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CONSULTING MICROPALAEONTOLOGY

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#14

June 7, 1979

TO: Husky/U. S. Geological Survey

RE: Husky/USGS - NPR-A
Ikpikpuk #1
Sec. 25, 13N/10W, U.B.M.
North Slope, Alaska

FORAMINIFERA REPORT

The following micropaleontological report is based on the examination and checklisting of 378 washed ditch samples, 99 thin sectioned ditch samples, 32 washed sidewall cores, 109 washed conventional core samples and 13 thin sectioned conventional core samples covering the interval 100 to 14,210 feet (suspended drilling depth). Thin sections were prepared on all samples below 11,290 feet. Five checklists and a faunal distribution log are enclosed for your convenience.

Standard techniques were employed in processing the material. All samples were boiled in Quaternary-0 and washed over 20 and 200 mesh screens.

Frequency symbols used in this report correspond to the following numerical values: R = rare (1-5); F = frequent (6-32); C = common (33-99); A = abundant (100-199); and FL = flood (200+).

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100-160'

This very thin interval is considered to be Late Cretaceous (Cenomanian) based on occurrences of Trochammina cf. ribstonensis, Zonodiscus B and Archicorys sp.

AGE: Late Cretaceous
Cenomanian (F-8)

ENVIRONMENT: Probable Neritic

160-740'

Fauna from this interval is so scarce it is impossible to tell whether we are dealing with Albian or Cenomanian strata.

AGE: Early to Late Cretaceous
Albian to Cenomanian (F-8 to F-9)

ENVIRONMENT: Nonmarine to Marginal Marine

740-3485'

Ammobaculites wenonahae, A. fragmentarius, Glomospirella gaultina, Eurycheilostoma grandstandensis, E. robinsonae, Haplophragmoides topagorukensis, H. cf. excavatus, H. gigas, Saccamina lathrami, Lenticulina macrodisca, Globulina exserta, Verneulinoides borealis, Gavelinella stictata, Marginulinopsis jonesi, Hippocrepina barksdalei, Miliammina manitobensis, M. awunensis, Valvulineria loetterlei, and Bathysiphon vitta among others, characterize these strata. The above association is typical of the Verneulinoides borealis faunal zone and is Middle to Late Albian age (F-9). The environments represented by these assemblages were

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740-3485' (con't.)

probably marginal marine to inner neritic between 740 feet and 2300 feet, and inner to middle neritic below 2300 feet.

AGE: Early Cretaceous
Middle to Late Albian (F-9)

ENVIRONMENT: Marginal Marine to Middle Neritic

3485-5180'

Based on co-occurrences of Gaudryina nanushukensis, Reophax troyeri, Gaudryina cf. tailleuri, Saracenaria dutroi, S. trollopei, and frequent pyritized radiolaria, this interval is believed to represent Late Aptian to Early Albian (F-10) age. A middle to outer neritic depositional environment is suggested for these strata.

AGE: Early Cretaceous
Late Aptian to Early Albian (F-10)

ENVIRONMENT: Middle to Outer Neritic

5180-7240'

A pyritized radiolarian fauna characterizes these strata together with rare to frequent occurrences of agglutinated and calcareous Foraminifera. Pyritized radiolaria of the following genera occur: Cenosphaera spp., Spongodiscus spp. and Lithocampe spp. This zonule is not as well developed in this well as it is in some of the other wells. Lithocampe N tops near the base of this unit at 7120 feet. According to Ramsey (1970) this zone of pyritized radiolaria

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5180-7240' (con't.)

separates the Verneuilinoides borealis Zone from the Gaudryina tailleuri Zone and is probably Aptian to Early Albian in age. We feel that it is probably Aptian in age, but our data is tentative at this time and the unit may indeed be time transgressive. Due to the preservation of this fauna, all that can be said about the environment of deposition is that it was marine and open to oceanic currents.

AGE: Early Cretaceous
Aptian (F-11)

ENVIRONMENT: Open Marine

7240-7420'

Occurrences of Gaudryina tailleuri, G. milleri, Bathysiphon scintillata, arenaceous spp. (large, coarse), Trochammina squamata, Pseudobolivina sp., Haplophragmoides duoflatis, H. inflatigrandis, and Conorboides cf. hofkeri indicate a Neocomian (F-12 to F-13) age for these strata. Frequent to abundant rounded frosted quartz floaters also dominate this interval. The moderate abundance and diversity of this assemblage suggests a relatively turbid middle to outer neritic depositional environment.

AGE: Early Cretaceous
Neocomian (F-12 to F-13)

ENVIRONMENT: Middle to Outer Neritic
(relatively turbid)

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7420-7480'

A sandstone lithology characterizes this thin interval, therefore rare older foraminiferal occurrences are suspect of reworking and younger forms are suspected of caving from the overlying interval. There were no cores taken from this interval. In order to be objective this interval will be considered of indeterminate age at this time. It could be as young as the overlying interval or as old as the underlying interval.

AGE: Indeterminate

ENVIRONMENT: Indeterminate

7480-7690'

Based on occurrences of Gaudryina milleri, G. dyscrita, Trochammina instowensis, T. canningensis, T. sablei, Haplophragmoides canui, H. barrowensis, Bathysiphon anomalo-coelia, Ammobaculites alaskensis, Eoquittulina liasica, Lenticulina audax, Conorboides hofkeri, Marginulinopsis phragmites and Textularia areoplecta this interval could be as old as Tithonian or as young as Valanginian. Core 6 taken from this interval contains a similar assemblage. An outer neritic to bathyal paleodepth is suggested for these strata.

AGE: Late Jurassic to Early Cretaceous
Tithonian to Valanginian (F-13 to F-15)

ENVIRONMENT: Outer Neritic to Bathyal

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7690-8190'

Ammobaculites alaskensis, arenaceous spp. (large, coarse), Bathysiphon anomalocoelia, Haplophragmoides canui, H. barrowensis, Lenticulina audax, Recurvoides turbinatus, Trochammina canningensis, T. instowensis, T. rostovzevi, T. kosyrevae, T. sp. (small, high-spined), T. sablei, T. topagorukensis, Gaudryina leffingwelli, G. topagorukensis, G. milleri and Frondicularia lustrata, indicate that these strata are probably pre-Tithonian in age. A Tithonian age, however, cannot be entirely ruled out. An outer neritic to bathyal depositional environment similar to the overlying interval is suggested.

AGE: Late Jurassic
Kimmeridgian to Tithonian
(F-15 to F-16)

ENVIRONMENT: Outer Neritic to Bathyal

8190-9180'

Overlapping occurrences of Marginulinopsis phragmites, Trochammina sp. (small, high-spined), T. instowensis, T. sablei, T. kamaensis, Glomospira pattoni, Gaudryina milleri, Saracenaria cf. oxfordiana, Lenticulina quenstedti, L. wisniowskii, Arenoturrspirillina intermedia, Ophthalmidium saskatchewanensis, Astacolus cf. dubius, Ammobaculites vetusta, Anmodiscus cheradospirus, Reophax liasica, R. metensis, and Eoguttulina metensis, among others, indicate an Oxfordian (F-16) age. The abundant and diverse assemblages associated with these strata suggest an outer neritic to bathyal depositional environment.

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8190-9180' (con't.)

AGE: Late Jurassic
Oxfordian (F-16)

ENVIRONMENT: Outer Neritic to Bathyal
(clear water)

9180-9600'

These strata are considered Early to Middle Jurassic age based on occurrences of Ammobaculites vetusta, Triplasia sp., Astacolus dubius, Lenticulina cf. faveolata, Paleopolymorphina vagina, Nodosaria mitis, N. radiata, Reophax densa, and common to abundant pyritized radiolaria of the genera Cenosphaera spp., Dictyomitra spp., Spongodiscus spp., Lithocampe spp., Cyrtocapsa? sp., Crucella sp., Rhopalastrum sp., and Patulibracchium sp. The abundance of radiolaria suggests open marine conditions. The depositional environment for these rocks was probably middle neritic to as deep as upper bathyal.

AGE: Early to Middle Jurassic
(F-17 to F-18)

ENVIRONMENT: Probable Middle Neritic to
Upper Bathyal (open marine)

9600-10,110'SW

It was necessary to spread the age of this interval since it contains a mixed assemblage. A fauna similar to the overlying interval occurs herein, along with possibly reworked Triassic (F-19) forms. Rare occurrences of

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9600-10,110'SW (con't.)

Astacolus connudatus, Trochammina cf. helicta and Nodosaria cf. shublikensis suggest a Triassic (F-19) age, but the interval is lacking a complete F-19 assemblage. These strata probably represent inner to middle neritic deposition.

AGE: Triassic to Early Jurassic
(F-18 to F-19)

ENVIRONMENT: Probable Inner to Middle Neritic

10,110SW-10,390'

Astacolus connudatus, Nodosaria shublikensis, N. larina, Frondicularia acmaea, Vaginulinopsis acrolus, Lingulina borealis, L. alaskensis, Pseudoglandulina simpsonensis, P. lata, Spirillina cf. gurgitata, Trochammina helicta, T. contornata, and Monotis/Halobia fragments occur throughout these beds. These faunas appear to represent open marine middle to outer neritic conditions. A distinctive dark brown to black calcareous pebbly sandstone similar to that described by Tappan (1951, pp. 5-6) from the basal 25 to 50 feet of the Shublik Fm. in the Sadlerochit River Region tops in a sidewall core at 10,273 feet in this well.

AGE: Triassic
(F-19)

ENVIRONMENT: Middle to Outer Neritic
(open marine)

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10,390-10,570'

This interval contains a mixed assemblage of Triassic Shublik Fm. forms and possible Permo-Triassic Sadlerochit Fm. forms. Rare to frequent occurrences of Ammodiscus cf. P suggest a possible F-20 age, but the rest of the fauna and the lithology still appear similar to the Shublik Fm. The depositional environment of these strata could be as shallow as marginal marine or as deep as outer neritic depending on what is caved and what is not caved.

AGE: Triassic
(F-19 to F-20)

ENVIRONMENT: Marginal Marine to Outer Neritic

10,570-11,380'

The upper portion of this unit is barren of Foraminifera and the top is picked on the basis of a lithologic change. A poor fauna consisting of Ammobaculites cf. vetusta, Gaudryina cf. dyscrita, and Ammodiscus P, occurs through most of the lower portion of this interval. This assemblage is indicative of Zone F-20. A possible Kavik shale top is placed at 11,110 feet. A lithologic change to glauconitic quartzitic sandstone at 11,290 feet suggests that we are probably in the Permian Echooka Formation at that point. These strata probably represent nonmarine to marginal marine deposition.

AGE: Permo-Triassic
(F-20)

ENVIRONMENT: Nonmarine to Marginal Marine

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11,380-14,210'

Generally throughout the North Slope of Alaska, the Lisburne Group can be divided into three lithologic units:

1. Upper Limestone Unit
2. Dolomite Unit
3. Lower Limy Unit

The Upper Limestone Unit is 2100 feet thick in this well. A lithologic change to argillaceous limestone at 11,380 feet indicates that the strata between 11,380 feet and 11,620 feet may be a lithologic equivalent to what some people wish to call the Joe Creek Limestone. Early Permian (A.W.A. F-21) packstones and grainstones predominate below 11,620 feet. Since the argillaceous limestone lies below the Early Permian Echooka Fm. and is underlain by Early Permian (A.W.A. F-21) carbonates it is considered to be Early Permian in this report. Grainstones and packstones between 11,620 feet and 11,830 feet are characterized by nodosariids, cornuspirids, and frequent to common Protonodosaria sp. These forms indicate that these beds are Early Permian (A.W.A. F-21). The base of this interval, and the top of the underlying Pennsylvanian carbonates is very difficult to pick since it is based primarily on the lowest occurrence of Protonodosaria sp. and we are dealing with ditch samples. A core (C-11) from 11,718 feet to 11,733 feet substantiates the presence of Protonodosaria sp. in this section to at least 11,733 feet.

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11,380-14,210' (con't.)

Strata between 11,830 feet and about 12,480 feet are certainly no older than Zone 21 but could easily be as young as Zone 24 (see Mamet, 1971, pp. 203 and 204)*. A burst of Eoschubertella yukonensis, Pseudostaffella sp., and kamaenid algae together with occurrences of Neoarchaediscus spp., Asteroarchaediscus spp., and Stylocodium sp. indicate that the strata between about 12,480 feet and 12,930 feet are Zone 21 in age. A Zone 20 call is made at 12,930 feet based on a significant reduction in the occurrence of kamaenid algae.

Based on the occurrence of section equivalent to the Zone 17-Zone 18 Dolomite Unit below this interval, a lack of Globivalvulina bulloides, and the occurrence of possible Paleotextularia ss. we suggest that section between 13,450 feet and 13,760 feet may be Zone 18 to Zone 19 in age. The Upper Limestone Unit represents the shoaling shelf facies of a carbonate platform suite.

The Dolomite Unit is placed between 13,760 feet and 14,000 feet based on lithologic change to gray microcrystalline dolomite. This unit is poorly fossiliferous. The Dolomite

*Mamet, B. L., and Ross, C. A., 1971, in Bamber & Waterhouse, "Carboniferous and Permian Stratigraphy and Paleontology, Northern Yukon Territory, Canada"; Bull. of Can. Petr. Geol., vol. 19, no. 1, pp. 196-205.

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11,380-14,210' (con't.)

Unit probably represents a supratidal depositional environment.

This last unit (the Lower Limy Unit) is recognized on the basis of a lithologic change to packstone, coupled with frequent to common occurrences of coral wall debris. It probably represents a Zone 16 or older age.

AGE: Late Mississippian to Early Permian
ENVIRONMENT: Supratidal to Shoaling Shelf
(Carbonate Platform Suite)

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