

G.S.C. O.F. 1862 PALYNOLOGICAL ANALYSIS OF THE INTERVAL 1140-
14,100 FT, MOHEIDA P-15 WELL, SCOTIAN SHELF

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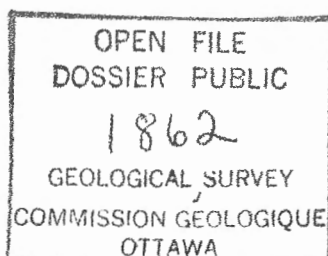
BUJAK DAVIES GROUP

PALYNOLOGICAL ANALYSIS OF THE
INTERVAL 1140-14,100FT, MOHEIDA P-15 WELL,
SCOTIAN SHELF

REPORT NO. 98-0008

March 1988

CALGARY, ALBERTA



BIOSTRATIGRAPHIC SUMMARY

1140-1170ft	No assignment
1230-2430ft	<u>Cannosphaeropsis</u> sp. A Zone (late Miocene)
2490-2610ft	<u>Pentadinium laticinctum</u> Zone (middle Miocene)
2670-2700ft	<u>Apteodinium</u> sp. B Zone (early Miocene)
2760-2970ft	<u>Chiropteridinium mespilanum</u> Zone (late Oligocene)
3030-3420ft	possible <u>Adnatosphaeridium reticulense</u> Zone (possible middle Eocene)
3480-3570ft	possible <u>Dinogymnium euclaense</u> Zone or older (possible Maastrichtian or older)
3940-3970ft	<u>Oligosphaeridium pulcherrimum</u> Zone (Coniacian)
4040-4170ft	<u>Surculosphaeridium longifurcatum</u> Peak Zone (Turonian)
4350-4880ft	<u>Kiokansium polypes</u> Zone (Cenomanian)
4950-6860ft	<u>Chichaouadinium vestitum</u> Zone (Albian)
6930-7360ft	<u>Subtilisphaera perlucida</u> Zone: <u>Pilosisorites</u> <u>trichopapillosus</u> Subzone (early Aptian)
7430-7560ft	<u>Subtilisphaera perlucida</u> Zone: <u>Cyclonephelium</u> <u>attadalicum</u> Subzone (early Aptian)

7630-7760ft	<u>Aptea anaphrissa</u> Zone (Barremian)
7830-8260ft	<u>Ctenidodinium elegantulum</u> Zone (Hauterivian)
8330-8950ft	<u>Phoberocysta neocomica</u> Zone (Berriasian to Valanginian)
9020-9150ft	<u>Ctenidodinium panneum</u> Zone (Portlandian)
9120-9550ft	<u>Hystrichogonyaulax</u> #EA Zone (Oxfordian)
9620-9650ft	<u>Hystrichosphaerina orbifera</u> Zone (Callovian)
9720-10,650ft	<u>Ctenidodinium combazii</u> Zone (Bathonian to early Callovian)
10,720-11,350ft	<u>Nummus</u> #EX Zone (early Bathonian)
11,420-11,850ft	<u>Gonglyodinium erymnoteichos</u> (late Bajocian)
11,920-12,050ft	<u>Eyachia prisca</u> Zone (early Bajocian)
12,120-12,600ft	<u>Dapcodinium semitabulatum</u> Zone (Aalenian)
12,600-12,750ft	<u>Scrinocassis weberi</u> Zone (Toarcian)
12,820-12,850ft	<u>Liasidinium variable</u> Zone (Late Simemurian)
12,920-14,100ft	No zonal assignment

SELECTED PALYNOMORPHS

Listings show highest occurrences unless otherwise specified.

(+) indicates marker species.

1140-1170f: no assignment (no assignment)

Comment: Impoverished assemblage comprising long-ranging taxa only.

1140-1170f Osmundacidites claytonites
 Piceapollenites spp.
 Pinuspollenites spp.

1230-2430f: Cannosphaeropsis sp. A Zone (late Miocene)

Comment: May be older than late Miocene without older marker species.

1230-1260f Cannosphaeropsis sp. A (+)
 Operculodinium centrocarpum
 Paralecaniella indentata

Comment: If in place, C. mespilanum would indicate late Oligocene at 1320ft.

1320-1350f Achomosphaera ramulifera
 Chiropteridium mespilanum (+) (?Reworked)
 Lingulodinium machaerophorum
 Spiniferites pseudofurcatus
 Tsugaepollenites igniculus

Hystrichokolpoma rigaudiae
Selenopemphix nephroides

3030-3420f: possible Adnatosphaeridium reticulense Zone (possible middle Eocene)

Comment: Tentative age assignment based on a single specimen of H. septata.

3030-3060f Hafniasphaera septata (+)

3300-3330f Hystrichosphaeridium parvum

3480-3570f: possible Dinogymnium euclaense Zone or older (possible Maastrichtian or older)

Comment: Tentative age assignment based on single specimen of I. belfastense.

3480-3510f Glaphyrocysta #LA (?Depressed top)
Isabelidinium belfastense (+)

3540-3570f Striadiporites sanctaebarae
(?Depressed top)

3940-3970f: Oligosphaeridium pulcherrimum Zone (Coniacian)

3940-3970f Cribroperidinium orthoceras (+)
Cyclonephelium distinctum
Deflandrea minor
Oligosphaeridium complex

Oligosphaeridium pulcherrimum (+)
Rugubivesiculites reductus
Rugubivesiculites rugosus

4040-4170f: Surculosphaeridium longifurcatum Peak Zone (Turonian)

4040-4070f Chatangiella tripartita
 Palaeohystrichophora infusorioides
 Surculosphaeridium longifurcatum (Common)

4140-4170f Cyclonephelium vannophorum (+)

4350-4880f: Kiokansium polypes Zone (Cenomanian)

4350-4380f Cyclonephelium vannophorum (+) (Common)

Comment: Very sparse assemblages from 4520-4950ft.

4420-4450f Xenascus ceratioides

4610-4640f Osmundacidites wellmannii

4950-6860f: Chichaouadinium vestitum Zone (Albian)

4950-4980f Astrocysta cretacea (Common)
 Cerebropollenites #EC (+)
 Cicatricosisporites annulatus (+)

Cicatricosisporites australiensis (+)
Cribroperidinium episomum (+)
Plicatella matesovae
Podocarpidites canadensis

5050-5080f Ellipsoidictyum reticulatum

5150-5180f Nytericysta arachnion

5250-5280f Aptea polymorpha (+)
Cedripites canadensis
Florentina cooksoniae
Liliacidites dividiuus (Present)
Podocarpidites potomacensis

5340-5370f Abiespollenites microreticulatus
Biretisporites potoniae (+)
Cicatricosisporites mohrioides (+)
Cyclonephelium eisenackii (+)
Eucommiidites minor (+)
Kiokansium polypes (Common)
Oligosphaeridium asterigerum (+)
Parvisaccites hortenensis (+)
Plicatella baconensis (+)
Rugubivesiculites minimus

5450-5480f Astrocysta cretacea (Abundant)
Chlamydophorella nyei
Cicatricosisporites cocononiensis
Epelidosphaeridia spinosa (+)
Luxadinium propatulum
Parvisaccites radiatus (+)
Phyllocladites microreticulatus
Plicatella silvestris
Retitricolpites vulgaris (+)

Stiphrosphaeridium anthophorum
Surculosphaeridium longifurcatum (Abundant)

5550-5580f Kiokansium polypes (Abundant)
 Plicatella problematica
 Senoniasphaera microreticulata (+)
 Spongodinium #EA (+)
 Stellatopollis #EA (+)

5650-5680f Cicatricosisporites venustus
 Cribroperidinium #EX
 Litosphaeridium siphoniphorum
 Nodosisporites #EG (+)

Comment: Probably middle Albian

5740-5770f Cicatricosisporites potomacensis (+)
 Corollina torosa (+)
 Ephedripites proceras
 Ischyosporites estherae (+)
 Oligosphaeridium totum totum (+)
 Palaeostomocysta fragilis
 Plicatella parviangulata
 Podocarpidites granulosus
 Rouseisporites simplex
 Tricolpopollenites micromunus (+)

5840-5870f Aequitriradites conosimilis
 Cicatricosisporites proxiradiatus
 Crybelosporites pannuceus (+)
 Foveosporites canalis (+)
 Liliacidites inequalis (+)
 Nodosisporites babsae (+)
 Nodosisporites dentimarginatus (+)
 Plicatella cristata (+)

Plicatella potomacensis
Spongodinium solidum
Tigrisporites scurrundus (+)

Comment: Possibly early Albian or late Aptian as indicated by Parvisaccites amplus.

- 5940-5970f Aequitriradites verrucosus
 Cicatricosisporites hughesii cf.
 Klokansium polypes (Abundant)
 Muderongia asymmetrica (+)
 Parvisaccites amplus (+)
 Phyllocladites inchoatus
 Plicatella jansonius
- 6040-6070f Callialasporites dampieri (+)
 Cicatricosisporites subrotundus
 Nodosisporites spinosus (+)
 Oligosphaeridium dividuum (+)
 Plicatella bilateralis
 Plicatella tricornitata
 Spongodinium solidum (Common)
- 6140-6170f Converrucosisporites proxigranulatus
 Lycopodiumsporites circolumenus
 Vitreisporites pallidus (+)
- 6240-6270f Cyclonephelium eisenackii (Common)
- 6330-6360f Cerebropollenites mesozoicus
 Cribroperidinium edwardsii (Common)
 Klokansium polypes (Abundant)
 Triretilobata marylandensis (+)

6430-6460f Cicatricosporites #EAI
 Impardecispora texensis
 Kiokansium polypes (Abundant)
 Oligosphaeridium asterigerum (Abundant)
 Palaeohystrichophora infusorioides (Abundant)
 Surculosphaeridium longifurcatum (Abundant)

6530-6560f Astrocysta #EA
 Chichaouadinium vestitum
 Cicatricosporites nankingensis
 Cribroperidinium #EX (Common)
 Oligosphaeridium asterigerum (Abundant)
 Palaeohystrichophora infusorioides (Abundant)

6630-6660f Kiokansium polypes (Abundant)
 Palaeohystrichophora infusorioides (Abundant)

6730-6760f Astrocysta #EA (Abundant)
 Kiokansium polypes (Abundant)
 Oligosphaeridium asterigerum (Abundant)
 Ovoidinium scabrosum
 Palaeohystrichophora infusorioides (Abundant)
 Triretilobata trioreticulosa (+)

6830-6860f Callialasporites segmentatus
 Oligosphaeridium asterigerum (Abundant)
 Palaeohystrichophora infusorioides (Abundant)
 Plicatella bifurcata
 Spiniferites ramosus (Abundant)

6930-7360f: Subtilisphaera perlucida Zone: Pilosisporites
trichopapillosus Subzone (early Aptian)

6930-6960f Kiokansium polypes (Abundant)

Nummus monoculatus
Oligosphaeridium asterigerum (Abundant)
Pilosporites crassangularis (+)

7030-7060f Astrocysta cretacea (Abundant)
Oligosphaeridium asterigerum (Abundant)
Pilosporites trichopapillosus (+)
Subtilisphaera pirnaensis (+)

7130-7160f Astrocysta cretacea (Abundant)
Chichaouadinium vestitum (Common)

7230-7260f Chichaouadinium vestitum (Common)
Impardecispora mirabile -

7430-7560f: Subtilisphaera perlucida Zone: Cyclonephelium
attadalicum Subzone (early Aptian)

7430-7460f Cyclonephelium attadalicum (+)
Distaltriangulisporites costatus
Trilobosporites crassus

Comment: Possibly Barremian or older as indicated by O. macrotubulum and M. tetracantha.

7530-7560f Callialasporites monoalaspurus (+)
Muderongia tetracantha
Oligosphaeridium macrotubulum

7630-7760f: *Aptea anaphrissa* Zone (Barremian)

Comment: Possibly older as indicated by *Muderongia staurota*.

- 7630-7660f *Aptea anaphrissa* (+)
 Cyclonephelium attadalicum (Common)
 Kleithriasphaeridium #EA (+)
 Muderongia staurota (+)
 Occisucysta distincta (+)
 Subtilisphaera terrula (+)
- 7730-7760f *Cyclonephelium attadalicum* (Abundant)
 Kleithriasphaeridium eoinodes
 Oligosphaeridium asterigerum (Abundant)

7830-8260f: *Ctenidodinium elegantulum* Zone (Hauterivian)

- 7830-7860f *Ctenidodinium elegantulum* (+)
 Muderongia simplex
 Polystephanophorus sarjeantii
 Pseudoceratium pelliiferum

- 7930-7960f *Spiniferites dentatus*

Comment: Possibly Valanginian as indicated by ?*Phoberocysta neocomica*.

- 8030-8060f *Oligosphaeridium albertense*
 Phoberocysta neocomica neocomica
 (Questionably present)

8130-8160f Oligosphaeridium asterigerum (Abundant)
 Subtilisphaera pirnaensis (Common)
 Systematophora complicata (+)

8230-8260f Muderongia simplex (Common)
 Plicatella #EQ
 Striatella #EF
 Subtilisphaera pirnaensis (Common)

8330-8950f: Phoberocysta neocomica Zone (Berriasian to Valanginian)

8330-8360f Phoberocysta neocomica neocomica (+)

8407.3f (Core) Caddasphaera halosa

8420-8450f Acanthaulax senta (Reworked)
 Cassiculosphaeridia magna
 Dapsilidinium laminaspinosum
 Meiourogonyaulax stoveri

8520-8550f Oligosphaeridium asterigerum (Abundant)

Comment: Probably Berriasian as indicated by M.californica & M. simplex microperforata.

8620-8650f Concavissimisporites verrucatus
 Cymososphaeridium validum
 Muderongia californica (+)
 Muderongia simplex microperforata (+) (Common)
 Phoberocysta neocomica cruciformis (+)
 (Present)
 Tanyosphaeridium magneticum

8720-8750f Achomosphaera neptunii (+)
 Endoscrinium pharo (+)
 Kalyptea glabra (Reworked)
 Occisucysta distincta (Common)
 Stiphrosphaeridium dictyophorum (+)
 Systematophora orbifera (Reworked)

8820-8850f Kalyptea monoceras
 Kleithriasphaeridium fasciatum (+)
 Oligosphaeridium diluculum (+)
 Perisseiasphaeridium #EA (+)

8920-8950f Hystrichodinium lanceatum (+)
 Systematophora complicata (Common)

9020-9150f: Ctenidodinium panneum Zone (Portlandian)

9020-9050f Ctenidodinium culmulum (+)
 Ctenidodinium panneum (+)
 Muderongia sp. A

9120-9550f: Hystrichogonyaulax #EA Zone (Oxfordian)

Comment: Abundant Early Cretaceous cavings throughout this zone and below.

9120-9150f Acanthaulax scarburghense (+)
 Adnatosphaeridium caulleryi (+)
 Alisporites thomasii (Common)
 Apteodinium nuciforme

Breedomiella #EB
Cleistosphaeridium ehrenbergii (+)
Cribrerodinium ehrenbergii
Ctenidodinium chondrum (+)
Ctenidodinium ornatum (+)
Ctenidodinium pachydermum (+)
Dingodinium jurassicum
Endoscrinium galeritum (+)
Hystrichogonyaulax #EA (+)
Hystrichogonyaulax cladophora (+)
Mendicodinium groenlandicum
Pityosporites dividuus
Sentusidinium filiatum
Subtilisphaera inaffecta (+)
Systematophora #EA
Systematophora fasciculigera (Common)

9220-9250f

Alisporites #EG
Epiplosphaera reticulospinosa
Leptodinium amabile
Saxosporis #EB
Senoniasphaera jurassica

9420-9450f

Amphorula #ED
Ctenidodinium sellwoodii
(Questionably present)
Lithodinia jurassica
Senoniasphaera jurassica

9520-9550f

Breedomiella #EA
Meiouronyaulax valensii
Scribnerodinium crystallinum (+)
Tubotuberella rhombiformis

9620-9650f: Hystrichosphaerina orbifera Zone (Callovian)

9620-9650f Atopodinium prostratum (+)
 Energlynia acollaris (Questionably present)
 Hystrichogonyaulax #EC (+)
 Hystrichosphaerina orbifera (+)
 Sentusidinium erythrocomum

9720-10650f: Ctenidodinium combazii Zone (Bathonian to early Callovian)

9720-9750f Ctenidodinium sellwoodii (+) (Common)
 Muderongia #EZ
 Occisucysta balios
 Paragonyaulacysta #Ecamb
 Pareodinia sp. C
 Tubotuberella egemenii

9820-9850f Ellipsoidictyum cinctum
 Hystrichogonyaulax #EB
 Meiourogonyaulax pila
 Prolixosphaeridium parvispinum
 Wanaea fimbriata

10120-10150f Acanthaulax senta
 Energlynia acollaris
 Sentusidinium sparsibarbatum

10320-10350f Meiourogonyaulax callomonii
 Uvaesporites subequatorialis

10520-10550f Systematophora #EE (+)

10620-10650f Gonyaulacysta jurassica (Depressed top)

10720-11350f: Nummus #EX Zone (early Bathonian)

10720-10750f Nummus #EX (+)
 Saxosporis tenerirugosus

10820-10850f *Chitinozoa (Reworked)
 Ctenidodinium rotundatum
 Occiscysta aculeata

10846.3f (Core) Systematophora #EE

10860.5f (Core) Adnatosphaeridium caulleryi

10920-10950f Ctenidodinium tenellum

11020-11050f Glomodinium tripartitum

11120-11150f Compositosphaeridium polonicum
 Pareodinia groenlandica

11120-11150f Fromea irregulare

11320-11350f Ctenidodinium #EA
 Ctenidodinium #EE (+)
 Ctenidodinium combazii (+)

Diacanthum filapicatum (+)
Dingodinium minutum
Dinopterygium absidatum (+)
Endoscrinium subvallare
Gonyaulacysta adecta (+)
Nummus #EX (+)
Systematophora #EF (+)
Tubotuberella sphaerocephalis

11420-11850f: Gonglyodinium erymnoteichos (late Bajocian)

11420-11450f Adnatosphaeridium #EZ (+)
 Ellipsoidictyum gochti (+)

11520-11550f Acanthaulax crispera (+)
 Valensiella vermiculata (+)

11620-11650f Escharisphaeridia pelionense

Comment: Possible early Bajocian as indicated by ?Eyachia prisca.

11720-11750f Eyachia prisca (Questionably present)

11820-11850f Ctenidodinium continuum
 Ctenidodinium mozaicum (+)
 Eyachia prisca (Questionably present)
 Gonglyodinium hocneratum (+)
 Rigaudella aemula

12600-12750f: Scrinocassis weberi Zone (Toarcian)

12600-12630f Scrinocassis weberi (+)

12820-12850f: Liasidinium variable Zone (Late Sinemurian)

12820-12850f Liasidinium variable (+)
 Rhaetogonyaulax #EA (+)

12920-14100f: No zonal assignment (no age assignment)

Comment: E. Cretaceous cavings are predominate thus the age is indeterminate.

13020-13050f Sverdrupiella spp. (Questionably present)

13120-13150f Sverdrupiella spp. (Questionably present)

Comment: Foraminisporis tribulosus indicates Rhaetian to early Liassic

13220-13250f Corollina simplex
 Foraminisporis tribulosus (+)

APPENDIX AAlphabetical Listing of Species Shown on Occurrence Chart:Marine Dinoflagellates

Taxa location index

Index numbers are the columns in which the taxon appears

Index number	Taxon names	Index number	Taxon names
222	Acanthaulax crispa	99	Ctenidodinium elegantulum
131	Acanthaulax scarburghense	229	Ctenidodinium mozaicum
189	Acanthaulax senta	138	Ctenidodinium pachydermum
208	Acanthaulax senta cf.	128	Ctenidodinium panneum
30	Achomosphaera allicornis	200	Ctenidodinium rotundatum
119	Achomosphaera neptunus	159	Ctenidodinium sellwoodii
3	Achomosphaera ramulifera	242	Ctenidodinium spp.
220	Adnatosphaeridium #EZ	203	Ctenidodinium tenellum
132	Adnatosphaeridium caul eryi	90	Cyclonephellium attadalicum
236	Aldorpha aldruphense	51	Cyclonephellium brevispinum
158	Amphorula #ED	39	Cyclonephellium distinctum
97	Aptea anaphrissa	59	Cyclonephellium eisenackii
55	Aptea polymorpha	74	Cyclonephellium paucispinum
202	Apteodinium grande	46	Cyclonephellium vannophorum
133	Apteodinium nuciforme	114	Cymosphaeridium validum
85	Astrocysta #EA	233	Dapcodinium semitabulatum
48	Astrocysta cretacea	112	Dapsilodinium laminaspinosum
167	Atopodinium prostratum	17	Dapsilodinium pastielsii
161	Breodoxiella #EA	31	Deflandrea #LR
134	Breodoxiella #ED	40	Deflandrea minor
109	Caddasphaera halosa	213	Diacanthum filapicatum
56	Callaiosphaeridium asymmetricum	196	Dingodinium cerviculum
1	Cannosphaera sp. A Williams & Brideaux '75	139	Dingodinium jurassicum
25	Cannosphaeropsis #LA	214	Dingodinium minutum
111	Cassiculosphaeridia magna	215	Dinopterygium absidatum
43	Chatangiella tripartita	27	Distatodinium paradoxum
86	Chichasquadinium vestitum	183	Ellipsodictyum cinctum
26	Chiropteridium dispersum	221	Ellipsodictyum gochtii
4	Chiropteridium mespilum	53	Ellipsodictyum reticulatum
63	Chlamydothorella nyei	140	Endoscrinium galeritum
76	Cleistosphaeridium aciculare	120	Endoscrinium pharo
135	Cleistosphaeridium ehrenbergii	216	Endoscrinium subvallare
205	Compositosphaeridium plonicum	169	Energlynia acollaris
21	Cordosphaeridium cantharellum	225	Energlynia spp.
15	Cordosphaeridium diversum	65	Epelidosphaeridia spinosa
64	Coronifera oceanica	150	Epiplosphaera reticulospinosa
73	Cribroperidinium #EX	226	Escharisphaeridia pelionense
83	Cribroperidinium edwardsii	162	Escharisphaeridia rudis
136	Cribroperidinium ehrenbergii	60	Exochosphaeridium bifidum
49	Cribroperidinium episorum	52	Exochosphaeridium striolatum
10	Cribroperidinium giuseppi	234	Eyachia #EA
168	Cribroperidinium granuligerum	227	Eyachia prisca
38	Cribroperidinium orthoceras	57	Florentinia cooksoniae
237	Cribroperidinium sepiantum	207	Fromea irregularis
50	Cribroperidinium spp.	36	Glaphyrocysta #LA
210	Ctenidodinium #EA	19	Glaphyrocysta semitecta
239	Ctenidodinium #EAE	204	Glomodinium tripartitum
244	Ctenidodinium #EAF	8	Gochtodinium simplex
211	Ctenidodinium #EE	230	Gonglyodinium hocneratum
245	Ctenidodinium #EZ	217	Gonyaulacysta adecta
137	Ctenidodinium chondrum	108	Gonyaulacysta helicoidea
212	Ctenidodinium combazii	197	Gonyaulacysta jurassica
228	Ctenidodinium continuum	243	Gonyaulacysta jurassica cf.
127	Ctenidodinium culmulum		

APPENDIX A cont'dAlphabetical Listing of Species Shown on Occurrence Chart:Marine Dinoflagellates

Index number	Taxon names	Index number	Taxon names
34	Hafniasphaera septata	94	Muderongia staurota
20	Hemicystodinium #LA	91	Muderongia tetracantha
18	Homotryblium floripes	14	Nematospaeropsis lemniscata
126	Hystrichodinium lanceatum	190	Nummus #EX
66	Hystrichodinium pulchrum	87	Nummus monoculatus
141	Hystrichogonyaulax #EA	54	Nytericysta arachnion
184	Hystrichogonyaulax #EL	241	Occisucysta #EX
170	Hystrichogonyaulax #E1	201	Occisucysta aculeata
142	Hystrichogonyaulax cl. dophora	179	Occisucysta balios
231	Hystrichogonyaulax cl. dophora cf.	95	Occisucysta distincta
151	Hystrichogonyaulax spp.	68	Odontochitina costata
32	Hystrichokolpoma riquadriae	69	Odontochitina operculata
35	Hystrichosphaeridium parvum	104	Oligosphaeridium albertense
81	Hystrichosphaeridium stellatum	62	Oligosphaeridium asterigerum
171	Hystrichosphaerina orliferia	41	Oligosphaeridium complex
22	Hystrichosphaeropsis ovum	124	Oligosphaeridium diluculum
9	Impagidinium cornutum	82	Oligosphaeridium divium
37	Isabelidium belfastense	92	Oligosphaeridium macrotubulum
122	Kalyptea monoceras	42	Oligosphaeridium pulcherrimum
61	Kiokansium polypes	77	Oligosphaeridium totum totum
223	Kiokansium polypes	105	Oligosphaeridium vasiiforme
93	Kleithriasphaeridium #EA	50	Oodnadattia tuberculata
98	Kleithriasphaeridium roinodes	?	Operculodinium centrocarpum
123	Kleithriasphaeridium fasciatum	20	Palaeocystodinium golzowense
84	Kleithriasphaeridium loffrense	44	Palaeohystrichophora infusorioides
143	Lanterna bulgarica	78	Palaeohystrichocysta fragilis
177	Lanterna sportula	180	Paragonyaulacysta #Ecamb
23	Lejeunecysta hyalina	173	Pareodinia ceratophora
185	Leptodinium aceras	238	Pareodinia evittii
152	Leptodinium anabile	206	Pareodinia groenlandica
153	Leptodinium sp. b	181	Pareodinia sp. C
155	Leptodinium sp.	125	Perisseiasphaeridium #EA
247	Liasidinium variabile	145	Perisseiasphaeridium pannosum
5	Lingulodinium machaerophorum	117	Phoberocysta neocomica cruciformis
160	Lithodinia jurassica	106	Phoberocysta neocomica neocomica
73	Litosphaeridium siphonophorum	156	Polystephanophorus sarjeantii
67	Luxadinium propatulum	101	Polystephanophorus sarjeantii
193	Meiourogoniaulax callononii	187	Prolixosphaeridium parvispinum
190	Meiourogoniaulax deflandrei	102	Pseudoceratium pelliiferum
194	Meiourogoniaulax dicryta	11	Reticulatosphaera actinocoronata
186	Meiourogoniaulax pila	248	Rhaetogonyaulax #EA
172	Meiourogoniaulax spp.	202	Rigaudella gemula
113	Meiourogoniaulax stoveri	246	Scriiniocassis weberi
163	Meiourogoniaulax valerii	164	Scriiniodinium crystallinum
144	Mendicodinium groenlandicum	33	Selenopemphix nephroides
110	Micrhystridium stellatum	154	Senoniasphaera jurassica
209	Muderongia #EA	71	Senoniasphaera microreticulata
178	Muderongia #EZ	235	Sentusidinium asymmetricum
80	Muderongia asymmetrica	174	Sentusidinium erythrocomum
115	Muderongia californica	146	Sentusidinium filiatum
100	Muderongia simplex	190	Sentusidinium rioultii
116	Muderongia simplex mic operforata	191	Sentusidinium sparsibarbatum
129	Muderongia sp. A		

APPENDIX A cont'dAlphabetical Listing of Species Shown on Occurrence Chart:Marine Dinoflagellates

Index number	Taxon names
240	Gentusidinium spp.
103	Spiniferites dentatus
6	Spiniferites pseudofurcatus
7	Spiniferites ramosus
72	Spongodinium #EA
79	Spongodinium solidum
70	Stiphrosphaeridium anthophorum
121	Stiphrosphaeridium dictyophorum
157	Subtilisphaera #EA
175	Subtilisphaera inaffecta
192	Subtilisphaera paeminosa
147	Subtilisphaera perlucida
89	Subtilisphaera pirnaensis
96	Subtilisphaera terrula
12	Sumatradinium hispidum
45	Surculosphaeridium longifurcatum
249	Sverdrupiella spp.
148	Systematophora #EA
195	Systematophora #EE
218	Systematophora #EF
24	Systematophora ancyroa
176	Systematophora areolata
107	Systematophora complicata
149	Systematophora fasciculigera
165	Systematophora spp.
80	Tanyosphaeridium isocalamus
110	Tanyosphaeridium magneticum
12	Tectatodinium pellitum
130	Tenua hystrix
29	Thalassiphora delicata
16	Tuberculodinium rossiagnoliae
182	Tubotuberella egemenii
166	Tubotuberella rhombiformis
219	Tubotuberella sphaerocephalus
224	Valensiella vermiculata
188	Wanaea fimbriata
47	Xenascus ceratioides

APPENDIX A (cont'd)Alphabetical Listing of Species Shown on Occurrence Chart:Pollen and Spores

Taxa location index

Index numbers are the columns in which the taxon appears

Index number	Taxon names	Index number	Taxon names
36	Abiespollenites microreticulatus	92	Converrucosisporites proxigranulatus
117	Acanthotriletes variegatosus	156	Convolutispora #EA
66	Aequitriradites conostictis	154	Corollina itunensis
135	Aequitriradites subverrucosus	163	Corollina simplex
76	Aequitriradites verrucosus	59	Corollina torosa
133	Alisporites #EG	68	Crybelosporites pannuceus
18	Alisporites bilateralis	131	Ctenidodinium ornatum
150	Alisporites grandis	29	Cyathidites australis
128	Alisporites thomasi	20	Cyathidites minor
7	Alnipollenites verus	4	Cyathidites spp.
32	Araucariacites australis	29	Deltoidospora hallii
141	Araucariacites punctatus	56	Densosporites microrugulatus
14	Betulaceopollenites betuloides	113	Densosporites velatus
37	Biretisporites potoniae	119	Distaltrianquisporites costatus
83	Callialasporites dampieri	60	Ephedripites proceras
160	Callialasporites dampieri	42	Eucommiidites minor
148	Callialasporites infrapunctatus	146	Exesipollenites scabratus
122	Callialasporites monolepisporus	139	Exesipollenites tumulus
149	Callialasporites obrutus	164	Foraminisporites tribulosus
109	Callialasporites segmentatus	69	Foveosporites canalis
127	Callialasporites trilobatus	25	Gleicheniidites senonicus
143	Callialasporites trilobatus cf.	0	Ilexpollenites margaritus
147	Callialasporites turbatus	102	Impardecispora apiverrucata
46	Camaronosporites dakotensis	110	Impardecispora mirabile
12	Camaronosporites #LA	103	Impardecispora texensis
38	Camaronosporites insinatus	61	Ischyosporites estherae
6	Caryapollenites simplex	155	Ischyosporites punctatus
33	Cedripites canadensis	16	Jussealia sp., Piel 1971
110	Cedripites cretaceus	115	Klukisporites areolatus
26	Cerebropollenites #EC	105	Klukisporites pseudoreticulatus
129	Cerebropollenites macroverrucosus	142	Kraeuselisporites #EA
96	Cerebropollenites mesocticus	106	Kraeuselisporites linearis
54	Chasmatosporites major	137	Kraeuselisporites reissingeri
101	Cicatricosisporites #EA	9	Laevigatosporites ovatus
161	Cicatricosisporites #EA	136	Leiotriletes mecklenburgensis
39	Cicatricosisporites #EF	34	Liliacidites dividius
137	Cicatricosisporites abacus	70	Liliacidites inequalis
27	Cicatricosisporites annulatus	10	Lycopodiumsporites annotinoides
38	Cicatricosisporites australiensis	78	Lycopodiumsporites austroclavitudines
47	Cicatricosisporites coccinoidensis	93	Lycopodiumsporites circolumenus
91	Cicatricosisporites hughesii	79	Lycopodiumsporites marginatus
77	Cicatricosisporites hughesii cf.	57	Nodosisporites #EG
40	Cicatricosisporites mohrioides	71	Nodosisporites babsae
104	Cicatricosisporites nanlingensis	72	Nodosisporites dentimarginatus
50	Cicatricosisporites potanensis	85	Nodosisporites spinosus
67	Cicatricosisporites proxiradiatus	97	Nodosisporites spp.
19	Cicatricosisporites sp.indet.	1	Osmundacidites claytonites
84	Cicatricosisporites subrotundus	24	Osmundacidites wellmannii
55	Cicatricosisporites venustus	107	Ovoidinium scabrosum
41	Concavissimisporites punctatus	80	Parvisaccites amplius
151	Concavissimisporites var. verrucatus	43	Parvisaccites hortenensis
126	Concavissimisporites verrucatus	48	Parvisaccites radiatus
158	Contignisporites cooksonae	111	Perinopollenites elatoides
130	Contignisporites dorsostriatus		

APPENDIX A (cont'd)Alphabetical Listing of Species Shown on Occurrence Chart:Pollen and Spores

Index number	Taxon names
31	Phyllocladites inchoatus
49	Phyllocladites microreticulatus
2	Piceapollenites spp.
114	Pilosiporites crassangularis
116	Pilosiporites trichopapillosus
123	Pilosiporites verus
3	Pinuspollenites spp.
25	Pityosporites #ER
102	Pityosporites dividius
114	Plicatella #EQ
44	Plicatella baconensis
112	Plicatella bifurcata
106	Plicatella bilateralis
13	Plicatella cristata
62	Plicatella jansonius
10	Plicatella matesovae
62	Plicatella parviangulata
74	Plicatella potomacensis
52	Plicatella problematica
50	Plicatella silvestris
67	Plicatella tricornitata
31	Podocarpidites canadensis
90	Podocarpidites epistriatus
73	Podocarpidites granulatus
105	Podocarpidites herbstii
65	Podocarpidites potomacensis
68	Polycingulatisporites segmentatus
11	Quercoidites micrhystridium
51	Retitricolpites vulgaris
120	Rotverrusporites spp.
99	Rouseisporites radiatus
89	Rouseisporites reticulatus
64	Rouseisporites simplex
45	Rugubivesiculites minimus
21	Rugubivesiculites reductus
22	Rugubivesiculites rugosus
124	Saxosporis #EB
144	Saxosporis tenerirugosus
162	Spheripollenites psilatus
53	Stellatopollis #EA
13	Stereisporites antiquasporites
17	Striadiporites sanctaebabarbarae
125	Striatella #EF
15	Taxodiaceapollenites hiatus
75	Tigrisporites scurrundus
90	Todisporites major
153	Triangulopsis discoidalis
65	Tricolpopollenites micromunus
121	Trilobosporites crassus
109	Triretilobata marylandensis
103	Triretilobata trioreticulosa
5	Tsugaepollenites igniculus
153	Uvaesporites argentinensis
140	Uvaesporites subequatorialis
152	Varirugosisporites planirugulatus
133	Varirugosisporites spp.
94	Vitreisporites pallidus

APPENDIX A (cont'd)Alphabetical Listing of Species Shown on Occurrence Chart:Algae and Miscellaneous

Taxa location index
Index numbers are the columns in which the taxon appears

Index number	Taxon names
4	Cymatiosphaera valdensis
2	foraminiferal liners
1	Paralecaniella indentata
3	Schizosporis reticulatus

Reworked Palynomorphs

Taxa location index
Index numbers are the columns in which the taxon appears

Index number	Taxon names
12	*Acanthaulax senta
6	*Appendicisporites problematicus
5	*Camarozonosporites insignis
2	*Ceratiopsis diebelii
3	*Cerebropollenites mesozoicus
8	*Chatangiella tripartita
15	*Chitinozoa
9	*Cribroperidinium orthoceras
11	*Cyclonephelium distinctum
13	*Hystriochosphaerina orbifera
14	*Kalyptea glabra
4	*Kiokansium polypes
10	*Odontochitina operculata
7	*Oligosphaeridium complex
1	*Spongodinium delitiense

APPENDIX BExamined Samples: Moheida P-15 Well

1140.00 : cuttings	6430.00 : cuttings	11120.00 : cuttings
1230.00 : cuttings	6530.00 : cuttings	11120.00 : cuttings
1320.00 : cuttings	6630.00 : cuttings	11220.00 : cuttings
1410.00 : cuttings	6730.00 : cuttings	11320.00 : cuttings
1500.00 : cuttings	6830.00 : cuttings	11420.00 : cuttings
1590.00 : cuttings	6930.00 : cuttings	11520.00 : cuttings
1680.00 : cuttings	7030.00 : cuttings	11620.00 : cuttings
1770.00 : cuttings	7130.00 : cuttings	11720.00 : cuttings
1860.00 : cuttings	7230.00 : cuttings	11820.00 : cuttings
1950.00 : cuttings	7330.00 : cuttings	11920.00 : cuttings
2040.00 : cuttings	7430.00 : cuttings	12020.00 : cuttings
2130.00 : cuttings	7530.00 : cuttings	12120.00 : cuttings
2220.00 : cuttings	7630.00 : cuttings	12220.00 : cuttings
2310.00 : cuttings	7730.00 : cuttings	12286.29 : core
2400.00 : cuttings	7830.00 : cuttings	12320.00 : cuttings
2490.00 : cuttings	7930.00 : cuttings	12345.00 : core
2580.00 : cuttings	8030.00 : cuttings	12390.00 : cuttings
2670.00 : cuttings	8130.00 : cuttings	12420.00 : cuttings
2760.00 : cuttings	8230.00 : cuttings	12450.00 : cuttings
2850.00 : cuttings	8330.00 : cuttings	12470.00 : cuttings
2940.00 : cuttings	8407.29 : core	12500.00 : cuttings
3030.00 : cuttings	8420.00 : cuttings	12520.00 : cuttings
3210.00 : cuttings	8520.00 : cuttings	12550.00 : cuttings
3300.00 : cuttings	8620.00 : cuttings	12570.00 : cuttings
3390.00 : cuttings	8720.00 : cuttings	12600.00 : cuttings
3480.00 : cuttings	8820.00 : cuttings	12650.00 : cuttings
3540.00 : cuttings	8920.00 : cuttings	12650.00 : cuttings
3940.00 : cuttings	9020.00 : cuttings	12720.00 : cuttings
4040.00 : cuttings	9120.00 : cuttings	12810.00 : cuttings
4140.00 : cuttings	9220.00 : cuttings	12920.00 : cuttings
4350.00 : cuttings	9320.00 : cuttings	13020.00 : cuttings
4420.00 : cuttings	9420.00 : cuttings	13120.00 : cuttings
4520.00 : cuttings	9520.00 : cuttings	13220.00 : cuttings
4610.00 : cuttings	9620.00 : cuttings	13320.00 : cuttings
4720.00 : cuttings	9720.00 : cuttings	13420.00 : cuttings
4850.00 : cuttings	9820.00 : cuttings	13520.00 : cuttings
4950.00 : cuttings	9920.00 : cuttings	13620.00 : cuttings
5050.00 : cuttings	10020.00 : cuttings	13720.00 : cuttings
5150.00 : cuttings	10120.00 : cuttings	13820.00 : cuttings
5250.00 : cuttings	10220.00 : cuttings	13920.00 : cuttings
5340.00 : cuttings	10320.00 : cuttings	14020.00 : cuttings
5450.00 : cuttings	10420.00 : cuttings	14070.00 : cuttings
5550.00 : cuttings	10520.00 : cuttings	
5650.00 : cuttings	10620.00 : cuttings	
5740.00 : cuttings	10720.00 : cuttings	
5840.00 : cuttings	10820.00 : cuttings	
5940.00 : cuttings	10846.29 : core	
6040.00 : cuttings	10860.50 : core	
6140.00 : cuttings	10920.00 : cuttings	
6240.00 : cuttings	11020.00 : cuttings	
6330.00 : cuttings	11020.00 : cuttings	