FORAMINIFERA

Age.	Early Cretaceous Probable Valanginian
Zone.	Probable F-13
Environment.	Possible Middle to Outer Neritic - Turbid (Possible Middle to Outer Shelf)
Fauna.	*Haplophragmoides inflatigrandis* (V)
Washed Lithology.	Dark gray shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Barren of palynomorphs.
T.A.I.	?
Remarks.	Very sparse organics. Mostly coaly fragments.

68) 94MU 72-1

FORAMINIFERA

Age.	Early Cretaceous Probable Neocomian (Undiff.)
Zone.	Probable F-12 to F-13
Environment.	Indeterminate
Fauna.	Barren of Foraminifera. Fish debris (R) Paper shale (F) Rounded frosted quartz floaters (F) Tar (R)
Washed Lithology.	Dark gray to black somewhat paper shale.

PALYNOLOGY

Age. Early Cretaceous
Hauterivian - Albian

Environment. Marine

Palynomorphs. *Gleicheniidites senonicus* (R)
Small indeterminate spore(?) (A)
Cleistosphaeridium sp. (F)
Cyclonephelium distinctum (V)
?Gardodinium deflandrei (V)
Gardodinium trabeculosum (V)
Gonyaulacysta sp. (V)
?Odontochitina operculata (fragment) (R)
Oligosphaeridium complex (R)
Pterospermopsis sp. (F)

T.A.I. 2.3

Remarks. Abundant amorphous organics.

69) 96MU 5

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray to black micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Probable Neocomian
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (F) *
Oligosphaeridium complex (thick-wall) (R)

T.A.I. 2.6

70) 96MU 14

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray silty micaceous shale or siltstone.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Early Cretaceous
Possible Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (R) *
Gardodinium trabeculosum (V)
Odontochitina operculata (V)
Oligosphaeridium complex (F)
Palaeoperidinium cretaceum (V)
Sentusidinium rioultii (V)

T.A.I. 2.5

71) 96MU 27

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic - Turbid
(Middle to Outer Shelf)

Fauna. *Ammobaculites erectus* (R)
Bathysiphon granulocoelia (R)
Gaudryina milleri (R)
Haplophragmoides coronis (C)

Haplophragmoides duoflatis (F)
Haplophragmoides goodenoughensis (R)
Haplophragmoides inflatigrandis (R)
Pyrite (F)
Pyrite sticks (F)
Thuramminoides sp. (F)

Washed Lithology. Dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. *Densosporites* sp. (V) *

T.A.I. 2.7?

Remarks. Sparse organic recovery. Mainly thick coaly fragments.

72) 96MU 27-1

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic - Turbid
(Middle to Outer Shelf)

Fauna. *Ammobaculites erectus* (R)
Ammodiscus asperus (R)
Gaudryina baillieuri (R)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (F)
Pyrite (R)
Pyrite sticks (R)
Recurvoides turbinatus (V)
Shell fragments? (R)
Thuramminoides sp. (R)
Trochammina instowensis (V)

Washed Lithology. Dark gray bentonitic? shale.

PALYNOLOGY

Age. Indeterminate

Environment. Nonmarine?

Palynomorphs. *?Classopollis classoides* (V)
Densosporites spp. (R) *
?Lycospora sp. (V) *
Taeniaesporites sp. (V) *

T.A.I. 2.7 - 3.0

Remarks. Sparse organics. Mainly coaly fragments.

73) 96MU 28

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic
(Middle to Outer Shelf)

Fauna. *Dentalina praecommunis* (V)
Gaudryina leffingwelli (V)
Gaudryina milleri (V)
Haplophragmoides duoflatis (R)
Lenticulina muensteri (R)
Shell fragments (R)

Washed Lithology. Dark gray slightly shelly shale.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cyclonephelium distinctum (A)
Gonyaulacysta sp. C (V)
Nelchinopsis kostromiensis (V)
Oligosphaeridium complex (thick-wall) (F)

T.A.I. 2.7 - 3.0

74) 96MU 28-1

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Light and dark gray speckled shale.

Discussion. Possible Valanginian based on washed lithology only.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. ?

Remarks. Extremely sparse organics. Essentially barren of organics.

75) 96MU 28-2

FORAMINIFERA

Age. Early Cretaceous
Probable Valanginian

Zone. Probable F-13

Environment. Probable Middle to Outer Neritic - Turbid
(Probable Middle to Outer Shelf)

Fauna. *Gaudryina tailleuri* (V)
Glomospira subarctica (F)
Haplophragmoides coronis (V)

Washed Lithology. Light and dark gray speckled shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Barren of palynomorphs.
T.A.I.	?
Remarks.	Essentially barren of organics.

76) 96MU 28-3

FORAMINIFERA

Age.	Early Cretaceous Valanginian
Zone.	F-13
Environment.	Inner to Middle Neritic (Inner to Middle Shelf)
Fauna.	*Ammobaculites vetusta* (V) *Astacolus strombecki* (R) *Globulina canadensis* (R) *Haplophragmoides coronis* (V) *Inoceramus* prisms (R) *Lenticulina muensteri* (R) Shell fragments (P)
Washed Lithology.	Dark gray shell hash or shelly shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Barren of palynomorphs.
T.A.I.	3.0?
Remarks.	Extremely sparse organics. Mainly coaly fragments.

77) 96MU 28-4

FORAMINIFERA

Age.	Early Cretaceous Valanginian
Zone.	F-13
Environment.	Inner to Middle Neritic (Inner to Middle Shelf)
Fauna.	*Globulina canadensis* (R) *Lenticulina muensteri* (F) *Lingulina loryi* (V) *Rectoglandulina kirschneri* (V) Shell fragments (P)
Washed Lithology.	Dark gray shell hash or shelly shale.

PALYNOLOGY

Age.	Indeterminate
Environment.	Indeterminate
Palynomorphs.	Barren of palynomorphs.
T.A.I.	?
Remarks.	Extremely sparse organics. Mainly coaly fragments.

78) 96MU 28-5

FORAMINIFERA

Age.	Early Cretaceous Valanginian
Zone.	F-13
Environment.	Middle to Outer Neritic - Turbid (Middle to Outer Shelf)
Fauna.	*Bathysiphon scintillata* (R) Fish debris (R) *Gaudryina milleri* (R) *Gaudryina tailleuri* (R)

Glomospira subarctica (C)
Glomospirella arctica (R)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (R)
Shell fragments (R)
Thuramminoides sp. (R)

Washed Lithology. Light and dark gray speckled shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. ?

Remarks. Extremely sparse organics. Mainly coaly fragments.

79) 96MU 28-6

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic - Turbid
(Middle to Outer Shelf)

Fauna. *Ammobaculites erectus* (C)
Gaudryina milleri (R)
Gaudryina tailleuri (R)
Glomospira subarctica (R)
Glomospirella arctica (F)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (R)

Washed Lithology. Dark gray slightly speckled shale.

PALYNOLOGY

Age. Neocomian
Undifferentiated

Environment. Marine

Palynomorphs. *Oligosphaeridium complex* (thick-wall) (F)
Sentusidinium rioultii (C)

T.A.I. 3.0

80) 96MU 28-7

FORAMINIFERA

Age. Early Cretaceous
Probable Valanginian

Zone. Probable F-13

Environment. Probable Middle to Outer Neritic - Turbid
(Probable Middle to Outer Shelf)

Fauna. *Ammobaculites erectus* (F)
Fish debris (F)
Glomospira subarctica (F)
Haplophragmoides coronis (R)
Haplophragmoides duoflatis (R)
Haplophragmoides goodenoughensis (R)

Washed Lithology. Dark gray shale.

PALYNOLOGY

Age. Neocomian
Undifferentiated

Environment. Marine

Palynomorphs. *Oligosphaeridium complex* (thick-wall) (F)
Sentusidinium rioultii (C)

T.A.I. 3.0

81) 96MU 30

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray sandy shale.

PALYNOLOGY

Age. Early Cretaceous
Possible Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (R) *
Lycopodiumsporites sp. (V)
Cyclonephelium distinctum (R)
Odontochitina operculata (V)
Oligosphaeridium complex (R)

T.A.I. 2.5

82) 96MU 30-1

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray shale.

PALYNOLOGY

Age. Early Cretaceous
Possible Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Endosporites sp. (V) *
Osmundacidites spp. (R)
Taeniaesporites spp. (R) *

Cyclonephelium distinctum (F)
Odontochitina operculata (V)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (V)

T.A.I. 2.3

83) 96MU 30-2

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray siltstone or silty shale.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (F) *
Osmundacidites spp. (R)
Gardodinium trabeculosum (V)
Odontochitina operculata (R)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (R)
Sverdrupiella usitata (V) *

T.A.I. 2.3

84) 96MU 30-3

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Middle to Outer Neritic - Turbid
(Middle to Outer Shelf)

Fauna. *Ammobaculites erectus* (F)
Ammobaculites reophacoides (R)
Ammodiscus asperus (R)
arenaceous spp. (large, coarse) (F)
Gaudryina leffingwelli (R)
Haplophragmoides duoflatis (R)
Pyrite (R)

Washed Lithology. Medium to dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. ?Tasmanaceae (A)
Unidentified spore and fragments, poorly preserved (R)

T.A.I. 2.6

Remarks. Relatively sparse organic recovery.

85) 96MU 33

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray siltstone or silty shale.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)

Densosporites spp. (C) *
Exesipollenites tumulus (F)
Podocarpidites sp. (V)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (V) *

T.A.I. 2.7

86) 96MU 33-1

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Pyrite (R)

Washed Lithology. Dark gray to black slickensided shale.

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (R)
Densosporites spp. (V) *

T.A.I. 2.3

Remarks. Abundant amorphous organics.

87) 96MU 33-2

FORAMINIFERA

Age. Late Jurassic to Early Cretaceous
Oxfordian to Valanginian

Zone. F-13 to F-16

Environment. Outer Neritic to Upper Bathyal - Turbid
(Outer Shelf to Upper Slope)

Fauna. *Gaudryina milleri* (R)
Haplophragmoides coronis (R)
Haplophragmoides duoflatis (F)
Haplophragmoides inflatigrandis (F)
Paper shale (R)
Pyrite sticks (F)

Washed Lithology. Dark gray to black slightly paper shale.

PALYNOLOGY

Age. Late Jurassic
Kimmeridgian - Tithonian(?)

Environment. Marine

Palynomorphs. *Densosporites* sp. (F) *
Punctatisporites spp. (F) *
Gonyaulacysta cladophora (V)
Pareodinia ceratophora (V)
Pareodinia osmingtonensis (A)

T.A.I. 2.6

Remarks. The limited assemblage indicates a post-Oxfordian age.

88) 96MU 33-7

FORAMINIFERA

Age. Late Jurassic to Early Cretaceous
Oxfordian to Valanginian

Zone. F-13 to F-16

Environment. Probable Middle to Outer Neritic - Turbid
(Probable Middle to Outer Shelf)

Fauna. *Ammobaculites reophacoides* (R)
Bathysiphon granulocoelia (R)
Cenosphaera spp. (pyritized) (F)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (F)
Haplophragmoides inflatigrandis (R)
Paper shale (R)
Pyrite sticks (C)
Trochammina instowensis (V)

Washed Lithology. Dark gray to black slightly paper shale.

PALYNOLOGY

Age. Late Jurassic
Oxfordian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Classopollis classoides (R)
Densosporites spp. (A) *
Indeterminate small spores (A)
Kraeuselisporites spp. (R) *
Lophozonotriletes rarituberculatus (F) *
Lundbladispora sp. (R) *
Lycopodiumsporites sp. (V)
Murospora varia (R) *
Punctatisporites spp. (R) *
?Acanthaulax senta (R)
Gonyaulacysta cladophora (F)
Nannoceratopsis pellucida (R)
?Sirmiodinium grossi (V)

T.A.I. 2.6 - 2.7

89) 96MU 38

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray shale.

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. *?Classopollis classoides* (V)
Densosporites spp. (R) *

T.A.I. 2.7?

90) 96MU 38-1

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray slightly silty shale.

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Indeterminate spore fragments (F)

T.A.I. 2.8?

91) 96MU 42

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray slightly silty shale.

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. *Densosporites* sp. (R) *
Indeterminate spore fragments (F)

T.A.I. 2.6?

92) 96MU 43

FORAMINIFERA

Age. Early Cretaceous
Barremian to Aptian

Zone. F-11 to F-12

Environment. Middle to Outer Neritic
(Middle to Outer Shelf)

Fauna. *Gavelinella stictata* (V)
Haplophragmoides coronis (V)
Inoceramus prisms (V)
Lenticulina macrodisca (V)
Valvulineria loetterlei (V)

Washed Lithology. Dark brownish-gray slightly silty micaceous shale.

PALYNOLOGY

Age. Probable Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites sp. (R) *
Oligosphaeridium complex (F)
Tasmanaceae (V)

T.A.I. 2.3 - 2.5

93) 96MU 46-2

FORAMINIFERA

Age. Early Cretaceous
Probable Barremian to Aptian

Zone. Probable F-11 to F-12

Environment. Marine (Undiff.)

Fauna. *Ammobaculites fragmentarius* (V)

Washed Lithology. Light and dark gray slightly micaceous shale.

PALYNOLOGY

Age. Probable Neocomian
Undifferentiated

Environment. Marine

Palynomorphs. ?*Cyclonephelium distinctum* (F)
?*Micrhystridium* spp. (A)
Oligosphaeridium complex (thick-wall) (C)

T.A.I. 2.8 - 3.0

Remarks. Poor preservation.

94) 96MU 46-3

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Limonite sticks (F)
Paper shale (R)

Washed Lithology. Dark gray slightly micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Classopollis classoides (C)

Excsipollenites tumulus (R)
Gleicheniidites senonicus (R)
Clathroctenocystis elegans (R)
?Gochteodinia villosa (V)
Gonyaulacysta sp. C (V)
Nelchinopsis kostromiensis (R)
Oligosphaeridium complex (thick-wall) (R)
Sentusidinium rioultii (V)

T.A.I. 2.8

95) 96MU 52

FORAMINIFERA

Age. Early Cretaceous
Probable Oxfordian to Valanginian

Zone. Probable F-13 to F-16

Environment. Probable Neritic (Undiff.)
(Probable Shelf)

Fauna. *Aminobaculites erectus* (V)
Haplophragmoides coronis (F)
Haplophragmoides duoflatis (F)

Washed Lithology. Dark gray shale.

PALYNOLOGY

Age. Late Jurassic
Oxfordian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Classopollis classoides (F)
Densosporites spp. (F) *
Gleicheniidites senonicus (R)
Hymenozonotriletes lepidophytus (V) *
Kraeuselisporites sp. (V) *
Lophozonotriletes rarituberculatus (R) *
Lycopodiumsporites sp. (F)
Punctatisporites spp. (R) *
Gonyaulacysta cladophora (R)
Gonyaulacysta jurassica (C)

Kalyptea diceras (R)
Nannoceratopsis pellucida (R)
Pareodinia osmingtonensis (A)
Sirmiodinium grossi (R)
Tubotuberella apatela (V)

T.A.I. 2.6

96) 96MU 54

FORAMINIFERA

Age. Early Cretaceous
Probable Barremian to Aptian

Zone. Probable F-11 to F-12

Environment. Marine (Undiff.)

Fauna. *Ammobaculites fragmentarius* (V)

Washed Lithology. Light and dark gray micaceous shale.

PALYNOLOGY

Age. Probable Early Cretaceous
Possible Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (R) *
Lycopodiumsporites spp. (R)
?*Muderongia* sp. 5 (V)
Nannoceratopsis gracilis (V) *
?*Odontochitina operculata* (V)
Oligosphaeridium complex (R)
Sverdrupiella usitata (V) *

T.A.I. 2.8 - 3.0

97) 96TM 20A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Classopollis classoides (R)
Densosporites spp. (F) *
Imbatodinium jaegeri (R)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (R) *

T.A.I. 2.7

98) 96TM 21B

FORAMINIFERA

Age. Early Cretaceous
Probable Aptian

Zone. Probable F-11

Environment. Probable Neritic (Undiff.)
(Probable Shelf)

Fauna. *Ammobaculites fragmentarius* (F)
Haplophragmoides excavatus (F)
Haplophragmoides topagorukensis (R)
Textularia topagorukensis (R)

Washed Lithology. Brownish-gray slightly sandy micaceous shale.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Gleicheniidites senonicus (R)
Lycopodiumsporites sp. (V)
Cyclonephelium distinctum (R)
Pterospermopsis sp. (V)

T.A.I. 3.0

99) 96TM 21C

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray slightly sandy micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Possible Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Densosporites spp. (R) *
?*Klukisporites* sp. (V)
?*Cyclonephelium distinctum* (R)

T.A.I. 3.0

Remarks. Poor preservation.

100) 96TM 22A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Odontochitina operculata (V)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (R) *

T.A.I. 2.7 - 2.8

101) 96TM 25

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark brownish-gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Cyclonephelium distinctum (R)
Cardodinium trabeculosum (V)
Muderongia sp. 5 (V)
Odontochitina operculata (V)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (V) *
Palaeoperidinium cretaceum (R)

T.A.I. 2.7

102) 96TM 28A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark brownish-gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. *Densosporites* spp. (F) *

T.A.I. 2.8 - 3.0

Remarks. Very poor preservation.

103) 96TM 28B

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (R)

T.A.I. 3.8

104) 96TM 40A

FORAMINIFERA

Age. Early Cretaceous
Valanginian

Zone. F-13

Environment. Outer Neritic to Upper Bathyal - Turbid
(Outer Shelf to Upper Slope)

Fauna. *Ammobaculites erectus* (F)
Gaudryina leffingwelli (R)
Gaudryina milleri (F)
Glomospira subarctica (C)
Glomospirella arctica (R)
Haplophragmoides coronis (R)
Haplophragmoides duoflatis (R)
Haplophragmoides inflatigrandis (R)

Washed Lithology. Dark gray bentonitic? shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs.	Barren of palynomorphs.
T.A.I.	3.0?
Remarks.	Very sparse organics. Some coaly fragments.

105) 96TM 41A

FORAMINIFERA

Age.	Early Cretaceous Probable Oxfordian to Valanginian
Zone.	Probable F-13 to F-16
Environment.	Marine (Undiff.)
Fauna.	*Haplophragmoides duoflatis* (R)
Washed Lithology.	Dark gray slickensided shale.

PALYNOLOGY

Age.	Late Jurassic Oxfordian
Environment.	Marine
Palynomorphs.	Undifferentiated bisaccates (R) *Densosporites* spp. (F) * *Punctatisporites* spp. (R) * *Atopodinium prostatum* (R) *?Chytroeisphaeridia pericompsa* (R) *Pareodinia osmingtonensis* (C)
T.A.I.	2.6 - 2.7

106) 96TM 42A

FORAMINIFERA

Age.	Early Cretaceous Probable Valanginian to Hauterivian
Zone.	Probable F-13

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)
Rounded frosted quartz floaters (F)
Tar (R)

Washed Lithology. Dark gray to black somewhat paper shale.

PALYNOLOGY

Age. Indeterminate

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)
Small indeterminate spore(?) (A)
Baltisphaeridium sp. (R)
Micrhystridium spp. (R)
Pterospermopsis sp. (R)

T.A.I. 2.3

Remarks. Abundant amorphous organics.

This sample appears to be from the same stratigraphic interval as 94MU 72-1.

Both samples consist largely of amorphous organic material and have an abundance of the same indeterminate spore(?).

107) 96TM 46B

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Possible Early Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Lycopodiumsporites sp. (V)
Oligosphaeridium complex (F)
?Sentusidinium rioultii (V)

T.A.I. 2.3 - 2.5

108) 96TM 48C

FORAMINIFERA

Age. Early Cretaceous
Probable Aptian

Zone. Probable F-11

Environment. Marine (Undiff.)

Fauna. *Bathysiphon scintillata* (V)
Gypsum (R)

Washed Lithology. Dark gray micaceous shale.

PALYNOLOGY

Age. Possible Early Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Lycopodiumsporites sp. (V)
Odontochitina operculata (V)
Oligosphaeridium complex (V)
Sirmiodinium grossi (V)

T.A.I. 2.3 - 2.5

109) 96TM 49A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray micaceous shale.

Discussion. Possible Barremian to Aptian based on washed lithology only.

PALYNOLOGY

Age. Probable Cretaceous Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Lycopodiumsporites sp. (R)
?*Odontochitina operculata* (V)
Oligosphaeridium complex (R)
Tasmanaceae (V)

T.A.I. 2.3 - 2.5

Remarks. Poor preservation.

REFERENCE

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

Interpreted by:

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Palynology
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MBM:HH:bc

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

BIOSTRATIGRAPHY REPORT

74 OUTCROP SAMPLES

WESTERN DELONG MOUNTAINS FIELD PARTY

NORTH SLOPE, ALASKA

Job No. 96-118March 20, 1997

March 20, 1997

TO: Gil Mull
State of Alaska, Department of Natural Resources
Division of Geological and Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, Alaska 99709-3645

SUBJECT: Biostratigraphic Report - Western Delong Mountains Field Party Outcrop Samples from North Slope, Alaska

INTRODUCTORY SUMMARY

A second group of outcrop samples from the Western Delong Mountains Field Party was submitted for biostratigraphic analysis. The samples, which totaled 74, were selectively analyzed for Foraminifera and/or palynomorphs.

This report is a continuation of the 109 sample study that was completed on December 4, 1996.

RESULTS

The interpretations for the age, zone and environment of deposition are given for each discipline. A list of the recovered microfossils is provided for each sample. The foraminiferal analysis also includes a washed lithology description.

The foraminiferal abundances represent the following quantities: V = very rare (single specimen), R = rare (2 - 5 specimens), F = frequent (6 - 25 specimens), C = common (26 - 100) specimens), A = abundant (101 - 999 specimens) and P = prolific (1000)+ specimens).

The reported palynomorph abundances represent the following quantities: V = very rare (single specimen), R = rare (2 - 5 specimens), F = frequent (6 - 15 specimens), C = common (16 - 30 specimens) and A = abundant (greater than 30 specimens). An asterisk (*) denotes reworked forms.

The palynological analysis also includes the visual estimate of the thermal alteration index (T.A.I.). The T.A.I. estimations are usually tentative when examining surface sample material. Past studies (Haga, H., unpublished report) have shown that weathered samples taken near the ground surface can contain significantly different organic constituent percentages when compared to unweathered samples taken from the same stratigraphic unit. The weathering can also alter palynomorph coloration through chemical processes. Often the chemical alteration will darken sporomorph walls. Having stated the above caveats, it appears that most of the T.A.I. values seen in these samples are within the mature range for hydrocarbon generation.

MCI #	DGGS SAMPLE NO.	PALEONTOLOGIC AGE	ENVIRONMENT	LOCATION	FORMATION	QUADRANGLE	LAT	LONG
110	96 Mu 4	Palynology- Probable Aptian-Albian	Marine	NW of Poko Mtn	Kto ss	Delong Mtn	68.872	-162.42
111	96 Mu 6	Palynology- Probable Aptian-Albian	Marine	NW of Poko Mtn	Kto ss	Delong Mtn	68.663	-162.629
112	96 Mu 12	Foraminifera- Indeterminate Palynology- Early Cretaceous Undifferentiated	Indeterminate Marine	Kukpowruk River	Kto	Delong Mtn	68.773	-163.155
113	96 Mu 13	Palynology- Early Cretaceous Undifferentiated	Marine	Eagle Creek	Kto	Delong Mtn C2	68.734	-163.076
114	96 Mu 16	Palynology- Probable Aptian-Albian	Marine	Adventure Creek	Kto	Misheguk Mtn	68.837	-161.156
115	96 Mu 18	Foraminifera- Indeterminate Palynology- Possible Aptian-Albian	Indeterminate Marine	Tupikchak syncline	Knc	Delong Mtn	68.961	-162.529
116	96 Mu 20	Palynology- Indeterminate	No evidence of marine	Eagle Creek	Kto	Delong Mtn C2	68.741	-162.896
117	96 Mu 20-1	Palynology- Indeterminate	No evidence of marine	Eagle Creek	Kto	Delong Mtn C2	68.74	-162.899
118	96 Mu 21	Foraminifera- Indeterminate Palynology- Probable Aptian-Albian	Indeterminate Marine	Upper Kukpowruk	Kbl	Delong Mtn B2	68.464	-162.932
119	96 Mu 26	Foraminifera- Possible Valanginian Palynology- Indeterminate	Marine (Undif.) Indeterminate	Kukpowruk River	??	Delong Mtn C3	68.562	-163.498
120	96 Mu 33-5	Foraminifera- Possible Hauterivian to Barremian Palynology- Cretaceous Undifferentiated	Indeterminate Marine	Thetis Creek	KJk	Delong Mtn C5	68.672	-164.78
121	96 Mu 33-6	Foraminifera- Indeterminate Palynology- Cretaceous Undifferentiated	Indeterminate Marine	Thetis Creek	KJk	Delong Mtn C5	68.672	-164.78
122	96 Mu 34	Foraminifera- Probable Oxfordian Palynology- Oxfordian	Middle to Outer Neritic-Turbid -(Middle to Outer Shelf) Marine	Thetis Creek	KJk	Delong Mtn C5	68.679	-164.746
123	96 Mu 35-2	Foraminifera- Possible Hauterivian to Barremian Palynology- Probable Aptian-Albian	Indeterminate Marine	Thetis Ridge	KJk	Delong Mtn C5	68.681	-164.609
124	96 Mu 35-3	Palynology- Probable Aptian-Albian	Marine	Thetis Ridge	KJk	Delong Mtn C5	68.684	-164.603
125	96 Mu 35-4	Palynology- Probable Aptian-Albian	Marine	Thetis Ridge	Kto	Delong Mtn C5	68.685	-164.595
126	96 Mu 35-5	Palynology- Probable Aptian-Albian	Marine	Thetis Ridge	Kto	Delong Mtn C5	68.687	-164.589
127	96 Mu 39	Palynology- Probable Early Cretaceous Undiff.	Marine	Lower Ilgluruk Ck	Kto	Misheguk Mtn C5	68.739	-161.751
128	96 Mu 40	Palynology- Indeterminate	No evidence of marine	Lower Ilgluruk Ck	Kto	Misheguk Mtn C5	68.728	-161.706

NOTE: Table compiled by C.G.Mull 12/97

129	96 Mu 53	Palynology- Probable Aptian-Albian	Marine	Pitmegea River	Kto	Delong Mtn C4	68.697	-163.867
130	96 Mu 53-1	Palynology- Probable Aptian-Albian	Marine	Pitmegea River	Kto	Delong Mtn C4	68.697	-163.867
131	96 Mu 57-4	Foraminifera- Indeterminate Palynology- Early-Middle Jurassic Undiff.	Indeterminate Marine	Kukpowruk River	KJk	Delong Mtn C4	68.529	-163.266
132	96 Ha 10	Foraminifera- Indeterminate Palynology- Possible Aptian-Albian	Indeterminate Marine	W. of Surprise C.	Kto	Delong Mtn D2	68.853	-162.944
133	96 Ha 11	Foraminifera- Indeterminate Palynology- Cretaceous Undifferentiated	Indeterminate Marginal Marine	W. of Surprise C.	Kto	Delong Mtn D2	68.853	-162.937
134	96 Ha 15	Foraminifera- Indeterminate Palynology- Cretaceous Undifferentiated	Indeterminate Marginal Marine	W. of Surprise C.	Kto	Delong Mtn D2	68.833	-162.783
135	96 Ha 16	Foraminifera- Indeterminate Palynology- Early Cretaceous Undifferentiated	Indeterminate Marginal Marine	W. of Surprise C.	Kto	Delong Mtn D2	68.854	-162.902
136	96 Ha 19	Palynology- Possible Barremian-Aptian	Marine	S. Fk. Tupikchak Ck.	Kto	Delong Mtn D1	68 904	-162.59
137	96 Ha 20	Palynology- Probable Aptian-Albian	Marine	Eagle Ck.	Kto	Delong Mtn D2	68.76	-163.124
138	96 Ha 27	Palynology- Cretaceous Undifferentiated	Marine	Spike/Iligluruk Ck.	Kbl/Kmk	Misheguk Mtn C5	68.706	-161.727
139	96 Ha 29	Palynology- Probable Early Cretaceous Undiff.	Marine	Spike/Iligluruk Ck.	Kbl/Kmk	Misheguk Mtn C5	68.71	-161.72
140	96 Ha 45	Palynology- Probable Aptian-Albian	Marine	NE of Thetis Ridge	Kto	Delong Mtn C5	68.694	-164.541
141	96 Ha 49	Palynology- Probable Aptian-Albian	Marine	NE of Thetis Ridge	Kto	Delong Mtn C5	68.711	-164.496
142	96 Ha 50	Palynology- Probable Aptian-Albian	Marine	NE of Thetis Ridge	Kto	Delong Mtn C5	68.72	-164.462
143	96 Ha 52	Palynology- Indeterminate	No evidence of marine	Kokolik River	Kto	Delong Mtn C1	68.723	-162.068
144	96 Ha 56	Palynology- Indeterminate	No evidence of marine	Upper Pitmegea R.	Kbl	Delong Mtn C4	68.617	-163.801
145	96 Ha 58	Palynology- Indeterminate	No evidence of marine	Upper Pitmegea R.	Kbl	Delong Mtn C4	68.622	-163.836
146	96 Ha 62	Palynology- Indeterminate	No evidence of marine	Sooner/Kukpowruk R.	Kmk	Delong Mtn C3	68.566	-163.432
147	96 Ha 68	Palynology- Indeterminate	No evidence of marine	Spike Creek	Kbl	Misheguk Mtn C5	68.639	-161.772
148	96 Ha 69	Palynology- Indeterminate	No evidence of marine	Spike Creek	Kbl	Misheguk Mtn C5	68.643	-161.775

NOTE: Table compiled by C.G.Mull 12/97

149	96 Ha 70	Palynology- Indeterminate	No evidence of marine	Spike Creek	Kbl	Misheguk Mtn C5	68 65	-161.773
150	96 TM 12A	Palynology- Probable Cretaceous Undifferentiated	Marine	NW of Poko Mtn	Kto	Delong Mtn D2	68.861	-162.702
151	96 TM 16A	Palynology- Probable Aptian-Albian	Marine	E. of Surprise C.	Kto	Delong Mtn D2	68.872	-162.75
152	96 TM 29B	Palynology- Indeterminate	No evidence of marine	Iligluruk Creek	Kbl	Misheguk Mtn C5	68 699	-161.726
153	96 TM 29D	Palynology- Indeterminate	No evidence of marine	Iligluruk Creek	Kbl?????	Misheguk Mtn C5	68.699	-161.726
154	96 TM 30C	Palynology- Indeterminate	No evidence of marine	Iligluruk Creek	Kbl	Misheguk Mtn C5	68 697	-161.736
155	96 TM 31B	Palynology- Indeterminate	No evidence of marine	Iligluruk Creek	Kbl	Misheguk Mtn C5	68.695	-161.732
156	96 TM 32B	Palynology- Indeterminate	No evidence of marine	Iligluruk Creek	Kbl	Misheguk Mtn C5	68 706	-161.73
157	96 TM 33B	Palynology- Indeterminate	No evidence of marine	Spike Creek	Kbl	Misheguk Mtn C5	68.655	-161.776
158	96 TM 43A	Foraminifera- Indeterminate Palynology- Possible Barremian-Aptian	Indeterminate Marine	Ipewik River	KJk	Delong Mtn C5	68.63	-164.582
159	96 TM 44A	Foraminifera- Possible Hauterivian to Barremian Palynology- Cretaceous Undifferentiated	Marine (Undiff.) Marine	Ipewik River	KJk	Delong Mtn C5	68.623	-164.562
160	96 TM 45A	Foraminifera- Possible Hauterivian to Barremian Palynology- Hauterivian - Albian	Middle to Outer Neritic -(Middle to Outer Shelf) Marine	Ipewik River	KJk	Delong Mtn C5	68.604	-164.545
161	96 TM 45B	Foraminifera- Possible Hauterivian to Barremian Palynology- Probable Aptian-Albian	Marine (Undiff.) Marine	Ipewik River	Kbl	Delong Mtn C5	68 604	-164.545
162	96 TM 54B	Palynology- Indeterminate	No evidence of marine	Iligluruk Creek	Kbl	Misheguk Mtn C5	68 641	-161.44
163	96 TM 55B	Palynology- Hauterivian	Marine	Iligluruk Creek	Kbl	Misheguk Mtn C5	68.652	-161.492
164	96 TM 56A	Palynology- Indeterminate	No evidence of marine	Iligluruk Creek	Kbl	Misheguk Mtn C5	68.66	-161.512
165	96 TM 57A	Palynology- Indeterminate	No evidence of marine	Iligluruk Creek	Kbl	Misheguk Mtn C5	68.665	-161.524
166	96 TM 58A	Palynology- Indeterminate	Marine?	Iligluruk Creek	Kbl	Misheguk Mtn C5	68.667	-161.531
167	96 TM 66C	Palynology- Probable Early Cretaceous Undiff.	Marine	Eagle Ck. nose	Kmk	Delong Mtn D1	68.77	-162.632
168	94 Mu 43-1	Palynology- Valanginian	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376

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NOTE: Table compiled by C.G.Mull 12/97

169	94 Mu 43-2	Palynology- Hauterivian	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
170	94 Mu 43-3	Palynology- Indeterminate	No evidence of marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
171	94 Mu 43-4	Palynology- Hauterivian	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
172	94 Mu 43-5	Palynology- Hauterivian	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
173	94 Mu 43-6	Palynology- Probable Hauterivian	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
174	94 Mu 43-7	Palynology- Early Cretaceous Undifferentiated	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
175	94 Mu 43-8	Palynology- Probable Hauterivian	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
176	94 Mu 43-9	Palynology- Indeterminate	Indeterminate	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
177	94 Mu 43-10	Palynology- Probable Hauterivian	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
178	94 Mu 43-11	Palynology- Probable Hauterivian	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
179	94 Mu 43-12	Palynology- Probable Hauterivian	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
180	94 Mu 43-13	Palynology- Probable Hauterivian	Marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
181	94 Mu 43-14	Palynology- Cretaceous Undifferentiated	Marine?	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
182	94 Mu 43-15	Palynology- Cretaceous Undifferentiated	No evidence of marine	Tingmerkpuk River measured section	Kbl	Delong Mtn C1	68.562	-162.376
				Tingmerkpuk River	Kbl	Delong Mtn C1	68.562	-162.376

110) 96MU 4

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Densosporites spp. (F) *
Lycopodiumsporites spp. (C)
Osmundacidites spp. (R)
Cyclonephelium distinctum (F)
Cardodinium deflandrei (F)
Cardodinium trabeculosum (R)
Microdinium opacum (V)
Odontochitina operculata (R)
Oligosphaeridium complex (A)
Palaeoperidinium cretaceum (R)

T.A.I. 2.5 - 2.7

111) 96MU 6

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (R) *
Endosporites sp. (V) *
Osmundacidites spp. (R)
Cyclonephelium distinctum (R)
Muderongia tetracantha (R)
Odontochitina operculata (R)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (R) *
Palaeoperidinium cretaceum (R)
Spiniferites sp. (V)

T.A.I. 2.3 - 2.5

Remarks. Poor preservation.

112) 96MU 12

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Deltoidospora sp. (V)
Densosporites spp. (R) *
Cyclonephelium distinctum (R)
?*Gardodinium trabeculosum* (R)
Oligosphaeridium complex (R)

T.A.I. 2.5 - 2.7

Remarks. Very poor preservation.

113) 96MU 13

PALYNOLOGY

Age. Early Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Densosporites spp. (R) *
?*Gleicheniidites senonicus* (V)
?*Gardodinium trabeculosum* (V)

T.A.I. 2.8

Remarks. Very poor preservation.

114) 96MU 16

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Gleicheniidites senonicus (R)
Lycopodiumsporites spp. (R)
Cyclonephelium distinctum (R)
Gardodinium deflandrei (R)
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (V) *

T.A.I. 2.3 - 2.5

115) 96MU 18

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Possible Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (R) *
Lycopodiumsporites spp. (R)
Cyclonephelium distinctum (R)
Micrhystridium spp. (R)

Odontochitina operculata (V)
Oligosphaeridium complex (R)
Palaeoperidinium cretaceum (V)

T.A.I. 2.3 - 2.5

116) 96MU 20

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (R) *
Gleicheniidites senonicus (R)
Lycopodiumsporites spp. (R)

T.A.I. 2.7

117) 96MU 20-1

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (F)
Cicatricosisporites sp. (V)

T.A.I. 2.7

Remarks. Poor preservation.

118) 96MU 21

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray micaceous siltstone.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (R) *
Gleicheniidites senonicus (R)
Taxodiaceae (R)
Cyclonephelium distinctum (R)
Florentinia cooksoniae (V) *
Gardodinium deflandrei (R)
Muderongia tetracantha (R)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (R) *
Sentusidinium rioultii (V)

T.A.I. 2.5

119) 96MU 26

FORAMINIFERA

Age. Early Cretaceous
Possible Valanginian

Zone. Possible F-13

Environment. Marine (Undiff.)

Fauna. Barren of Foraminifera.
Buchia molds? (C)

Washed Lithology. Medium to dark gray shelly shale.

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Barren of palynomorphs.

T.A.I. ?

Remarks. Essentially barren of organics.

120) 96MU 33-5

FORAMINIFERA

Age. Possible Early Cretaceous
Possible Hauterivian to Barremian

Zone. Possible F-12 to F-13

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Fish debris (R)
Rounded frosted quartz floaters (F)

Washed Lithology. Black shale.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)
Cicatricosisporites sp. (V)
Densosporites sp. (V) *
Lycopodiumsporites spp. (R)
Cyclonephelium distinctum (F)
Odontochitina operculata (V)
Oligosphaeridium complex (R)
Pterospermopsis sp. (R)

T.A.I. 2.5 - 2.7

Remarks. The presence of *Odontochitina operculata* suggests a Cretaceous age no older than Hauterivian.

121) 96MU 33-6

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray very fine grained sandstone or sandy shale.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)
Densosporites sp. (R) *
Lycopodiumsporites spp. (R)
Cyclonephelium distinctum (R)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (R) *
Palaeoperidinium cretaceum (V)

T.A.I. 2.5 - 2.7

122) 96MU 34

FORAMINIFERA

Age. Probable Late Jurassic
Probable Oxfordian

Zone. Probable F-16

Environment. Middle to Outer Neritic - Turbid
(Middle to Outer Shelf)

Fauna. *Ammobaculites alaskensis* (F)
Ammobaculites barrowensis (R)
Ammodiscus asperus (V)
Glomospirella arctica (R)
Haplophragmoides spp. (C)
Haplophragmoides canui (R)

Pyrite sticks (F)

Washed Lithology. Dark gray shale.

PALYNOLOGY

Age. Late Jurassic
Oxfordian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Densosporites sp. (F) *
Lycopodiumsporites spp. (R)
Taeniaesporites sp. (V) *
Tripartites vetustus (V) *
Gonyaulacysta jurassica (A)
Nannoceratopsis pellucida (R)
Pareodinia osmingtonensis (F)
Sirmiodinium grossi (F)

T.A.I. 2.7

123) 96MU 35-2

FORAMINIFERA

Age. Possible Early Cretaceous
Possible Hauterivian to Barremian

Zone. Possible F-12 to F-13

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (C)
Rounded frosted quartz floaters (C)

Washed Lithology. Dark gray to black paper shale.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)
Cardodinium deflandrei (V)
Odontochitina operculata (R)
Oligosphaeridium complex (R)
Pterospermopsis sp. (R)

T.A.I. 2.3 - 2.5

Remarks. Abundant amorphous organics.

124) 96MU 35-3

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Deltoidospora spp. (R)
Densosporites spp. (R) *
Gleicheniidites senonicus (R)
Kraeuselisporites sp. (V) *
Lycopodiumsporites spp. (R)
Cyclonephelium distinctum (R)
Cardodinium deflandrei (V)
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (V) *

T.A.I. 2.5

125) 96MU 35-4

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Cornutisporites seebergensis (R) *
Densosporites spp. (F) *

Gleicheniidites senonicus (R)
Cyclonephelium distinctum (R)
Muderongia tetracantha (V)
Odontochitina operculata (R)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (V) *

T.A.I. 2.5

126) 96MU 35-5

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Gleicheniidites senonicus (R)
Kraeuselisporites sp. (V) *
Lycopodiumsporites spp. (R)
Osmundacidites spp. (R)
Cyclonephelium distinctum (R)
Muderongia tetracantha (V)
Oligosphaeridium complex (R)

T.A.I. 2.5

127) 96MU 39

PALYNOLOGY

Age. Probable Early Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Densosporites sp. (R) *
Gleicheniidites senonicus (V)
Lycopodiumsporites spp. (R)
Zebrasporites sp. (V) *
Microdinium opacum (R)

T.A.I. 2.5 - 2.7

Remarks. Very poor preservation.

128) 96MU 40

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (R) *
Gleicheniidites senonicus (V)

T.A.I. 2.7

129) 96MU 53

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Densosporites spp. (F) *
Lycopodiumsporites spp. (R)
Osmundacidites spp. (R)
Trilobosporites sp. (V)
Cyclonephelium distinctum (R)
Odontochitina operculata (R)
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (R) *
Palaeoperidinium cretaceum (R)

T.A.I. 2.3 - 2.5

130) 96MU 53-1

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Gleicheniidites senonicus (R)
Lycopodiumsporites spp. (R)
Osmundacidites spp. (R)
Taeniaesporites sp. (V) *
Cleistosphaeridium sp. (R)
Imbatodinium jaegeri (R)
Odontochitina operculata (R)
Oligosphaeridium complex (F)
Sverdrupiella usitata (V) *

T.A.I. 2.3 - 2.5

131) 96MU 57-4

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (F)

Washed Lithology. Dark gray slightly paper shale.

PALYNOLOGY

Age. Early - Middle Jurassic
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (R) *
Nannoceratopsis gracilis (F)
Tasmanaceae (F)

T.A.I. 2.7

Remarks. Abundant amorphous organics.

132) 96HA 10

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Possible Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Cicatricosisporites sp. (V)
Densosporites spp. (R) *
Cardodinium trabeculosum (V)
Oligosphaeridium complex (thick-wall) (V) *
Pareodinia cf. *P. alaskensis* (V) *

T.A.I. 2.5

133) 96HA 11

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray slightly micaceous shale.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marginal Marine

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (R) *
Lycopodiumsporites sp. (V)
Oligosphaeridium complex (R)

T.A.I. 2.7

Remarks. Poor preservation.

134) 96HA 15

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray slightly micaceous shale.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marginal Marine

Palynomorphs. Undifferentiated bisaccates (R)
Densosporites spp. (R) *
Cyclonephelium distinctum (R)
Oligosphaeridium complex (thick-wall) (R)

T.A.I. 2.7

135) 96HA 16

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.

Washed Lithology. Dark gray slightly micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Undifferentiated

Environment. Marginal Marine

Palynomorphs. Undifferentiated bisaccates (C)
Densosporites spp. (R) *
Trilobosporites sp. (V)
Cyclonephelium distinctum (R)

T.A.I. 2.6

136) 96HA 19

PALYNOLOGY

Age. Early Cretaceous
Possible Barremian - Aptian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Gardodinium deflandrea (V)
Microdinium opacum (V)
Odontochitina operculata (F)
Oligosphaeridium complex (A)

T.A.I. 2.7

Remarks. Mainly amorphous organics.

137) 96HA 20

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)

Cornutisporites seebergensis (V) *
Deltoidospora spp. (R)
Densosporites spp. (F) *
Lycopodiumsporites spp. (R)
Gardodinium trabeculosum (V) *
Muderongia sp. 5 (R)
Odontochitina operculata (R)
Oligosphaeridium complex (F)

T.A.I. 2.5

138) 96HA 27

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)
Densosporites spp. (V) *
Gleicheniidites senonicus (R)
Odontochitina operculata (V)

T.A.I. 2.5+

139) 96HA 29

PALYNOLOGY

Age. Probable Early Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)
Densosporites sp. (V) *
Gleicheniidites senonicus (R)
Herendeenia alaskaensis (V) *
Oligosphaeridium complex (V)

T.A.I. 2.5+

Remarks. Poor preservation. The palynomorph assemblage is very sparse. The incomplete assemblage suggests that the Hauterivian age marker *Herendeenia alaskensis* is a reworked specimen.

140) 96HA 45

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Deltoidospora spp. (R)
Densosporites spp. (F) *
Cyclonephelium distinctum (V)
Odontochitina operculata (R)
Oligosphaeridium complex (R)
Palaeoperidinium cretaceum (R)

T.A.I. 2.3 - 2.5

141) 96HA 49

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Deltoidospora spp. (R)
Densosporites spp. (R) *
Lycopodiumsporites spp. (R)
Zebrasporites sp. (V) *
Gardodinium deflandrei (V)
Odontochitina operculata (R)
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (V) *
Palaeoperidinium cretaceum (R)

T.A.I. 2.3 - 2.5

142) 96HA 50

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (R) *
Lycopodiumsporites sp. (V)
Osmundacidites spp. (F)
Cyclonephelium distinctum (V)
Cardodinium deflandrei (V)
Muderongia tetracantha (V)
Muderongia sp. 5 (V)
Oligosphaeridium complex (V)
Palaeoperidinium cretaceum (R)

T.A.I. 2.3 - 2.5

143) 96HA 52

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (V)
Densosporites sp. (V) *

T.A.I. 2.5+

144) 96HA 56

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (V)
Densosporites spp. (R) *

T.A.I. 2.5 - 2.7

145) 96HA 58

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. *Densosporites* sp. (V) *
Gleicheniidites senonicus (V)

T.A.I. 2.7

146) 96HA 62

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (R)
Cicatricosisporites sp. (V)
Gleicheniidites senonicus (V)

T.A.I. 2.7

147) 96HA 68

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Indeterminate spore(?) fragments (R)

T.A.I. 2.5 - 2.7

148) 96HA 69

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. *Densosporites* spp. (R) *
Gleicheniidites senonicus (R)

T.A.I. 2.7

149) 96HA 70

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Indeterminate spore fragments (F)
?*Densosporites* spp. (R) *
?*Gleicheniidites senonicus* (R)

T.A.I. 2.3 - 2.5

Remarks. Poor preservation.

150) 96TM 12A

PALYNOLOGY

Age. Probable Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Micrhystridium sp. (V)
Oligosphaeridium complex (R)
Tasmanaceae (V)

T.A.I. 2.5

151) 96TM 16A

PALYNOLOGY

Age. Probable Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Osmundacidites spp. (R)
Gochteodinia villosa (V) *
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (R) *

T.A.I. 2.5

Remarks. The single specimen of *Gochteodinia villosa*, a Valanginian age dinocyst, is presumed to be reworked.

152) 96TM 29B

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (F)
Densosporites spp. (R) *

T.A.I. 2.5+

153) 96TM 29D

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (F)
Densosporites spp. (R) *

T.A.I. 2.5+

154) 96TM 30C

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (R)
Densosporites spp. (R) *

T.A.I. 2.5+

155) 96TM 31B

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Indeterminate spores and spore fragments (R)

T.A.I. 2.5 - 2.7

156) 96TM 32B

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (R)
Densosporites spp. (R) *
Osmundacidites spp. (R)

T.A.I. 2.5+

157) 96TM 33B

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (R)

T.A.I. 2.7

158) 96TM 43A

FORAMINIFERA

Age. Indeterminate

Environment. Indeterminate

Fauna. Barren of Foraminifera.
Paper shale (R)

Washed Lithology. Black slightly paper shale.

PALYNOLOGY

Age. Early Cretaceous
Possible Barremian - Aptian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Cleistosphaeridium spp. (R)
Cyclonephelium distinctum (A)
Gardodinium deflandrei (V)
Muderongia tetracantha (V)
Odontochitina operculata (C)
Oligosphaeridium complex (F)
Oligosphaeridium complex (thick-wall) (R)
Palaeoperidinium cretaceum (R)
Pterospermopsis sp. (V)
Tasmanaceae (R)

T.A.I. 2.3 - 2.5

Remarks. Abundant amorphous organics.

159) 96TM 44A

FORAMINIFERA

Age. Early Cretaceous
Possible Hauterivian to Barremian

Zone. Possible F-12 to F-13

Environment. Marine (Undiff.)

Fauna. *Bathysiphon granulocoelia* (V)
Coal (F)
Haplophragmoides coronis (R)
Haplophragmoides duoflatis (V)

Washed Lithology. Dark gray very fine grained mica coaly sandstone or sandy shale.

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (V) *
Cyclonephelium distinctum (V)
Odontochitina operculata (V)
Oligosphaeridium complex (F)
Pterospermopsis sp. (V)

T.A.I. 2.3 - 2.5

Remarks. The single specimen of *Odontochitina operculata* suggests an age of Hauterivian or younger Cretaceous.

160) 96TM 45A

FORAMINIFERA

Age. Early Cretaceous
Possible Hauterivian to Barremian

Zone. Possible F-12 to F-13

Environment. Middle to Outer Neritic
(Middle to Outer Shelf)

Fauna. *Conorboides umiatensis* (F)
Gaudryina tailleuri (V)
Haplophragmoides coronis (R)

Washed Lithology. Dark gray silty shale.

PALYNOLOGY

Age. Early Cretaceous
Hauterivian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Deltoidospora spp. (R)
Densosporites spp. (F) *
Cyclonephelium distinctum (V)
Cardodinium deflandrei (V)
Muderongia tetracantha (V)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (V)
Palaeoperidinium cretaceum (V)
?Parcodinia osmingtonensis (V) *
Pterospermopsis sp. (R)
Tasmanaceae (R)

T.A.I. 2.3 - 2.5

161) 96TM 45B

FORAMINIFERA

Age. Early Cretaceous
Possible Hauterivian to Barremian

Zone. Possible F-12 to F-13

Environment. Marine (Undiff.)

Fauna. *Ammobaculites erectus* (F)
Haplophragmoides coronis (R)

Washed Lithology. Dark gray slightly silty micaceous shale.

PALYNOLOGY

Age. Early Cretaceous
Probable Aptian - Albian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (F) *
Lycopodiumsporites spp. (R)
Vitreisporites pallidus (V)

Muderongia sp. 5 (V)
Muderongia tetracantha (V)
Odontochitina operculata (R)
Oligosphaeridium complex (R)
Palaeoperidinium cretaceum (V)

T.A.I. 2.3 - 2.5

162) 96TM 54B

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. *Deltoidospora* spp. (R)
Densosporites spp. (R) *

T.A.I. 2.5+

163) 96TM 55B

PALYNOLOGY

Age. Early Cretaceous
Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Densosporites spp. (R) *
Gardodinium trabeculosum (F)
Imbatodinium jaegeri (V)
Odontochitina operculata (F)
Odontochitina sp. 1 (R)
Oligosphaeridium complex (R)
Tubotuberella uncinatum (V)

T.A.I. 2.3 - 2.5

164) 96TM 56A

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (R)
Indeterminate spore fragments (R)

T.A.I. 2.7

165) 96TM 57A

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. *Gleicheniidites senonicus* (V)
Indeterminate spore fragments (R)

T.A.I. 2.8

166) 96TM 58A

PALYNOLOGY

Age. Indeterminate

Environment. Marine?

Palynomorphs. Indeterminate spore fragments (R)
Gleicheniidites senonicus (V)
Oligosphaeridium complex (V)

T.A.I. 2.5 - 2.8

167) 96TM 66C

PALYNOLOGY

Age. Probable Early Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)

Densosporites spp. (R) *
Lycopodiumsporites spp. (R)
Osmundacidites spp. (R)
Cyclonephelium distinctum (V)
Oligosphaeridium complex (V)

T.A.I. 2.5 - 2.7

168) 94MU 43-1

PALYNOLOGY

Age. Early Cretaceous
Valanginian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Gleicheniidites senonicus (R)
Lycopodiumsporites spp. (R)
Gonyaulacysta sp. G (F)
Nelchinopsis kostromiensis (R)
Oligosphaeridium complex (R)

T.A.I. 2.5 - 2.7

169) 94MU 43-2

PALYNOLOGY

Age. Early Cretaceous
Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Cicatricosisporites spp. (R)
Gleicheniidites senonicus (R)
Gardodinium trabeculosum (F)
Herendeenia alaskensis (R)

T.A.I. 2.7

170) 94MU 43-3

PALYNOLOGY

Age. Indeterminate

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (R)

T.A.I. 2.5

171) 94MU 43-4

PALYNOLOGY

Age. Early Cretaceous
Hauterivian

Environment. Marine

Palynomorphs. *Gleicheniidites senonicus* (R)
Clathroctenocystis elegans (R)
Cyclonephelium distinctum (R)
Cardodinium trabeculosum (F)
Herendeenia alaskensis (F)
Oligosphaeridium complex (R)
Tubotuberella apatela (V) *

T.A.I. 2.5

172) 94MU 43-5

PALYNOLOGY

Age. Early Cretaceous
Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Deltoidospora spp. (R)
Densosporites spp. (R) *
Gleicheniidites senonicus (R)
Cardodinium trabeculosum (F)
Herendeenia alaskensis (F)

Prionodinium alaskense (R)

T.A.I. 2.5 - 2.7

173) 94MU 43-6

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Deltoidospora spp. (R)
Gardodinium trabeculosum (V)
Herendeenia alaskensis (V)
Oligosphaeridium complex (R)

T.A.I. 2.5 - 2.7

Remarks. Poor preservation.

174) 94MU 43-7

PALYNOLOGY

Age. Early Cretaceous
Undifferentiated

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)
Deltoidospora sp. (V)
Densosporites spp. (R) *
Gleicheniidites senonicus (R)
Cyclonephelium distinctum (V)
Muderongia sp. (R)
Oligosphaeridium complex (V)

T.A.I. 2.5 - 2.7

175) 94MU 43-8

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)
Lycopodiumsporites sp. (V)
Gardodinium trabeculosum (F)
?Herendeenia alaskensis (R)
Muderongia sp. (V)
Oligosphaeridium complex (R)

T.A.I. 2.5 - 2.7

Remarks. Poor preservation.

176) 94MU 43-9

PALYNOLOGY

Age. Indeterminate

Environment. Indeterminate

Palynomorphs. Indeterminate spore fragments (C)

T.A.I. 2.5 - 2.7

Remarks. Poor preservation.

177) 94MU 43-10

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (R)
Gleicheniidites senonicus (R)
Gardodinium trabeculosum (R)

T.A.I. 2.5 - 2.7

Remarks. Poor preservation.

178) 94MU 43-11

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Densosporites spp. (R) *
Gleicheniidites senonicus (V)
Rogalskaisporites cicatricosus (V)
Gardodinium trabeculosum (R)
Oligosphaeridium complex (R)

T.A.I. 2.5 - 2.7

Remarks. Poor preservation.

179) 94MU 43-12

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (F)
Classopollis classoides (R)
Densosporites spp. (R) *
Gardodinium trabeculosum (R)
Oligosphaeridium complex (R)
Oligosphaeridium complex (thick-wall) (V)

T.A.I. 2.5 - 2.7

Remarks. Poor preservation.

180) 94MU 43-13

PALYNOLOGY

Age. Early Cretaceous
Probable Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (A)
Deltoidospora spp. (R)
Densosporites spp. (R) *
Gleicheniidites senonicus (V)
Cyclonephelium distinctum (V)
Gardodinium trabeculosum (R)

T.A.I. 2.5

Remarks. Poor preservation.

181) 94MU 43-14

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. Marine?

Palynomorphs. *Gleicheniidites senonicus* (R)
Cyclonephelium distinctum (V)

T.A.I. 2.5 - 2.7

Remarks. Poor preservation.

182) 94MU 43-15

PALYNOLOGY

Age. Cretaceous
Undifferentiated

Environment. No evidence of marine.

Palynomorphs. Undifferentiated bisaccates (R)
Classopollis classoides (V)
Deltoidospora spp. (R)
Densosporites spp. (R) *
Gleicheniidites senonicus (V)

T.A.I. 2.5 - 2.7

Remarks. Poor preservation.

183) 94MU 43-16

PALYNOLOGY

Age. Early Cretaceous
Hauterivian

Environment. Marine

Palynomorphs. Undifferentiated bisaccates (C)
Deltoidospora spp. (R)
Gardodinium trabeculosum (R)
Herendeenia alaskensis (R)
Oligosphaeridium complex (V)

T.A.I. 2.5 - 2.7

Remarks. Poor preservation.

REFERENCE

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

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