INTRODUCTION

The zonation and ages used in this report correspond to those of Martini and Worsley (1970) for the Neogene, Martini (1970) for the Paleogene, and Cepek and Hay (1969) for the Late Cretaceous. The *Gephyrocapsa oceanica* Zone, defined by the first occurrence of the name species at the base and by the first occurrence of *Emiliania huxleyi* at the top, is used here instead of the *Pseudoemiliania lacunosa* Zone.

**HOLE 85/85A**

Samples: 85-1-1 (6-7 cm); 85-1-2 (6-7 cm); 85-1-3 (3-4 cm): These samples contain generally poor assemblages; mostly reworked Late Cretaceous species, including *Micula staurophora*, *Waiznaueria barnesae*, *Arkhangelskiella octaradiata*, *Cribrosphaera ehrenbergii*, *Cretadiscus colatus*, and *Eiffellithus turriseifeli*. Some specimens of *Gephyrocapsa aperta* are present.

Age: Probably *Gephyrocapsa oceanica* Zone; Late Pleistocene.

Sample 85-1-4 (6-7 cm): Very poor assemblage with only *Micula staurophora* and a few corroded coccoliths.

Sample 85-1-5 (10-11 cm): Poor assemblage with some reworked Late Cretaceous species, as in Sample 85-1-3 (3-4 cm), but also including *Gephyrocapsa caribbeica* and *G. aperta*.

Age: Probably *Gephyrocapsa oceanica* Zone; Late Pleistocene.

Sample 85-1-6 (6-7 cm): Very poor assemblage with only a few specimens of *Gephyrocapsa aperta* and *G. caribbeica*.

Age: Probably *Gephyrocapsa oceanica* Zone; Late Pleistocene.

Samples: 85-2-1 (6-7 cm); 85-2-2 (6-7 cm); 85-2-3 (3-4 cm): These samples contain generally poor assemblages; mostly reworked Late Cretaceous species, including *Micula staurophora*, *Waznaueria barnesae*, *Arkhangelskiella octaradiata*, *Cribrosphaera ehrenbergii*, *Cretadiscus colatus*, and *Eiffellithus turriseifeli*. Some specimens of *Gephyrocapsa aperta* are present.

Age: Probably *Gephyrocapsa oceanica* Zone; Late Pleistocene.

Samples: 85-3-1 (10-11 cm): Very poor assemblage with rare coccoliths, including *Prediscosphera cretacea* from the Late Cretaceous, and *Gephyrocapsa oceanica*.

Age: *Gephyrocapsa oceanica* Zone; Late Pleistocene.

Samples: 85-3-2 (10-11 cm); 85-3-3 (7-8 cm); 85-3-4 (5-4 cm): No calcareous nannofossils.

**HOLE 86**

Samples: 85-3-6 (6-7 cm); 85-4-2 (10-11 cm); 85-5-1 (63-64 cm): Very poor assemblages with *Gephyrocapsa aperta* and *G. caribbeica*.

Age: Probably *Gephyrocapsa oceanica* Zone; Late Pleistocene.

Sample 85-5-2 (6-7 cm): No calcareous nannofossils.

Samples: 86-1-1 (7-8 cm); 86-1-2 (6-7 cm); 86-1-3 (6-7 cm): These samples contain *Gephyrocapsa oceanica*, *G. aperta*, *G. caribbeica*, *Rhabdosphaera stylifera*, and *Scapholithus* fossils.

Age: *Gephyrocapsa oceanica* Zone; Late Pleistocene.

Sample 86-2-1 (57-58 cm): Moderately good assemblage with *Gephyrocapsa caribbeica*, both elliptical and varieties of *Pseudoemiliania lacunosa*, *Helicopontosphaera kamptneri*, and *Rhabdosphaera clavigera*. Age: *Gephyrocapsa caribbeica* Zone; Early Pleistocene.

Sample 86-3-1 (7-8 cm): This sample contains *Gephyrocapsa caribbeica*, *Cylicococcolithina leptopora*, *Pseudoemiliania lacunosa*, *Discocaster brouweri*, and *D. pentaradiatus*.

Age: Probably *Discocaster pentaradiatus* Zone or *Discocaster surculus* Zone; Late Pliocene.

Sample 86-3-2 (6-7 cm): This sample contains the same assemblage as that immediately above, plus *Sphenolithus abies*.

Age: Early *Discocaster surculus* Zone; Late Pliocene.

Sample 86-3-3 (7-8 cm): Assemblage like that above, but badly corroded.

Samples: 86-3-4 (5-6 cm); 86-3-5 (9-10 cm); 86-3-6 (7-8 cm): Moderately good assemblages like Sample 86-3-2 (6-7 cm), but with *Discocaster asymmetricus* added.

Age: Early *Discocaster surculus* Zone; Late Pliocene.

Samples 86-4-1 (18-19 cm); 86-4-2 (6-7 cm): Same assemblage as in Sample 86-3-6 (7-8 cm), but with *Discocaster asymmetricus* and *Reticulofenestra pseudoumbilica*.

Age: *Reticulofenestra pseudoumbilica* Zone; Early Pliocene.

Samples: 86-4-3 (6-7 cm); 86-4-4 (6-7 cm); 86-4-5 (9-10 cm): As above but with *Discocaster variabilis* added.

Age: *Reticulofenestra pseudoumbilica* Zone; Early Pliocene.
Samples: 86-5-1 (87-88 cm); 86-5-2 (6-7 cm):  
- Good assemblage with Discoaster nephados, D. Saundersi, Coccolithus pelagicus, Sphenolithus distentus, S. predistentus, and Triquetrarhabdulus carinatus.  
- Age: Probably Sphenolithus distentus Zone; Middle or Late Oligocene. The overlap of Sphenolithus predistentus and Triquetrarhabdulus carinatus should not occur and may be an indication of mixing of material of different ages.

Samples: 86-5-3 (11-12 cm); 86-5-4 (4-5 cm):  
- Sphenolithus predistentus is common in these samples and no Triquetrarhabdulus carinatus occur.  
- Age: Sphenolithus predistentus Zone; Middle Paleocene.

Samples: 86-7-2 (6-7 cm); 86-7-3 (6-7 cm); 86-7-4 (4-5 cm); 86-7-5 (6-7 cm):  
- Generally poor assemblages with Coccolithus pelagicus, Chiasmolithus sp., Braarudosphaera bigelowi, B. undata, and Sphenolithus radians.  
- Age: Uncertain, possibly Lower Eocene.

Sample 86-8-1 (101-102):  
- No calcareous nannofossils.

Sample 86-8-2 (7-8 cm):  
- Moderately good assemblage with Zygodiscus adamas, Chiasmolithus bidens, Coccolithus cavus, Heliolithus kleinpelli, Fasciculithus tympaniformis, and Sphenolithus anarrhopus.  
- Age: Heliolithus kleinpelli Zone; Middle Paleocene.

Samples: 86-8-3 (6-7 cm); 86-8-4 (6-7 cm); 86-9-1 (8-10 cm); 86-9-2 (6-7 cm):  
- Very poor assemblages; resembling that in Sample 86-8-2 (7-8 cm), but lacking Heliolithus kleinpelli.  
- Age: Probably Fasciculithus tympaniformis Zone; Early or Middle Paleocene.

**HOLE 87**

Sample 87-1-1 (6-7 cm):  
- Moderately good assemblage with Gephyrocapsa oceanica, Cyclococcolithina leptopora, Cyclolithella annula, Helicopontosphaera kamptneri, and Scapholithus fossils.  
- Age: Gephyrocapsa oceanica Zone; Late Pliocene.

Samples: 87-1-1 (116-117 cm); 87-1-2 (6-7 cm):  
- No calcareous nannofossils.

**HOLE 88**

Samples: 88-1-2 (6-7 cm); 88-1-2 (145-146 cm); 88-1-3 (6-7 cm):  
- Good assemblage with Gephyrocapsa oceanica, Helicopontosphaera kamptneri, Scapholithus fossils, Rhabdosphaera clavigera, and G. aperta.  
- Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Sample 88-1-4 (6-7 cm):  
- Same assemblage as above but with Gephyrocapsa caribbeanica and G. aperta.  
- Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Samples: 88-2-1 (6-7 cm); 88-2-2 (6-7 cm); 88-2-3 (12-13 cm); 88-2-4 (8-9 cm); 88-2-5 (3-4 cm):  
- Good assemblages with Gephyrocapsa oceanica, G. aperta, G. caribbeanica, Helicopontosphaera kamptneri, and Pseudoemiliania lacunosa.  
- Age: Early Gephyrocapsa oceanica Zone; Late Pleistocene.

Samples: 88-3-3 (69-70 cm); 88-3-4 (5-6 cm):  
- Good assemblage with Discoaster brouweri rutellus, D. brouweri tridenus, and D. brouweri tamalis accompanying a flood of Pseudoemiliania lacunosa.  
- Age: Discoaster brouweri Zone; Late Pleistocene.

Samples: 88-3-5 (5-6 cm); 88-3-6 (27-28 cm):  
- Same assemblage as in the upper part of this barrel, but with Discoaster pentaradiatus.  
- Age: Discoaster pentaradiatus Zone; Late Pliocene.

Samples: 88-4-1 (6-7 cm); 88-4-2 (125-126 cm); 88-4-3 (19-20 cm); 88-4-4 (48-49 cm):  
- Assemblages with Discoaster brouweri, D. pentaradiatus, D. surculus (rare), and Pseudoemiliania lacunosa.  
- Age: Discoaster surculus Zone; Late Pliocene.

Samples: 88-4-5 (13-14 cm); 88-5-1 (2-3 cm); 88-5-2 (28-29 cm); 88-5-6 (18-19 cm):  
- Age: Reticulofenestra pseudoumbilica Zone; Early Pliocene.

**HOLE 89**

Samples: 89-1-1 (100-101 cm); 89-1-2 (19-20 cm):  
- Assemblages of very small coccoliths, including Gephyrocapsa oceanica, G. aperta, G. caribbeanica, and Cyclcoccolithina leptopora.  
- Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Sample 89-1-3 (12-13 cm):  
- Very poor assemblage with a few large specimens of Gephyrocapsa oceanica.  
- Age Gephyrocapsa oceanica Zone; Late Pleistocene.

Sample 89-2-1 (122-123 cm):  
- Good assemblage with many Gephyrocapsa caribbeanica and Pseudoemiliania lacunosa, some Cyclcoccolithina leptopora and Helicopontosphaera kamptneri.  
- Age: Gephyrocapsa caribbeanica Zone; Early Pleistocene.

Samples: 89-3-1 (4-5 cm); 89-2-3 (6-7 cm):  
- Moderately good assemblages with Gephyrocapsa caribbeanica, Pseudoemiliania lacunosa, Rhabdosphaera clavigera, and Helicopontosphaera kamptneri.  
- Age: Gephyrocapsa caribbeanica Zone; Early Pleistocene.

Sample 89-3-3 (10-11 cm):  
- Same assemblage as above, but with fragments of Discoaster brouweri.  
- Age: Earliest Gephyrocapsa caribbeanica Zone or latest Discoaster brouweri Zone; Earliest Pleistocene or latest Pliocene.

Sample 89-3-4 (6-7 cm):  
- Gephyrocapsa caribbeanica, Pseudoemiliania lacunosa, Discoaster brouweri, and D. pentaradiatus.  
- Age: Discoaster pentaradiatus Zone, Late Pliocene.
Sample 89-4-1 (6-7 cm):
Age: Probably Discoaster surculus Zone; Late Pliocene.

Sample 89-4-2 (6-7 cm):
Same species as above are present, but the assemblage is very poor.

Sample 89-4-3 (7-8 cm):
Same assemblage as in Sample 89-4-1 (6-7 cm), but with typical specimens of Discoaster surculus.
Age: Discoaster surculus Zone; Late Pliocene.

Sample 89-4-4 (6-7 cm):
Same assemblage as in Sample 89-4-3 (7-8 cm), but with a reworked specimen of Discoaster barbadiensis.

Sample 89-4-5 (24-25 cm):
Age: Ceratolithus rugosus Zone; Early Pliocene.

Sample 89-4-6 (7-8 cm):
Same assemblage as in Sample 89-4-5 (24-25 cm), but with Discoaster cf. quinqueramus.
Age: Ceratolithus rugosus Zone; Early Pliocene.

Sample 90-1-1 (6-7 cm):
Good assemblage with Gephyrocapsa oceanica, G. caribbeanica, Helicopontosphaera kamptneri, Discoclitina phaeola, Helicopontosphaera kamptneri, Cyclcoccolithina leptopora, and Rhabdosphaera styfiera.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Sample 90-1-2 (6-7 cm):
Sandy sample with very poor assemblage like that above.

Sample: 90-1-3 (6-7 cm); 90-1-4 (6-7 cm); 90-1-5 (6-7 cm); 90-1-6 (6-7 cm):
Good assemblages with Gephyrocapsa oceanica, G. aperta, G. caribbeanica, Ceratolithus cristatus, Discoclitina phaeola, Helicopontosphaera kamptneri, Cyclcoccolithina leptopora, and Rhabdosphaera styfiera.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Sample: 90-2-1 (57-58); 90-2-2 (6-7 cm); 90-2-3 (15-16 cm); 90-2-4 (6-7 cm):
Same assemblage as in Sample 90-1-6 (6-7 cm), but with Pseudoemiliania lacunosa.
Age: Early Gephyrocapsa oceanica Zone; Late Pleistocene.

Sample: 90-3-1 (60-61 cm); 90-3-2 (6-7 cm); 90-3-3 (14-15 cm):
Assemblages with Discoaster brouweri rutellus, D. brouweri tridenus, D. brouweri tamalis, and D. pentaradiatus.
Age: Discoaster pentaradiatus Zone; Late Pliocene.

Sample: 90-4-1 (86-87 cm); 90-4-2 (6-7 cm); 90-4-3 (13-14 cm):
Age: Early Discoaster surculus Zone; Late Pliocene.

Sample 90-5-1 (6-7 cm):
Very poor assemblage with Micula staurophora.
Age: Late Miocene or Pliocene.

Sample 90-5-2 (7-8 cm):
Very poor assemblage with only a few unidentifiable coccoliths.
Age: Uncertain.

Sample 90-5-3 (3-4 cm):
Very poor assemblage, but with Micula staurophora.
Age: Uncertain.

Sample 90-5-4 (6-7 cm); 90-6-1 (19-20 cm); 90-6-2 (6-7 cm):
No calcareous nannofossils.

Samples 90-7-1 (32-33 cm); 90-7-2 (6-7 cm); 90-7-3 (6-7 cm):
Age: Discoaster quinqueramus Zone; Late Miocene.

Samples: 90-9-1 (26-27 cm); 90-10-1 (3-4 cm):
No calcareous nannofossils.

Sample 90-11-2 (11-12 cm):
Sample almost barren, containing only a few coccolith and asterolith fragments.

Sample 90-11-3 (6-7 cm):
Very poor sample containing some heavily calcified asterolith fragments. Apparently only five- and six-rayed asteroliths are present.
Age: Probably Middle or Late Miocene.
Samples: 90-11-4 (6-7 cm); 90-11-5 (6-7 cm); 90-11-6 (6-7 cm); 90-13-1 (6-7 cm); 90-13-2 (6-7 cm); 90-13-3 (19-20 cm):

No calcareous nanofossils.

HOLE 91

Sample 91-1-1 (90-91 cm):

No calcareous nanofossils.

Sample 91-1-2 (6-7 cm):

Very poor assemblage with Gephyrocapsa oceanica, G. caribbeanica, and Helicopontosphaera kamperti.
Age: Gephyrocapsa caribbeanica Zone; Late Pleistocene.

Samples: 91-1-3 (3-4 cm); 91-1-4 (14-15 cm); 91-1-5 (6-7 cm); 91-1-6 (6-7 cm); 91-2-1 (122-123 cm):

No calcareous nanofossils.

Samples: 91-2-2 (6-7 cm); 91-2-3 (6-7 cm); 91-2-4 (5-6 cm):

Very poor samples with a few specimens of Gephyrocapsa oceanica, G. caribbeanica, and G. aperta.
Age: Gephyrocapsa caribbeanica Zone; Late Pleistocene.

Sample 91-2-5 (6-7 cm):

No calcareous nanofossils.

Sample 91-3-1 (6-7 cm):

Very poor sample with Helicopontosphaera kamperti and reworked Mesozoic Watznaueria barnesae.
Age: Gephyrocapsa caribbeanica Zone; Late Pleistocene.

Samples: 91-3-2 (4-5 cm); 91-3-6 (6-7 cm):

No calcareous nanofossils.

Sample 91-4-1 (6-7 cm):

A few reworked Cretaceous coccoliths occur: Eiffelithus turrisisifieli, Watznaueria barnesae, Vekshinella sp., Micula staurophora.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Samples: 91-4-2 (6-7 cm); 91-4-3 (6-7 cm):

Very poor samples with only a few specimens of reworked Mesozoic Watznaueria barnesae.

Samples: 91-4-4 (6-7 cm); 91-4-5 (6-7 cm); 91-4-6 (6-7 cm):

No calcareous nanofossils.

Sample 91-5-1 (5-6 cm):

Very poor assemblage with Gephyrocapsa oceanica and G. aperta.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Sample 91-5-2 (5-6 cm):

Very poor assemblage containing Gephyrocapsa aperta, G. caribbeanica, and Helicopontosphaera kamperti.
Age: Probably Gephyrocapsa oceanica Zone; Late Pleistocene.

Samples: 91-5-3 (6-7 cm); 91-5-4 (6-7 cm); 91-5-5 (6-7 cm):

No calcareous nanofossils.

Sample 91-5-6 (5-6 cm):

Poor assemblage with Gephyrocapsa oceanica, G. aperta, G. caribbeanica, and reworked Cretaceous Watznaueria barnesae.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Sample 91-6-1 (6-7 cm):

Moderately good assemblage with Gephyrocapsa oceanica, G. aperta, G. caribbeanica, Cyclococcolithina leptopora, Scapholithus fossils, and Rhabdosphaera stylifera.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Sample 91-6-2 (6-7 cm):

Poor assemblage of reworked Cretaceous coccoliths: Arkhangelskiella cymobiformis, Eiffelithus turrisisifieli, Prediscosphaera cretacea, Watznaueria barnesae, Micula staurophora.

Sample 91-6-3 (6-7 cm):

Very poor assemblage with only a few rims of Cretaceous coccoliths.

Sample 91-6-4 (5-6 cm):

No calcareous nanofossils.

Sample 91-6-5 (5-6 cm):

Very poor assemblage with Gephyrocapsa oceanica, and some reworked Cretaceous specimens of Watznaueria barnesae, Micula staurophora, and Orbipsphaera ehrenbergi.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Samples: 91-7-1 (45-46 cm); 91-7-2 (? cm); 91-7-3 (6-7 cm):

No calcareous nanofossils.

Sample 91-7-4 (6-7 cm):

Very poor assemblage with Gephyrocapsa oceanica, Cyclococcolithina leptopora, and reworked Watznaueria barnesae.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Sample 91-7-5 (6-7 cm):

No calcareous nanofossils.

Sample 91-8-1 (23-24 cm); 91-8-2 (6-7 cm):

Very poor assemblages with Gephyrocapsa caribbeanica, Pseudoemiliania lacunosa, and Discoaster brouweri.
Age: Discoaster brouweri Zone; Late Pleistocene.

Samples: 91-9-2 (7-8 cm); 91-9-3 (6-7 cm); 91-9-4 (6-7 cm):

No calcareous nanofossils.

Sample 91-9-5 (7-8 cm):

Age: Discoaster pentaradiatus Zone; Late Pliocene.

Sample 91-9-6 (12-13 cm):

Very poor sample with only a few specimens of Pseudoemiliania lacunosa.

Sample 91-10-2 (6-7 cm):

Very poor assemblage with Discoaster brouweri and D. pentaradiatus.
Age: Discoaster pentaradiatus Zone; Late Pliocene.

Samples: 91-10-3 (6-7 cm); 91-10-4 (6-7 cm):

No calcareous nanofossils.

Sample 91-11-2 (6-7 cm):

Very poor, with only a few coccolith rims present.

Samples: 91-11-3 (4-5 cm); 91-11-4 (6-7 cm); 91-12-2 (6-7 cm); 91-12-3 (8-9 cm); 91-13-1 (58-59 cm); 91-13-2 (6-7 cm); 91-13-3 (9-10 cm); 91-14-2 (6-7 cm); 19-15-1 (6-7 cm):

No calcareous nanofossils.

Samples: 91-15-2 (6-7 cm); 91-15-3 (6-7 cm):

Poor assemblage with Discoaster brouweri, D. extensus, D. kugleri, D. bollii.
Age: Discoaster kugleri Zone; Middle Miocene.
Sample 91-16-1 (3-4 cm):
No calcareous nannofossils.
Sample 91-16-2 (6-7 cm):
Poor assemblage with Discoaster brouweri, D. bollii, D. kugleri, and Catinaster calyculus.
Age: Discoaster kugleri Zone, Middle Miocene.
Samples: 91-16-3 (6-7 cm); 91-20-2 (6-7 cm); 91-20-6 (7-8 cm); 91-22-1 (6-7 cm):
No calcareous nannofossils.
Sample 91-22-2 (5-6 cm):
Very poor assemblage with Coccolithus cf. pelagicus, and asterolith fragments.
Age: Uncertain.
Samples: 91-25-1 (89-90 cm); 91-25-2 (6-7 cm); 91-25-3 (13-14 cm); 91-25-4 (12-13 cm):
No calcareous nannofossils.

HOLE 92
Sample 92-2-1 (91-92 cm):
No calcareous nannofossils.
Sample 92-2-2 (6-7 cm):
Very poor assemblage of reworked Cretaceous coccoliths, with Watznaueria barnesae and Micula staurophora.
Sample 92-2-3 (6-7 cm):
Very poor assemblage with Gephyrocapsa caribbeanica, and reworked Cretaceous calcareous nannofossils: Microrhabdulus decoratus, Arkhangelskia sp., Micula staurophora, Prediscoaphera cretacea.
Age: Probably Gephyrocapsa caribbeanica Zone; Early Pleistocene.
Sample 92-2-4 (6-7 cm):
Few Cretaceous calcareous nannofossils present: Microrhabdulus decoratus, Micula staurophora.
Sample 92-2-5 (6-7 cm):
Poor assemblage of reworked Cretaceous calcareous nannofossils, with Watznaueria barnesae, Arkhangelskia cymbiformis, and Prediscoaphera cretacea.
Sample 92-3-1 (101-102 cm):
Very poor assemblage with a few specimens of Gephyrocapsa caribbeanica and G. aperta.
Age: Probably Gephyrocapsa caribbeanica Zone; Early Pleistocene.
Samples: 92-3-2 (6-7 cm); 92-3-3 (6-7 cm); 92-3-4 (6-7 cm); 92-3-5 (6-7 cm); 92-4-2 (6-7 cm); 92-4-3 (6-7 cm):
No calcareous nannofossils.
Sample 92-4-4 (6-7 cm):
Very poor sample with a few specimens of Watznaueria barnesae and Gephyrocapsa sp.
Sample 92-4-5 (9-10 cm):
No calcareous nannofossils.
Sample 92-5-1 (6-7 cm):
Very poor assemblage with Gephyrocapsa sp. and reworked Cretaceous coccoliths: Arkhangelskia cymbiformis, Watznaueria barnesae, and Prediscoaphera cretacea.
Sample: 92-5-2 (6-7 cm):
Very rare, poorly preserved specimens of Gephyrocapsa cf. caribbeanica.
Age: Gephyrocapsa caribbeanica Zone; Early Pleistocene.
Samples: 92-5-3, (6-7 cm); 92-5-4, (6-7 cm):
Only a few coccolith remnants are present.
Sample 92-5-5, (6-7 cm):
Micula staurophora and Watznaueria barnesae from the Cretaceous occur with rare, poor specimens of Gephyrocapsa cf. caribbeanica.
Age: Gephyrocapsa caribbeanica Zone; Early Pleistocene.
Sample: 92-5-6 (8-9 cm):
Only a few reworked Cretaceous coccoliths are present: Prediscoaphera cretacea, Arkhangelskia cymbifolium, Eiffelliithus turrisifeli, and Watznaueria barnesae.
Samples: 92-6-2 (6-7 cm); 92-7-1 (126-127 cm); 92-8-1 (34-35 cm); 92-11-2 (6-7 cm):
No calcareous nannofossils.

HOLE 93
Sample 93-1-1 (133-134 cm):
Mixed assemblage with Gephyrocapsa oceanica, G. caribbeanica, Cyclococcolithina leptopora, Helicopontosphaera kamptneri, and Discoaster brouweri.
Age: Mixed Late Pleistocene and Late Pliocene.
Sample 93-1-2 (6-7 cm):
Good assemblage with Sphenolithus abies, Discoaster pentaradiatus, D. brouweri, D. extensus, Helicopontosphaera kamptneri, and Cyclococcolithina pelagica.
Age: Probably Discoaster surculus Zone; Late Pliocene.

HOLE 94
Samples: 94-1-1 (103-104 cm); 94-1-2 (6-7 cm):
Good assemblage with Gephyrocapsa oceanica, G. caribbeanica, G. aperta, Helicopontosphaera kamptneri, and Cyclococcolithina leptopora.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.
Samples: 94-2-1 (6-7 cm); 94-2-2 (6-7 cm):
Good assemblage with Gephyrocapsa caribbeanica, G. aperta, Pseudoemiliania lacunosa, Helicopontosphaera kamptneri, and Cyclococcolithina leptopora.
Age: Gephyrocapsa caribbeanica Zone; Early Pleistocene.
Samples: 94-2-3 (6-7 cm); 94-2-4 (6-7 cm); 94-2-5 (6-7 cm); 94-2-6 (6-7 cm):
Good assemblage with Gephyrocapsa caribbeanica, Pseudoemiliania lacunosa, Discoaster brouweri, and D. pentaradiatus.
Age: Early Discoaster surculus Zone; Late Pleistocene.
Samples: 94-3-1 (33-34 cm); 94-3-2 (6-7 cm):
Age: Early Discoaster surculus Zone; Late Pleistocene.
Sample 94-3-3 (6-7 cm):
Poor assemblage, but with the same species as immediately above.
Sample 94-3-4 (17-18 cm):
Moderately good assemblage like that of Sample 94-3-2 (6-7 cm)
Samples; 94-3-5 (6-7 cm); 94-3-6 (6-7 cm):
Assemblages like in Sample 94-3-2 (6-7 cm), but with typical Discoaster present.
Age: Early Discoaster Zone; Late Miocene.
Sample 94-4-1 (6-7 cm):
Age: Reticulofenestra pseudoumbilica Zone; Early Pliocene.
Sample 94-4-2 (6-7 cm):
Age: Discoaster asymmetricus Zone; Early Pliocene.
Sample 94-4-3 (12-13 cm):
Assemblage as immediately above, but apparently lacking Discoaster asymmetricus.
Age: Ceratolithus rugosus Zone; Early Pliocene.
Samples: 94-4-4 (6-7 cm); 94-4-5 (6-7 cm):
Assemblages with the same species as in Sample 94-4-3 (12-13 cm), but dominated by a flood of minute coccoliths.
Age: Ceratolithus rugosus Zone; Early Pliocene.
Samples: 94-4-6 (6-7 cm); 94-5-1 (14-15 cm); 94-5-2 (6-7 cm); 94-5-3 (6-7 cm); 94-5-4 (14-15 cm):
Moderately good samples with Discoaster brouweri, D. pentaradiatus, D. surculus, Reticulofenestra pseudoumbilica, Ceratolithus tricorniculatus and C. rugosus.
Age: Ceratolithus rugosus Zone; Early Pliocene.
Samples: 94-5-5 (6-7 cm); 94-6-1 (6-7 cm); 94-6-2 (4-5 cm); 94-6-3 (6-7 cm); 94-6-4 (13-14 cm); 94-6-5 (4-5 cm); 94-6-6 (6-7 cm); 94-7-1 (108-109 cm); 94-7-2 (6-7 cm); 94-7-3 (6-7 cm); 94-7-4 (6-7 cm):
Poor to very poor assemblages with few asteroliths and very rare ceratoliths; species mostly as in Sample 94-5-4 (14-15 cm)
Age: Probably Ceratolithus rugosus Zone or Ceratolithus tricorniculatus Zone; Early Pliocene or Late Miocene.
Sample 94-7-5 (6-7 cm):
Moderately good assemblage with Discoaster brouweri, D. surculus, and D. quinqueramus.
Age: Discoaster quinqueramus Zone; Late Miocene.
Sample 94-8-1 (111-112 cm); 94-8-2 (6-7 cm):
Good assemblages with abundant Discoaster quinqueramus.
Age: Discoaster quinqueramus Zone; Late Miocene.
Samples: 94-8-3 (6-7 cm); 94-8-4 (6-7 cm); 94-8-5 (6-7 cm):
Age: Discoaster quinqueramus Zone; Late Miocene.
Sample 94-9-1 (6-7 cm):
Poor assemblage with a few corroded coccoliths and asteroliths.
Samples: 94-9-2 (6-7 cm); 94-9-3 (6-7 cm); 94-9-4 (6-7 cm):
Age: Sphenolithus heteromorphus Zone; Middle Miocene.
Sample 94-9-6 (6-7 cm):
Poor assemblage containing Helicopontosphaera paral-leta, Sphenolithus ciperoensis, and a few nondescript asteroliths.
Age: Probably Discoaster druggi Zone; Early Miocene.
Samples: 94-10-1 (69-70 cm); 94-10-2 (6-7 cm); 94-10-3 (6-7 cm):
Good assemblages with Triquetrorhabdulus carinatus, Coronocyclus nitesens, Cyclococcolithina floridana, Discoaster aulakos, D. deflandrei, D. adamanteus, D. saundersi, and D. extensus.
Age: Probably Triquetrorhabdulus carinatus Zone; Late Oligocene or Early Miocene.
Sample 94-11-1 (103-104 cm):
Assemblage similar to that above, but lacking Trique- trorhabdulus carinatus, and with Sphenolithus distentus and Reticulofenestra bicastra.
Age: Sphenolithus distentus Zone; Middle or Late Oligo-ocene.
Samples: 94-11-2 (6-7 cm); 94-11-3 (14-15 cm); 94-11-4 (6-7 cm):
Good assemblage with Reticulofenestra bicastra, Discoaster trinidadensis, D. saundersi, D. adamanteus, Cyclococcolithina floridana, Sphenolithus distentus and S. predistentus.
Age: Sphenolithus predistentus Zone; Middle Oligocene.
Samples: 94-11-5 (6-7 cm); 94-11-6 (6-7 cm); 94-12-1 (19-20 cm); 94-12-2 (6-7 cm); 94-12-3 (6-7 cm); 94-12-4 (6-7 cm); 94-13-2 (22-23 cm); 94-13-3 (6-7 cm):
Good assemblages with the same species as in Sample 94-11-4, except that Sphenolithus distentus is absent, and rare specimens of Discoaster tani ornatus occur.
Age: Sphenolithus predistentus Zone; Middle Oligocene.
Samples: 94-14-1 (119-120 cm); 94-14-2 (5-6 cm); 94-14-3 (6-7 cm); 94-14-4 (4-5 cm); 94-15-4 (39-40 cm):
Moderately good assemblages with Cyclococcolithina formosa, Reticulofenestra umbilica, Discoaster barbadiensis, D. saipanensis, D. tani ornatus, and Ericsonia subdisti-cha.
Age: Probably Isthmolithus recurvus Zone or Sphenolithus pseudoradians Zone; Late Eocene.
Sample 94-16-1 (11-12 cm):
Very poor assemblage, lacking Discoaster barbadiensis.
Samples: 94-16-2 (6-7 cm); 94-16-3 (6-7 cm); 94-17-1 (16-17 cm); 94-17-2 (12-13 cm); 94-17-3 (7-8 cm):
Moderately good assemblages, with species as in Sample 94-15-4 (39-40 cm)
Sample 94-17-4 (6-7 cm):
Very poor sample with only a few small corroded coccoliths.
Samples: 94-18-1 (6-7 cm); 94-18-2 (6-7 cm):
Moderately good assemblage with Reticulofenestra umbilica, Discoaster barbadiensis, D. saipanensis, Braarudosphaera undata, and B. discula.
Age: Late Eocene.
Sample 94-18-3 (6-7 cm):
Poor assemblage with small coccoliths.
Samples: 94-18-4 (6-7 cm); 94-19-1 (7-8 cm); 94-19-2 (5-6 cm); 94-19-3 (5-6 cm); 94-19-4 (6-7 cm); 94-19-5 (5-6 cm); 94-20-1 (6-7 cm); 94-20-2 (6-7 cm); 94-20-3 (7-8 cm); 94-20-4 (6-7 cm):
Generally poor samples with species as in Sample 94-18-2 (6-7 cm).
Age: Probably Middle Eocene.
Sample 94-19-3 (5-6 cm); 94-19-4 (6-7 cm); 94-19-5 (5-6 cm):
Age: Probably Middle Eocene.
Sample 94-19-6 (6-7 cm):
Very poor assemblage with species as in Sample 94-19-5 (5-6 cm).
Age: Probably Late Eocene.
Sample 94-20-4 (6-7 cm):
Age: Late Paleocene.
Samples: 94-20-1 (6-7 cm); 94-20-2 (6-7 cm); 94-20-3 (7-8 cm); 94-20-4 (6-7 cm):
Samples: 94-21-2 (6-7 cm):
Moderately good sample with Zygrhablithus bijugatus, Triquetrorhabdulus inversus, Micrantholithus procerus, Braarudosphaera discula, Discoaster barbadiensis, and D. saipanensis.
Age: Probably Middle Eocene.
Samples: 94-22-1 (15-16 cm); 94-22-2 (6-7 cm); 94-22-3 (6-7 cm):
Moderately good assemblages with Discoaster barbadiensis, D. saipanensis, Reticulofenestra umbilica, Zygrhablithus bijugatus, Micrantholithus procerus, and Heliorthus concinnus.
Age: Probably Middle Eocene.
Samples: 94-22-4 (6-7 cm); 94-23-1 (89-90 cm); 94-23-2 (6-7 cm); 94-24-1 (115-116 cm); 94-24-2 (6-7 cm); 94-24-3 (7-8 cm):
Mediocre to poor samples with the same assemblage as Sample 94-22-3 (6-7 cm).
Sample 94-24-4 (6-7 cm):
Good assemblage with Discoaster barbadiensis, D. deflandrei, Coccolithus eopelagicus, Triquetrorhabdulus inversus, Micrantholithus procerus, Campylosphaera delata, Chiasmolithus grandis.
Age: Middle Eocene.
Samples: 94-25-1 (22-23 cm); 94-25-2 (6-7 cm):
Poor assemblages, but with the same species as immediately above.
Sample 94-25-3 (7-8 cm):
Good assemblage like that of Sample 94-24-4 (6-7 cm).
Age: Middle Eocene.
Samples: 94-26-1 (103-104 cm); 94-26-2 (6-7 cm); 94-26-3 (6-7 cm); 94-26-4 (6-7 cm); 94-26-5 (6-7 cm); 94-28-1 (80-81 cm); 94-28-2 (6-7 cm); 94-28-3 (6-7 cm):
Moderately good assemblages with species as in Sample 94-24-4 (6-7 cm).
Age: Middle Eocene.
Samples: 94-28-4 (6-7 cm); 94-28-5 (6-7 cm):
Poor assemblages with species as in Sample 94-24-4 (6-7 cm).
Age: Probably Middle Eocene.
Samples: 94-30-1 (4-5 cm); 94-30-2 (1-2 cm):
Very poor assemblages with Sphenolithus anarrhopus, Discocyclina pectinata, Coccolithus cf. pelagicus, Discoaster barbadiensis, and Lophodolithus reniformis.
Age: Early Eocene.
Sample 94-33-1 (6-7 cm):
Discoaster barbadiensis is the only recognizable calcareous nannofossil.
Sample 94-33-2 (4-5 cm):
Very poor assemblage with Discoaster multiradiatus and Neocomactolites protenus.
Age: Discoaster multiradiatus Zone or Marthasterites contortus Zone; Late Paleocene or Early Eocene.
Samples: 94-34-1 (1-2 cm); 94-34-2 (4-5 cm); 94-34-3 (1-2 cm):
Poor assemblages with Discoaster multiradiatus, Chiasmolithus consuetus, and Fasciculithus tympaniformis.
Age: Discoaster multiradiatus Zone; Late Paleocene.
Sample 94-36-1 (99-101 cm):
Very poor assemblage with Ericsonia subpertusa, Coccolithus carus, and small nondescript coccoliths.
Age: Probably Cruciplacolithus tenuis Zone; Early Paleocene.
Sample 94-38-1 (23-24 cm):
No calcarceous nannofossils.

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Samples: 95-1-1 (14-15 cm); 95-1-5 (6-7 cm):
Good assemblages with Gephyrocapsa oceanica, G. caribbeanica, G. aperta, and Cyclococcolithina leptopora.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.
Samples: 95-2-1 (6-7 cm); 95-2-2 (24-25 cm); 95-2-3 (6-7 cm):
Good assemblages with Triquetrorhabdulus carinatus, Cyclococcolithina floridana, Coccolithus pelagicus, Sphenolithus belemnos, Discoaster nephados, D. saundersi, and D. deflandrei.
Age: Probably Triquetrorhabdulus carinatus Zone; Late Oligocene or Early Miocene.
Sample 95-2-6 (6-7 cm):
Poor assemblage with species as in Sample 95-2-3 (6-7 cm).
Samples: 95-3-1 (6-7 cm); 95-3-2 (28-29 cm); 95-3-3 (5-6 cm); 95-3-4 (8-9 cm); 95-3-5 (15-16 cm); 95-3-6 (6-7 cm); 95-4-2 (7-8 cm); 95-4-3 (6-7 cm); 95-4-4 (6-7 cm):
Good assemblages with Cyclococcolithina floridana, Coccolithus eopelagicus, Sphenolithus predistentus and S. distentus.
Age: Probably Sphenolithus distentus Zone; Middle or Late Oligocene.
Samples: 95-5-1 (2-3 cm); 95-5-2 (13-14 cm); 95-5-3 (6-7 cm); 95-5-4 (6-7 cm):
Good assemblages with Cyclococcolithina floridana, Coccolithus eopelagicus and Sphenolithus predistentus.
Age: Probably Sphenolithus predistentus Zone; Middle Oligocene.
Samples: 95-6-1 (6-7 cm); 95-6-2 (6-7 cm); 95-6-3 (6-7 cm); 95-6-4 (6-7 cm); 95-6-5 (6-7 cm); 95-6-6 (6-7 cm): Good assemblages with Cyclococcolithina floridana, Coccolithus eopelagicus, Sphenolithus predistentus, Reticulofenestra umbilica, Coronoclycus nitescens, and Quinquerhabdus colossicus.
Age: Sphenolithus predistentus Zone; Middle Oligocene
Samples: 95-7-1 (5-6 cm); 95-7-2 (6-7 cm); 95-7-3 (6-7 cm); 95-7-4 (4-5 cm); 95-7-5 (5-6 cm); 95-7-6 (6-7 cm); 95-8-1 (6-7 cm): Moderately good assemblages with Coccolithus eopelagicus, Cyclococcolithina floridana, and Discoaster barbadiensis.
Age: Probably Late Eocene.
Samples: 95-7-4 (4-5 cm); 95-7-5 (5-6 cm); 95-7-6 (6-7 cm); 95-8-1 (6-7 cm): Moderately good to poor assemblages with Cyclococcolithina floridana, Coccolithus eopelagicus, Chiasmolithus grandis, Triquerorrhabdus inversus, and Micrantholithus procerus.
Age: Probably Late Eocene.
Age: Probably Middle Eocene.
Sample 95-10-1 (10-11 cm): Good assemblage with Ericsonia subpertusa, Fasciculithus tympaniformis, Chiasmolithus bidens, Discoaster multiradiatus, and Braarudosphaera bigelowi.
Age: Probably Discoaster multiradiatus Zone; Late Paleocene.
Samples: 95-11-1 (108-110 cm); 95-11-2 (6-7 cm); 95-11-3 (6-7 cm); 95-11-4 (1-2 cm): Poor assemblages with Fasciculithus tympaniformis, Chiasmolithus danicus, Braarudosphaera discula, B. bigelowi, Ericsonia subpertusa, Cruciplacolithus tenuis, Markalius astroporus, Zygodiscus adamus, and Coccolithus cavus.
Age: Fasciculithus tympaniformis Zone; Middle Paleocene.
Samples: 95-12-1 (1-2 cm); 95-12-2 (6-7 cm); 95-12-3 (4-5 cm); 95-12-4 (1-2 cm): Poor assemblages with Ericsonia subpertusa, Markalius astroporus, Cruciplacolithus tenuis, Chiasmolithus danicus, and Coccolithus cavus.
Age: Chiasmolithus danicus Zone; Early Paleocene.
Samples: 95-13-1 (26-27 cm); 95-13-2 (6-7 cm); 95-13-3 (5-6 cm): These samples contain only coccolith fragments, no identifiable species.
Sample 95-13-4 (6-7 cm): Moderately good assemblage of corroded coccoliths, with Watznaueria barnesae, Prediscosphaera creatacea, Cribraspheara sp.
Age: Late Cretaceous.
Samples: 95-14-1 (42-43 cm); 95-15-1 (6-7 cm): Moderately good assemblage with Watznaueria barnesae, Prediscosphaera creatacea, Cribraspheara ehrenbergi, Eiffellithus turrisieffeli, Microrhabdus decoratus, Ahmuellerella octoradiata, and Lithastrinus grillii.
Age: Probably Campanian.
Samples: 95-15-2 (8-9 cm); 95-15-3 (7-8 cm); 95-15-4 (7-8 cm); 95-15-5 (7-8 cm); 95-15-6 (6-7 cm); 95-16-1 (6-7 cm); 95-16-2 (6-7 cm); 95-16-3 (7-8 cm); 95-16-4 (6-7 cm); 95-16-5 (4-5 cm); 95-16-6 (6-7 cm): Moderately good to mediocre to poor assemblages with the same species as in Sample 95-15-1 (6-7 cm).
Age: Probably Campanian.
Sample 95-17-1 (6-7 cm): Very poor assemblage with only coccolith fragments.
Samples: 95-17-2 (6-7 cm); 95-17-3 (6-7 cm); 95-17-4 (5-6 cm); 95-17-5 (6-7 cm); 95-17-6 (5-6 cm): Moderately good assemblages like Sample 95-16-6 (6-7 cm), but with abundant Lithraphidites carniolensis.
Age: Probably Santonian.

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Sample 96-1-1 (6-7 cm): Very poor sample with a few reworked specimens of Watznaueria barnesae.
Sample 96-1-3 (6-7 cm): No calcareous nannofossils.
Samples: 96-1-4 (6-7 cm); 96-1-5 (6-7 cm): Very poor samples with a few reworked Cretaceous species, including Watznaueria barnesae, Prediscosphaera creatacea, and Kampineriius sp.
Sample 96-1-6 (13-14 cm): Poor assemblage of reworked Cretaceous coccoliths: Micula staurophora, Watznaueria barnesae, Prediscosphaera creatacea, and Cribraspheara sp.
Samples: 96-2-1 (6-7 cm); 96-2-2 (6-7 cm): Good assemblages with Cyclococcolithina floridana, Coccolithus eopelagicus, Sphenolithus moriformis, S. heteromorphus, Helicopontosphera parallela, Reticulofenestra bisecta, Discoaster nephados, D. deflandrei, and Triquerorrhabdus carinatus.
Age: Mixed Early Miocene.
Samples: 96-2-3 (6-7 cm); 96-2-4 (6-7 cm); 96-2-5 (6-7 cm); 96-2-6 (6-7 cm): Good assemblages with Sphenolithus ciperoensis, Cyclococcolithina floridana, Coccolithus eopelagicus, Helicopontosphera truncata, Triquerorrhabdus carinatus, and Discoaster saundersi.
Age: Sphenolithus ciperoensis Zone; Late Oligocene.
Samples: 96-3-1 (6-7 cm); 96-3-2 (6-7 cm); 96-3-3 (6-7 cm); 96-3-4 (6-7 cm): Moderately good assemblages with Ericsonia subpertusa, Discoaster multiradiatus, Sphenolithus anarrhopus, Coccolithus eopelagicus.
Age: Discoaster multiradiatus Zone; Late Paleocene.
Samples: 96-3-5 (6-7 cm); 96-3-9 (6-7 cm): Mediocre samples with species as in Sample 96-3-1 (6-7 cm)
Age: Discoaster multiradiatus Zone; Late Paleocene.
Sample 96-5-1 (44-45 cm): Poor assemblage with Ericsonia subpertusa, Coccolithus cf. pelagicus, and Fasciculithus tympaniformis.
Age: Probably Fasciculithus tympaniformis Zone; Middle Paleocene.
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Samples: 97-1-1 (91-92 cm); 97-1-2 (6-7 cm); 97-1-2 (59-60 cm):
Good assemblages with Gephyrocapsa oceanica, G. caribbeanica, G. aperta, Helicopontosphaera kamptneri, and Cyclococcolithina leptopora.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Samples: 97-1-3 (7-8 cm); 97-1-4 (6-7 cm):
Good assemblages with species as above, but with Pseudoemiliania lacunosa.
Age: Gephyrocapsa oceanica Zone; Late Pleistocene.

Samples: 97-2-1 (26-27 cm); 96-2-2 (6-7 cm); 96-2-3 (6-7 cm); 96-2-4 (13-14 cm):
Moderately good assemblages with Gephyrocapsa caribbeanica, Sphenolithus abies, Discoaster brouweri, D. pentaradiatus, and D. surculus.
Age: Discoaster surculus Zone; Late Pliocene.

Sample 97-3-2 (6-7 cm):
Age: Discoaster calcaris Zone; Late Miocene.

Sample 97-3-3 (12-13 cm):
Poor assemblage, but with species as immediately above.

Sample 97-4-2 (6-7 cm):
Mixed assemblage with Discoaster brouweri, D. variabilis, Sphenolithus heteromorphus, and Cyclococcolithina floridana.
Age: Mixed Early and Middle or Late Miocene.

Samples: 97-4-2 (58-59 cm); 97-4-3 (5-6 cm); 97-4-4 (5-6 cm); 97-4-5 (6-7 cm):
Good assemblage with Cyclococcolithina floridana, Reticulofenestra bisecta, Sphenolithus distentus, and S. predistentus.
Age: Sphenolithus predistentus Zone; Middle Oligocene.

Sample 97-5-1 (123-124 cm):
Good assemblage with Reticulofenestra umbilica, Coccolithus eopelagicus, Peritrachelina joidea, and Bramlettis serraculoides.
Age: Late Eocene.

Sample 97-6-1 (49-50 cm):
Very poor assemblage with Watznaueria barnesae.

Sample 97-7-1 (108-109 cm):
No recognizable coccoliths.

Sample 97-7-2 (10-11 cm):
Very poor assemblage with Watznaueria barnesae.

Sample 97-8-1 (74-75 cm):
Poor assemblage with Watznaueria barnesae the only recognizable species.

Sample 97-8-2 (23-24 cm):
Moderately good assemblage with Watznaueria barnesae, Eiffellithus turrisieffeli, Prediscosphaera cretacea, Ahmuellerella octoradiata, Glauckolithus diplogrammus and Staurolithites matalosus.
Age: Probably Cenomanian.

Sample 97-8-3 (31-32 cm):
Poor assemblage, but with species as immediately above.

Sample 97-8-4 (11-12 cm):
No recognizable calcareous nannofossils.

Sample 97-12-1 (30-31 cm):
Good assemblage like that in Sample 97-8-2 (23-24 cm)
Age: Probably Cenomanian.

REFERENCES
