



**MICROPALÉO**  
CONSULTANTS, INC.

**USN/HUSKY - NPRA**

**W. T. FORAN NO. 1**

**API #50-103-20010**

**SEC. 13, T17N/R2W UM**

**NORTH SLOPE, ALASKA**

**Prepared by:**

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**BIOSTRATIGRAPHY REPORT**

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## **INTEGRATED SUMMARY**

500-675'

Tertiary  
Middle Eocene

675-1445'

Probable Tertiary  
Probable Early Paleocene  
Probable F-4(2)

1445-1720'

Late Cretaceous  
Maestrichtian

1720-2500'

Late Cretaceous  
Santonian to Campanian

2500-2950'

Late Cretaceous  
Turonian to Coniacian

2950-3620'

Late Cretaceous  
Probable Cenomanian

3620-5855'

Early Cretaceous  
Middle to Late Albian

5855-7380'

Early Cretaceous  
Aptian to Early Albian

7380-7490'

Early Cretaceous  
Barremian  
KE<sub>B</sub>

7490-7540'

Early Cretaceous  
Hauterivian  
KE<sub>H</sub>

7540-8195'

Early Triassic  
TE

Discussion. Sadlerochit Group. Fire Creek Fm. tops at 7540 feet, Ivishak Fm. tops at 7730 feet and Kavik Fm. tops at 8130 feet.

8195-8495'

Early to Middle Pennsylvanian  
Morrowan to Atokan  
Zone M-21

Discussion. Lisburne Group. Wahoo Fm.; Upper Limestone Unit.

8495-8570'

Early Pennsylvanian  
Morrowan  
Zone M-20

8570-8760'

Mississippian  
Undifferentiated

Discussion. Endicott Group. Reddish-brown shale and siltstone. Possible Itkilyariak Fm.

8760-8864'T.D.

Indeterminate Age

Discussion. Black wavy banded argillite.

# **FORAMINIFERA REPORT**

**Interpreted by**

**Michael B. Mickey**



## **FORAMINIFERA SUMMARY**

### 500-1220'

<u>Age.</u>	Tertiary Probable Paleocene to Eocene
<u>Zones.</u>	Probable F-3A(4) to F-4(2)
<u>Environment.</u>	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)

### 1220-1610'

<u>Age.</u>	Latest Cretaceous to Tertiary Undifferentiated
<u>Environment.</u>	Nonmarine to Marginal Marine (Alluvial Plain to Transitional)

### 1610-2450'

<u>Age.</u>	Late Cretaceous Santonian to Campanian
<u>Zones.</u>	F-5 to F-6
<u>Environment.</u>	Middle Neritic to Upper Bathyal (Middle Shelf to Upper Slope)

2450-2930'

<u>Age.</u>	Late Cretaceous Turonian to Coniacian
<u>Zones.</u>	F-6 to F-7
<u>Environment.</u>	Middle to Lower Bathyal (Middle to Lower Slope)

2930-3650'

<u>Age.</u>	Late Cretaceous Cenomanian
<u>Zones.</u>	F-7 to F-8
<u>Environment.</u>	Lower Bathyal - Distal (Base of Slope - Starved Basin)

3650-5860'

<u>Age.</u>	Early Cretaceous Middle to Late Albian
<u>Zones.</u>	F-9 to F-10
<u>Environment.</u>	3650-4670'?: Inner to Middle Neritic (Inner to Middle Shelf) 4670?-5860': Outer Neritic to Upper Bathyal (Outer Shelf to Upper Slope)

5860-7380'

Age. Early Cretaceous  
Aptian to Early Albian

Zone. F-11

Environment. Middle to Lower Bathyal  
(Middle to Lower Slope)

7380-7470'

Age. Early Cretaceous  
Barremian

Zone. F-12

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

7470-7530'

Age. Early Cretaceous  
Hauterivian

Zone. F-13a

Environment. Upper Bathyal  
(Upper Slope)

7530-8200'

<u>Age.</u>	Early Triassic
<u>Zone.</u>	F-20a
<u>Environment.</u>	Nonmarine to Inner Neritic (Alluvial Plain to Inner Shelf)
<u>Discussion.</u>	Sadlerochit Group. Fire Creek Fm. tops at 7530 feet, Ivishak Fm. tops at 7740 feet and Kavik Fm. tops at 8110 feet.

8200-8500'

<u>Age.</u>	Early to Middle Pennsylvanian Morrowan to Atokan
<u>Zone.</u>	M-21
<u>Environment.</u>	Shoaling Shelf (Outer Lagoonal to Bank)
<u>Discussion.</u>	Lisburne Group. Wahoo Fm.; Upper Limestone Unit.

8500-8590'

<u>Age.</u>	Early Pennsylvanian Morrowan
<u>Zone.</u>	M-20
<u>Environment.</u>	Shoaling Shelf (Lagoonal to Bank)

8590-8770'

<u>Age.</u>	Possible Mississippian Undifferentiated
<u>Environment.</u>	Nonmarine to Inner Neritic (Alluvial Plain to Inner Shelf)
<u>Discussion.</u>	Possible Endicott Group. Reddish-brown shale and siltstone. Possible Itkilyariak Fm.

8770-8864" T.D.

<u>Age.</u>	Indeterminate
<u>Environment.</u>	Indeterminate
<u>Discussion.</u>	Black wavy banded argillite.

## **INTRODUCTION**

### **Scope**

Data from 251 Foraminifera samples from the USN/Husky W. T. Foran No. 1 well were incorporated into this report. These samples consisted of 249 ditch and two (2) sidewall core samples covering the interval 500 to 8864 feet total depth. Thin sections were prepared on 27 ditch samples from 8080 to 8864 feet total depth. This work was done as part of M.C.I. Job Number 21-106.

### **Procedures**

Standard techniques were used to process the material. All samples were boiled in Quaternary-O and washed over 20 and 200 mesh screens. Frequency symbols correspond to the following numerical values: very rare (1), rare (2 - 4), frequent (5 -25), common (26 - 100), abundant (101 - 999) and prolific (1000+). The picked foram slides, prepared thin sections and residues are reposited at the State of Alaska Geological Materials Center in Eagle River, Alaska.

Certain factors such as shelf widths, basin configuration and overall basin depths associated with Arctic Mesozoic basins are not completely understood at present. The paleoenvironments presented in this report reflect relative basinal position only and should not be tied to specific water depths. Generally, neritic corresponds to shelf or deltaic environments, while bathyal corresponds to slope or prodelta environments and bathyal (starved basin) corresponds to distal (far from the source) deposition. As an example, prodelta deposits could represent deposition as shallow as middle neritic or as deep as bathyal (slope) depending on the delta type and shelf width. With a narrow shelf, a river-dominated deltaic system could build across the shelf and the prodelta deposits would be in a bathyal (slope) depth. A tide-dominated deltaic system associated with a wide shelf could result in middle neritic prodelta deposition.

## **Format**

A listing of the age, environment, fauna and occasional lithology comments for each biostratigraphic interval follows. A generalized summary of the well is presented in the Conclusions section at the end of the Foraminifera Report. Foraminifera Distribution Charts (Figures F-1 and F-2) and a High-Resolution Biostratigraphy Plot (Figure B-1) containing foram diversity/abundance plots, a cumulative faunal plot and paleoenvironmental plot(s) are in pockets at the back of this report.

## RESULTS

### 500-1220'

<u>Age.</u>	Tertiary Probable Paleocene to Eocene
<u>Zones.</u>	Probable F-3A(4) to F-4(2)
<u>Environment.</u>	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
<u>Fauna.</u>	<i>Cornuspira involvens</i> , <i>Elphidium bartletti</i> , <i>E. clavatum</i> , <i>E. cf. ustulatum</i> , <i>E. subnodosum</i> , <i>Cassidulina teretis</i> , <i>C.</i> <i>tortuosa</i> , <i>C. minuta</i> , <i>Cibicides perlucidus</i> , <i>C. lobatulus</i> , <i>Ammosphaeroidina?</i> sp., <i>Globulina inaequalis</i> , <i>Elphidiella cf. acutum</i> , plant debris, pyrite, pyrite spheres and rare to common coal.

### 1220-1610'

<u>Age.</u>	Latest Cretaceous to Tertiary Undifferentiated
<u>Environment.</u>	Nonmarine to Marginal Marine (Alluvial Plain to Transitional)
<u>Fauna.</u>	Barren of indigenous Foraminifera. Plant debris, pyrite, pyrite spheres and rare to common coal.



1610-2450'

<u>Age.</u>	Late Cretaceous Santonian to Campanian
<u>Zones.</u>	F-5 to F-6
<u>Environment.</u>	Middle Neritic to Upper Bathyal (Middle Shelf to Upper Slope)
<u>Fauna.</u>	<i>Haplophragmoides bonanzaensis</i> , <i>H. rota</i> , <i>Trochammina albertensis</i> , <i>T. ribstonensis</i> , <i>T.</i> <i>whittingtoni</i> , <i>Anomalinoides pinguis</i> , <i>Praebulimina</i> <i>venusae</i> , <i>Eoeponidella strombodes</i> , <i>Neobulimina</i> <i>canadensis</i> , <i>Hyperamminoides barksdalei</i> , <i>Verneuilinoides fischeri</i> , <i>Textularia gravenori</i> , <i>Arenobulimina torula</i> , plant debris, shell fragments, <i>Inoceramus</i> prisms, pyrite spheres, coal, pyrite, volcanic glass shards, pyrite sticks, and common to abundant radiolaria below 1820 to 1850 feet.

2450-2930'

<u>Age.</u>	Late Cretaceous Turonian to Coniacian
<u>Zones.</u>	F-6 to F-7
<u>Environment.</u>	Middle to Lower Bathyal (Middle to Lower Slope)
<u>Fauna.</u>	<i>Trochammina whittingtoni</i> , <i>T. ribstonensis</i> , <i>T. albertensis</i> , <i>Haplophragmoides rota</i> , <i>Saccammina lathrami</i> , <i>Hedbergella loetterlei</i> , <i>Verneuulinoides fischeri</i> , <i>Anomalinoides pinguis</i> , <i>Praebulimina seabeensis</i> , <i>Nonionella taylorensis</i> , coal, pyrite and rare to common scattered radiolaria.

2930-3650'

<u>Age.</u>	Late Cretaceous Cenomanian
<u>Zones.</u>	F-7 to F-8
<u>Environment.</u>	Lower Bathyal - Distal (Base of Slope - Starved Basin)
<u>Fauna.</u>	<i>Saccammina lathrami</i> , <i>Trochammina ribstonensis</i> , <i>Haplophragmoides rota</i> , <i>Hyperamminoides barksdalei</i> , megaspores, <i>Inoceramus</i> prisms, fish debris, shell fragments, coal, pyrite, pyrite oblates, common to abundant radiolaria, and frequent to common paper shale below 3410 to 3440 feet.

3650-5860'

<u>Age.</u>	Early Cretaceous Middle to Late Albian	
<u>Zones.</u>	F-9 to F-10	
<u>Environment.</u>	3650-4670':	Inner to Middle Neritic (Inner to Middle Shelf)
	4670'-5860':	Outer Neritic to Upper Bathyal (Outer Shelf to Upper Slope)
<u>Fauna.</u>	<i>Haplophragmoides topagorukensis</i> , <i>H. linki</i> , <i>H. excavatus</i> , <i>H. gigas</i> , <i>Saccamina lathrami</i> , <i>Verneuilinoides borealis</i> , <i>Trochammina umiatensis</i> , <i>T. mcmurrayensis</i> , <i>Ammobaculites wenonahae</i> , <i>A. fragmentarius</i> , <i>Lenticulina macrodisca</i> , <i>L. erecta</i> , <i>L. topagorukensis</i> , <i>Miliammina manitobensis</i> , <i>Bathysiphon vitta</i> , <i>Praebulimina nannina</i> , <i>Vaginulina exilis</i> , <i>Psamminopelta bowsheri</i> , <i>P. subcircularis</i> , <i>Globorotalites alaskensis</i> , astrorhizids, <i>Valvulineria loetterlei</i> , <i>Ammodiscus rotalarius</i> , <i>Gavelinella stictata</i> , <i>Dentalina dettermanni</i> , <i>Globulina prisca</i> , <i>Gaudryinella irregularis</i> , <i>Textularia topagorukensis</i> , <i>Reophax troyeri</i> , fish debris, <i>Inoceramus</i> prisms, megaspores, shell fragments, <i>Ditrupa cornu</i> , pelmatozoan fragments, coal, pyrite, paper shale, pyrite sticks and frequent to common radiolaria (some pyritized).	

5860-7380'

Age. Early Cretaceous  
Aptian to Early Albian

Zone. F-11

Environment. Middle to Lower Bathyal  
(Middle to Lower Slope)

Fauna. *Bathysiphon vitta*, astrorhizids, *Haplophragmoides excavatus*, *H. topagorukensis*, *H. gigas*, *Verneuulinoides borealis*, *Lenticulina macrodisca*, *Oolina apiculata*, *Valvulineria loetterlei*, *Globulina exserta*, *Trochammina umiatensis*, *Globorotalites alaskensis*, *Glomospirella gaultina*, *Hyperamminoides barksdalei*, *Saracenaria grandstandensis*, *Ammobaculites wenonahae*, *A. fragmentarius*, *Gaudryina* cf. *tailleuri*, *Saccammina lathrami*, *Miliammina manitobensis*, *Textularia topagorukensis*, *Conorboides umiatensis*, *Reophax* sp., shell fragments, *Inoceramus* prisms, pelmatozoan fragments, fish debris, *Ditrupa cornu*, pyrite, pyrite sticks, and frequent to common pyritized radiolaria with pyritized *Lithocampe* sp. N frequent in the basal sample.

7380-7470'

<u>Age.</u>	Early Cretaceous Barremian
<u>Zone.</u>	F-12
<u>Environment.</u>	Outer Neritic to Middle Bathyal (Outer Shelf to Middle Slope)
<u>Fauna.</u>	<i>Thuramminoides</i> sp., arenaceous spp., a. spp. (large, coarse), pyrite, common to abundant pyritized radiolaria (including <i>Lithocampe</i> sp. N) and frequent rounded frosted quartz floating sand grains.

7470-7530'

<u>Age.</u>	Early Cretaceous Hauterivian
<u>Zone.</u>	F-13a
<u>Environment.</u>	Upper Bathyal (Upper Slope)
<u>Fauna.</u>	<i>Haplophragmoides coronis</i> , <i>H. duoflatis</i> , <i>Trochammina squamata</i> , <i>T. conicominuta</i> , <i>Thuramminoides</i> sp., <i>Gaudryina tappanae</i> , <i>G. tailleuri</i> , <i>Ammobaculites erectus</i> , <i>Pseudobolivina</i> sp., <i>Glomospirella arctica</i> , <i>Gaudryinella irregularis</i> , arenaceous spp. (large, coarse), pyrite, frequent to abundant pyritized radiolaria and abundant rounded frosted quartz floating sand grains.

7530-8200'

<u>Age.</u>	Early Triassic
<u>Zone.</u>	F-20a
<u>Environment.</u>	Nonmarine to Inner Neritic (Alluvial Plain to Inner Shelf)
<u>Fauna.</u>	Arenaceous spp., <i>Ammodiscus</i> sp. P, <i>Ammobaculites vetusta</i> , <i>Trochammia</i> sp. (very small), <i>Bathysiphon</i> spp., spicules, pelmatozoan fragments, <i>Monotis?</i> fragments, megaspores, pyrite, pyrite spheres, siderite, and essentially barren of Foraminifera below 7650 to 7680 feet.
<u>Discussion.</u>	Sadlerochit Group. Fire Creek Fm. tops at 7530 feet, Ivishak Fm. tops at 7740 feet and Kavik Fm. tops at 8110 feet.

8200-8500'

<u>Age.</u>	Early to Middle Pennsylvanian Morrowan to Atokan
<u>Zone.</u>	M-21
<u>Environment.</u>	Shoaling Shelf (Outer Lagoonal to Bank)
<u>Fauna.</u>	<i>Earlandia</i> spp., <i>E. elegans</i> , <i>Trepeilopsis</i> spp., <i>Pseudoglomospira</i> spp., <i>Neoarchaediscus incertus</i> , <i>Monotaxinoides multivolutus</i> , <i>Biseriella parva</i> , <i>Endothyra</i> spp., archaeodiscids, <i>Priscella prisca</i> , <i>Globivalvulina bulloides</i> , <i>Eoschubertella yukonensis</i> , <i>Stylocodium</i> sp., <i>Kamaena</i> sp., <i>Calcisphaera laevis</i> , chert, and rare to common oolites below 8370 to 8400 feet.
<u>Discussion.</u>	Lisburne Group. Wahoo Fm.; Upper Limestone Unit.

8500-8590'

<u>Age.</u>	Early Pennsylvanian Morrowan
<u>Zone.</u>	M-20
<u>Environment.</u>	Shoaling Shelf (Lagoonal to Bank)
<u>Fauna.</u>	<i>Monotaxinoides multivolutus</i> , <i>Zellerina</i> sp., <i>Earlandia</i> spp., <i>Priscella prisca</i> , <i>Trepeilopsis</i> spp., <i>Pseudoglomospira</i> spp., <i>Endothyra</i> spp., <i>Biseriella</i> <i>parva</i> , <i>Planoendothyra rotayi</i> , archaeodiscids, <i>Asphaltina</i> sp., <i>Calcisphaera laevis</i> and rare <i>Kamaena</i> sp. algae.

8590-8770'

<u>Age.</u>	Possible Mississippian Undifferentiated
<u>Environment.</u>	Nonmarine to Inner Neritic (Alluvial Plain to Inner Shelf)
<u>Fauna.</u>	<i>Trepeilopsis</i> spp., <i>Earlandia</i> spp., <i>Pseudoglomospira</i> spp., and rare scattered algae and coral wall debris.
<u>Discussion.</u>	Possible Endicott Group. Reddish-brown shale and siltstone. Possible Itkilyariak Fm.

8770-8864'T.D.

<u>Age.</u>	Indeterminate
<u>Environment.</u>	Indeterminate
<u>Fauna.</u>	Barren of Foraminifera.
<u>Discussion.</u>	Black wavy banded argillite.



## **CONCLUSIONS**

The USN/Husky W. T. Foran No. 1 well penetrated the following biostratigraphic sequence based on foraminiferal analysis:

- 175+ feet (500-675') of probable Middle Eocene age (Late Brookian) transitional to inner shelf deposits.
- 2820 feet (675-3495') of Cenomanian to Maestrichtian or Early Paleocene? age (Early Brookian) upward shallowing base of slope bottomsets, slope foresets and transitional to outer shelf topsets.
- 4035 feet (3495-7530') of Hauterivian to Cenomanian age (Early Brookian & Beaufortian - Rift Sequence) generally upward shallowing base of slope bottomsets, slope foresets and inner to outer shelf topsets with a basal inner to middle shelf transgressive sandstone.
- 670 feet (7530-8200') of undifferentiated Early Triassic to age (Late Ellesmerian) alluvial plain, transitional and inner shelf deposition.
- 570 feet (8200-8770') of possible Mississippian to Early or Middle Pennsylvanian (Morrowan or Atokan) age (Early Ellesmerian) shoaling shelf carbonates and basal alluvial plain to inner shelf clastics.
- 94+ feet (8770-8864'T.D.) of indeterminate age (Franklinian) black wavy banded basement argillite.

# **PALYNOLOGY REPORT**

**Interpreted by:**

**Hideyo Haga**

## **PALYNOLOGY SUMMARY**

### 500-590'

Age. Tertiary  
In Middle Eocene

Zone. P-M11b

Environment. Marginal Marine

### 590-1490'

Age. Tertiary  
Paleocene

Zone. P-T10

Environment. Nonmarine

### 1490-1670'

Age. Late Cretaceous  
Maestrichtian

Zone. P-T11 and marginal marine equivalent

Environment. Nonmarine - Marginal Marine

1670-1850'

<u>Age.</u>	Late Cretaceous Campanian
<u>Zone.</u>	P-T12 and marginal marine equivalent
<u>Environment.</u>	Nonmarine - Marginal Marine

1850-2930'

<u>Age.</u>	Late Cretaceous Santonian - Campanian
<u>Zone.</u>	P-M14
<u>Environment.</u>	Marine

2930-3290'

<u>Age.</u>	Late Cretaceous Turonian - Coniacian
<u>Zone.</u>	P-M15
<u>Environment.</u>	Marine

3290-4010'

<u>Age.</u>	Possible Late Cretaceous Possible Cenomanian
<u>Zone.</u>	P-M16?
<u>Environment.</u>	Marine

4010-5800'?

<u>Age.</u>	Early Cretaceous Middle - Late Albian
<u>Zone.</u>	P-M17
<u>Environment.</u>	Marine

5800?-7330'

<u>Age.</u>	Early Cretaceous Aptian - Early Albian
<u>Zone.</u>	P-M18
<u>Environment.</u>	Marine
<u>Remarks.</u>	This age assignment is based on negative evidence.

7330-7510'SW

<u>Age.</u>	Early Cretaceous Barremian - Aptian
<u>Zone.</u>	P-M18a
<u>Environment.</u>	Marine

7510SW-7539'C

<u>Age.</u>	Early Cretaceous Hauterivian
<u>Zone.</u>	P-M19
<u>Environment.</u>	Marine

7539C-7610'

<u>Age.</u>	Indeterminate
<u>Environment.</u>	Probable Marginal Marine

7610-8060'

<u>Age.</u>	Triassic Undifferentiated
<u>Zones.</u>	P-T16 to P-T15
<u>Environment.</u>	Marginal Marine - Nonmarine

8060-8240'

<u>Age.</u>	Early Triassic Undifferentiated
<u>Zone.</u>	P-T17
<u>Environment.</u>	Nonmarine - Marginal Marine

8240-8510'

<u>Age.</u>	Indeterminate
<u>Environment.</u>	Indeterminate
<u>Remarks.</u>	Barren of indigenous palynomorphs.

8510-8780'

<u>Age.</u>	Mississippian Undifferentiated
<u>Zone.</u>	P-T21b?
<u>Environment.</u>	Nonmarine

8780-8864" T.D.

<u>Age.</u>	Indeterminate
<u>Environment.</u>	Indeterminate
<u>Remarks.</u>	Argillite basement.



## **INTRODUCTION**

### **Purpose and Scope**

The USN/Husky W. T. Foran No. 1 well completed drilling in April, 1977. A palynological study of sample material from the well was conducted during the drilling process. A total of 102 palynology samples were examined in course of this initial investigation. The sample total consisted of 93 ditch-cutting composites, five (5) conventional core fragments, and two (2) sidewall cores taken between 500 feet and the total depth of 8864 feet.

This report provides an updated format from the original data. Some of the taxa designations have been revised to reflect the newer taxonomic assignments that have evolved over the decades since the initial study.

### **Procedures**

At the time the well was drilled, the palynological samples were processed in San Diego, California, using techniques that were standard for the time. The chemical treatments involved the use of hydrochloric, hydrofluoric and nitric acids. The resulting kerogen residues were further concentrated by physical separation with heavy liquids and a sieving/panning technique. Permanent slide mounts were made of the residue concentrates. The coverslip mounting medium used was a synthetic resin sold under the brand name of "Coverbond".

The original palynomorph distribution chart data were entered into a desktop PC using proprietary software to compile new format charts. The charts are located in the pocket.

The Palynomorph Distribution Chart (Figure P-1) lists the occurrence and abundance of recorded taxa in each sample. Included on this chart are the diversity and abundance curves for the spore-pollen and the microplankton cysts.

High Resolution Biostratigraphy Plots - Foraminifera/Palynomorphs (Figure B-1) are also provided. This chart includes additional palynology parameters in the form of a cumulative plot that illustrates the relative abundance of the nonmarine, marine and miscellaneous palynomorph components.

## RESULTS

Based on the palynomorph assemblages observed, an age and generalized environment of deposition were interpreted for each palynostratigraphic subdivision. The environments, as interpreted from the palynological preparations, are simply categorized as nonmarine, marginal marine or marine. These categories are based on the absence or presence and diversity of microplankton.

The sample examination began at 500 feet and the youngest units encountered at that depth were of Middle Eocene age. The oldest datable strata seen were of Mississippian age at 8510 feet. The well bottomed in argillite basement rocks.

### 500-590'

<u>Age.</u>	Tertiary In Middle Eocene
<u>Zone.</u>	P-M11b
<u>Environment.</u>	Marginal Marine
<u>Palynomorphs.</u>	<p>The uppermost sample contained a rich Tertiary pollen assemblage that included <i>Caryapollenites</i>, <i>Momipites</i>, Onagraceae and <i>Tiliaepollenites</i>.</p> <p>The dinocyst assemblage was limited. The key form for the Eocene age assignment is <i>Wetzeliella articulata</i>.</p>

590-1490'

<u>Age.</u>	Tertiary Paleocene
<u>Zone.</u>	P-T10
<u>Environment.</u>	Nonmarine
<u>Palynomorphs.</u>	<p>The Paleocene section is marked by the consistent appearance of the pollen species <i>Paraalnipollenites confusus</i>.</p> <p>Dinocysts are mainly reworked forms and quite rare to the interval. However, the top of this section did contain several reworked Cretaceous species.</p>

1490-1670'

<u>Age.</u>	Late Cretaceous Maestrichtian
<u>Zone.</u>	P-T11 and marginal marine equivalent
<u>Environment.</u>	Nonmarine to Marginal Marine
<u>Palynomorphs.</u>	<p>The Maestrichtian interval is identified by the appearance of <i>Aquilapollenites magnus</i>, <i>Cranwellia striata</i> and <i>Wodehouseia jacutense</i>.</p> <p>The dinocysts recorded were <i>Chatangiella biapertura</i> and <i>Oligosphaeridium complex</i>.</p>

1670-1850'

<u>Age.</u>	Late Cretaceous Campanian
<u>Zone.</u>	P-T12 and marginal marine equivalent
<u>Environment.</u>	Nonmarine to Marginal Marine
<u>Palynomorphs.</u>	<p>The Campanian interval is separated by the appearance of <i>Aquilapollenites quadricretae</i> and <i>A. aucellus</i>. The marker species <i>Aquilapollenites trialatus</i> was first recorded in the sample below this interval.</p> <p>A slight increase in dinocyst diversity begins in this interval. The dinocyst species present include <i>Chatangiella biapertura</i>, <i>C. sverdrupiana</i>, <i>Isabelidinium acuminatum</i>, <i>I. cooksoniae</i> and <i>Odontochitina operculata</i>.</p>

1850-2930'

<u>Age.</u>	Late Cretaceous Santonian to Campanian
<u>Zone.</u>	P-M15
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	<p>The terrestrial assemblage consists mainly of long-ranging spores, with some scattered occurrences of reworked Paleozoic spores.</p> <p>The dinocyst assemblage is very diverse in this interval. The most numerous are species of <i>Chatangiella</i> of which <i>C. ditissima</i> is a key form. Other species in the assemblage include <i>Cribroperidinium edwardsi</i>, <i>Exochosphaeridium bifidum</i>, <i>Isabelidinium acuminatum</i>, <i>I. amphiatum</i>, <i>Hexagonifera chlamydata</i>, <i>Hystriosphaeiridium difficile</i>, <i>Odontochitina operculata</i>, <i>Oligosphaeridium complex</i> and <i>Spiniferites ramosus</i>.</p>

2930-3290'

<u>Age.</u>	Late Cretaceous Turonian to Coniacian
<u>Zone.</u>	P-M15
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	<p>The Turonian - Coniacian interval carries many of the same species as the interval above. The marker for this section is the dinocyst <i>Isabelidinium globosum</i>.</p>

3290-4010'

<u>Age.</u>	Possible Late Cretaceous Possible Cenomanian
<u>Zone.</u>	P-M16?
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	This interval is designated as possible Cenomanian based on the appearance of the dinocysts <i>Pseudoceratium</i> cf. <i>P. dettmanniae</i> and <i>P. expositum</i> .
<u>Discussion.</u>	These species can occur in the Albian; however, absent the usual Middle - Late Albian markers in this interval, a Cenomanian age is tentatively assigned.

4010-5800'?

<u>Age.</u>	Early Cretaceous Middle to Late Albian
<u>Zone.</u>	P-M17
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	The Albian interval continues with a palynomorph assemblage similar to that above. The principal forms making their appearance here are <i>Luxadinium propatulum</i> , <i>Spinidinium vestitum</i> and <i>Wigginsiella grandstandica</i> .
<u>Discussion.</u>	The lower boundary of the interval is questionably placed at the apparent base of <i>Luxadinium propatulum</i> occurrences. This boundary can only be tentatively placed using ditch sample control.

5800?-7330'

<u>Age.</u>	Early Cretaceous Aptian to Early Albian
<u>Zone.</u>	P-M18
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	The Aptian - Early Albian interval carries most of the same palynomorphs from the assemblage above. The basis for separating this section is the inconsistent (and probably sloughed) presence of the age restrictive Albian markers that were seen above. Thus, it is a negative evidence age assignment.

7330-7510'SW

<u>Age.</u>	Early Cretaceous Barremian to Aptian
<u>Zone.</u>	P-M18a
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	The Barremian - Aptian interval is marked by an increase in dinocyst abundances. Species included in this assemblage are <i>Cyclonephelium distinctum</i> , <i>Gardodinium eisenackii</i> , <i>Odontochitina operculata</i> and <i>Oligosphaeridium complex</i> .



7510SW-7539'C

<u>Age.</u>	Early Cretaceous Hauterivian
<u>Zone.</u>	P-M19
<u>Environment.</u>	Marine
<u>Palynomorphs.</u>	The Hauterivian section is marked by the appearance of the dinocyst species <i>Florentinia cooksoniae</i> , <i>Muderongia simplex</i> and <i>Oligosphaeridium complex</i> (thick-wall).

7539C-7610'

<u>Age.</u>	Indeterminate
<u>Environment.</u>	Probable Marginal Marine
<u>Palynomorphs.</u>	This interval was very poorly fossiliferous. The presence of some acritarch species indicates at least some marine influences during deposition.

7610-8060'

<u>Age.</u>	Triassic Undifferentiated
<u>Zones.</u>	P-T16 to P-T15
<u>Environment.</u>	Marginal Marine to Nonmarine
<u>Palynomorphs.</u>	<p>The important forms marking this section are the pollen <i>Lueckisporites</i>, <i>Striatites richteri</i> and <i>Taeniaesporites</i>.</p> <p>Abundant <i>Micrhystridium</i> species were also present.</p>

8060-8240'

<u>Age.</u>	Early Triassic Undifferentiated
<u>Zone.</u>	P-T17
<u>Environment.</u>	Nonmarine to Marginal Marine
<u>Palynomorphs.</u>	<p>An increase in spore-pollen diversity was recorded for this interval. The assemblage included <i>Klausipollenites staplinii</i>, <i>Kraeuselisporites spinosus</i>, <i>Lueckisporites</i>, <i>Lundbladispora?</i>, <i>Striatites richteri</i> and <i>Taeniaesporites</i>.</p> <p><i>Micrhystridium</i> species were also numerous in this section.</p>
<u>Discussion.</u>	This assemblage is usually associated with the Kavik Formation.

8240-8510'

<u>Age.</u>	Indeterminate
<u>Environment.</u>	Indeterminate
<u>Palynomorphs.</u>	The barren core samples in this interval suggest that the palynomorphs recovered in the ditch samples may not be indigenous to this section.

8510-8780'

<u>Age.</u>	Mississippian Undifferentiated
<u>Zone.</u>	P-T21b?
<u>Environment.</u>	Nonmarine
<u>Palynomorphs.</u>	The consistent occurrence of <i>Densosporites</i> , and the appearance of <i>Calamospora</i> and <i>Tripartites vetustus</i> , are indications for the Mississippian interval.
<u>Discussion.</u>	The relatively low diversity recorded is the reason for the questionable zonal assignment.

8780-8894" T.D.

Age.

Indeterminate

Environment.

Indeterminate

Palynomorphs.

No indigenous palynomorphs were recorded in this bottom interval. The washed lithology indicates that the well bottomed in argillite basement rocks.

## **CONCLUSIONS**

Palynological analysis of the USN/Husky W. T. Foran No. 1 well provides the following generalized palynostratigraphic succession:

- The top sample at 500 feet to 590 feet represents marginal marine Middle Eocene strata.
- Nonmarine strata of Paleocene age were recorded from 590 feet to 1490 feet.
- Nonmarine to marginal marine strata of Campanian and Maestrichtian ages were identified from 1490 feet to 1850 feet.
- Marine Santonian - Campanian age strata occurred from 1850 feet to 2930 feet.
- Marine strata of Turonian - Coniacian age occurred in the interval from 2930 feet to 3290 feet.
- Possible Cenomanian age marine strata are assigned in the interval between 3290 feet and 4010 feet.
- Marine Middle - Late Albian and Aptian - Early Albian strata are placed between 4010 feet and 7330 feet.
- A thin interval of marine Barremian - Aptian age strata was designated from 7330 feet to 7510SW feet.
- A very thin interval of marine Hauterivian strata was seen between 7510SW feet and 7539C feet.

- A section of indeterminate age was recorded between 7539C feet and 7610 feet. The depositional environment was probably marginal marine.
- Two intervals of nonmarine to marginal marine Triassic strata were designated between 7610 feet and 8240 feet.
- The section from 8240 feet to 8510 feet was of indeterminate age. The core samples within this interval suggests that no indigenous palynomorphs were recovered.
- Nonmarine Mississippian age strata were identified between 8510 feet and 8780 feet.
- The bottom interval from 8780 feet to the total depth of 8864 feet was in argillite basement.