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USGS/HUSKY - NPRA

LISBURNE NO. 1

API #50-137-20003

SEC. 17, T11S/R16W UM

NORTH SLOPE, ALASKA

Prepared by:

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BIOSTRATIGRAPHY REPORT

Job No. 22-113 **April, 2003**

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Hauterivian
KE_H

Discussion. Increased thickness possibly due to recumbent folding.

5343C-6030'

Early Cretaceous
Valanginian
KE_V

6030-6710'

Probable Jurassic
Undifferentiated

6710-6975'

Early Jurassic
Pliensbachian to Toarcian?
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6975-7015'

Early Jurassic
Pliensbachian
JE_P

7015-7180'

Late Triassic
Carnian to Norian
TL_C to TL_N

Discussion. Karen Creek Fm. (Shublik Fm. equivalent)

7180-7410'

Early Triassic
Undifferentiated
TE

Discussion. Sadlerochit Group. Ivishak Fm. - Kavik Fm.?

7410-7420'

Late Permian
Undifferentiated
PL

Discussion. Echooka Fm.

7420-8230'

Late Mississippian
Meramecian to Chesterian
Zone M-14 to Zone M-16

Discussion. Alapah Limestone (Lower Limy Unit)

8230-8600'

Late Mississippian
Meramecian
Zone M-12 to Zone M-13

Discussion. Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)

8600' THRUST FAULT

8600-9030'

Probable Jurassic
Undifferentiated

Discussion. Probable Blankenship Fm. (Kingak Fm. equivalent)

9030-9420'

Late Triassic
Carnian to Norian
TL_C to TL_N

Discussion. Karen Creek Fm. (Shublik Fm. equivalent)

9420-9670'

Early Triassic
Undifferentiated
TE

Discussion. Sadlerochit Group. Ivishak Fm. - Kavik Fm.?

9670-9680'

Late Permian
Undifferentiated
PL

Discussion. Echooka Fm.

9680-10,530'

Late Mississippian
Meramecian to Chesterian
Zone M-14 to Zone M-16

Discussion. Alapah Limestone (Lower Limy Unit)

10,530-10,900'

Late Mississippian
Meramecian
Zone M-12 to Zone M-13

Discussion. Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)

10,900' THRUST FAULT

10,900-11,040'

Probable Jurassic
Undifferentiated

Discussion. Probable Blankenship Fm. (Kingak Fm. equivalent)

11,040-11,310'

Late Triassic
Carnian to Norian
TL_C to TL_N

Discussion. Karen Creek Fm. (Shublik Fm. equivalent)

11,310-11,550'

Early Triassic
Undifferentiated
TE

Discussion. Sadlerochit Group. Ivishak Fm. - Kavik Fm.?

11,550-11,565'

Late Permian
Undifferentiated
PL

Discussion. Echooka Fm.

11,565-12,245'

Late Mississippian
Meramecian to Chesterian
Zone M-14 to Zone M-16

Discussion. Alapah Limestone (Lower Limy Unit)

12,245-13,370'

Late Mississippian
Meramecian
Zone M-12 to Zone M-13

Discussion. Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)

13,370' THRUST FAULT

13,370-13,720'

Early Triassic
Undifferentiated
TE

Discussion. Sadlerochit Group. Ivishak Fm. - Kavik Fm.?

13,720-13,735'

Late Permian
Undifferentiated
PL

Discussion. Echooka Fm.

13,735-14,460'

Late Mississippian
Meramecian to Chesterian
Zone M-14 to Zone M-16

Discussion. Alapah Limestone (Lower Limy Unit)

14,460-15,310'

Late Mississippian
Meramecian
Zone M-12 to Zone M-13

Discussion. Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)

15,310' THRUST FAULT

15,310-15,390'

Early Triassic
Undifferentiated
TE

Discussion. Sadlerochit Group. Kavik Fm.?

15,390-16,080'

Late Mississippian
Meramecian to Chesterian
Zone M-14 to Zone M-16

Discussion. Alapah Limestone (Lower Limy Unit)

16,080-17,000'T.D.

Late Mississippian
Meramecian
Zone M-12 to Zone M-13

Discussion. Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)

FORAMINIFERA REPORT

Interpreted by

Michael B. Mickey

FORAMINIFERA SUMMARY

130-2130'

Age.	Early Cretaceous Aptian? to Early Albian	
Zones.	Probable F-10 to F-11	
Environment.	130-730':	Upper to Middle Bathyal (Upper to Middle Slope)
	730-2130':	Middle to Lower Bathyal (Middle to Lower Slope)

2130-5340'C

Age.	Early Cretaceous Hauterivian
Zone.	F-13a
Environment.	Outer Neritic to Upper Bathyal (Outer Shelf to Upper Slope)

5343C-6010'

Age.	Early Cretaceous Valanginian
Zone.	F-13b
Environment.	Middle to Outer Neritic (Middle to Outer Shelf)

6010-6700'

Age. Probable Jurassic
Undifferentiated

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

6700-6970'

Age. Early Jurassic
Pliensbachian to Toarcian?

Zones. F-18a? to F-18b

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

6970-7000'

Age. Early Jurassic
Pliensbachian

Zone. F-18b

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

7000-7180'

Age.	Late Triassic Carnian to Norian
Zones.	F-19b to F-19c
Environment.	Inner to Middle Neritic (Inner to Middle Shelf)
Discussion.	Karen Creek Fm. (Shublik Fm. equivalent)

7180-7390'

Age.	Early Triassic Undifferentiated
Zone.	F-20a
Environment.	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
Discussion.	Sadlerochit Group. Ivishak Fm.

7390-7420'

Age.	Late Permian Undifferentiated
Zone.	F-20b
Environment.	Nonmarine to Marginal Marine (Alluvial Plain to Transitional)
Discussion.	Echooka Fm.

7420-8220'

Age.	Late Mississippian Meramecian to Chesterian
Zones.	M-14 to M-16
Environment.	Inner to Middle Neritic (Outer Lagoonal to Bank)
Discussion.	Alapah Limestone (Lower Limy Unit)

8220-8610'

Age.	Late Mississippian Meramecian
Zones.	M-12 to M-13
Environment.	8220-8400': Inner to Middle Neritic (Outer Lagoonal to Bank) 8400-8610': Marginal Marine to Inner Neritic (Lagoonal to Inner Bank)
Discussion.	Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)

8610' THRUST FAULT

8610-9030'

Age.	Probable Jurassic Undifferentiated
Environment.	Outer Neritic to Middle Bathyal (Outer Shelf to Middle Slope)
Discussion.	Probable Blankenship Fm. (Kingak Fm. equivalent)

9030-9420'

Age.	Late Triassic Carnian to Norian
Zones.	F-19b to F-19c
Environment.	Inner to Middle Neritic (Inner to Middle Shelf)
Discussion.	Karen Creek Fm. (Shublik Fm. equivalent)

9420-9650'

Age.	Early Triassic Undifferentiated
Zone.	F-20a
Environment.	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
Discussion.	Sadlerochit Group. Ivishak Fm.

9650-9680'

Age.	Late Permian Undifferentiated
Zone.	F-20b
Environment.	Nonmarine to Marginal Marine (Alluvial Plain to Transitional)
Discussion.	Echooka Fm.

9680-10,540'

Age.	Late Mississippian Meramecian to Chesterian
Zones.	M-14 to M-16
Environment.	Inner to Middle Neritic (Outer Lagoonal to Bank)
Discussion.	Alapah Limestone (Lower Limy Unit)

10,540-10,900'

Age.	Late Mississippian Meramecian	
Zones.	M-12 to M-13	
Environment.	10,540-10,720':	Inner to Middle Neritic (Outer Lagoonal to Bank)
	10,720-10,900':	Marginal Marine to Inner Neritic (Lagoonal to Inner Bank)
Discussion.	Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)	

10,900' THRUST FAULT

10,900-11,020'

Age.	Probable Jurassic Undifferentiated
Environment.	Outer Neritic to Middle Bathyal (Outer Shelf to Middle Slope)
Discussion.	Probable Blankenship Fm. (Kingak Fm. equivalent)

11,020-11,320'

Age.	Late Triassic Carnian to Norian
Zones.	F-19b to F-19c
Environment.	Inner to Middle Neritic (Inner to Middle Shelf)
Discussion.	Karen Creek Fm. (Shublik Fm. equivalent)

11,320-11,540'

Age.	Early Triassic Undifferentiated
Zone.	F-20a
Environment.	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
Discussion.	Sadlerochit Group. Ivishak Fm.

11,540-11,570'

Age.	Late Permian Undifferentiated
Zone.	F-20b
Environment.	Nonmarine to Marginal Marine (Alluvial Plain to Transitional)
Discussion.	Echooka Fm.

11,570-12,240'

Age.	Late Mississippian Probable Meramecian to Chesterian	
Zones.	Probable M-14 to M-16	
Environment.	Marginal Marine to Inner Neritic (Outer Lagoonal to Inner Bank)	
Discussion.	Alapah Limestone (Lower Limy Unit)	

12,240-13,370'

Age.	Late Mississippian Meramecian	
Zones.	M-12 to M-13	
Environment.	12,240-13,020':	Inner to Middle Neritic (Outer Lagoonal to Bank)
	13,020-13,370':	Marginal Marine to Inner Neritic (Lagoonal to Inner Bank)
Discussion.	Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)	

13,370' THRUST FAULT

13,370-13,700'

Age.	Early Triassic Undifferentiated
Zone.	F-20a
Environment.	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
Discussion.	Sadlerochit Group. Ivishak Fm.

13,700-13,730'

Age.	Late Permian Undifferentiated
Zone.	F-20b
Environment.	Nonmarine to Marginal Marine (Alluvial Plain to Transitional)
Discussion.	Echooka Fm.

13,730-14,450'

Age.	Late Mississippian Meramecian to Chesterian
Zones.	M-14 to M-16
Environment.	Inner to Middle Neritic (Outer Lagoonal to Bank)
Discussion.	Alapah Limestone (Lower Limy Unit)

14,450-15,320'

Age.	Late Mississippian Meramecian	
Zones.	M-12 to M-13	
Environment.	14,450-14,720':	Inner to Middle Neritic (Outer Lagoonal to Bank)
	14,720-15,320':	Marginal Marine to Inner Neritic (Lagoonal to Inner Bank)
Discussion.	Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)	

15,320' THRUST FAULT

15,320-15,380'

Age.	Early Triassic Undifferentiated
Zone.	F-20a
Environment.	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
Discussion.	Sadlerochit Group. Ivishak Fm.

15,380-16,090'

Age.	Late Mississippian Meramecian to Chesterian
Zones.	M-14 to M-16
Environment.	Inner to Middle Neritic (Outer Lagoonal to Bank)
Discussion.	Alapah Limestone (Lower Limy Unit)

16,090-17,000'T.D.

Age.	Late Mississippian Meramecian	
Zones.	M-12 to M-13	
Environment.	16,090-16,800':	Inner to Middle Neritic (Outer Lagoonal to Bank)
	16,800-17,000'T.D.:	Marginal Marine to Inner Neritic (Lagoonal to Inner Bank)
Discussion.	Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)	

INTRODUCTION

Scope

Data from 722 Foraminifera samples from the USGS/Husky Lisburne No. 1 well were incorporated into this report. These consisted of 577 ditch and 145 conventional core samples covering the interval 130 to 17,000 feet total depth. This work was done as part of M.C.I. Job Number 22-113.

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 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 (Figure F-1, F-2, F-3 & F-4) 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.

There are five (5) lithologic correlation charts (Appendices A - E), found at the end of the Foraminifera Report section, that define lithologic units based on recorded percentage estimates of various lithologic, mineralogic and microfossil group aspects. The percentages have been normalized to 100% for each sample.

RESULTS

130-2130'

Age. Early Cretaceous
Aptian? to Early Albian

Zones. Probable F-10 to F-11

Environment. 130-730': Upper to Middle Bathyal (Upper to Middle Slope)
730-2130': Middle to Lower Bathyal (Middle to Lower Slope)

Fauna. Arenaceous spp., *Saccammina* spp., *Bathysiphon vitta, B. brosgei, B. scintillata, Glomospirella arctica, Glomospira corona, Gaudryina* cf. *tailleuri, Haplophragmoides topagorukensis, Ammodiscus elongatus*, fecal pellets, pyrite and rare to common radiolaria.

2130-5340'C

Age.	Early Cretaceous Hauterivian
Zone.	F-13a
Environment.	Outer Neritic to Upper Bathyal (Outer Shelf to Upper Slope)
Fauna.	Arenaceous spp., a. spp. (large, coarse), *Bathysiphon vitta, B. scintillata*, *Glomospira corona, G. subarctica, Gaudryina* cf. *tailleuri, Trochammina conicominuta, T. squamata, Haplophragmoides coronis, H. duoflatis, H. goodenoughensis, Gaudryinella irregularis, Thuramminoides* spp., *T. septagonalis, Ammobaculites erectus, A. reophacoides, Reophax tundraensis, Ammodiscus mackenziensis*, fecal pellets, *Inoceramus* prisms, pyrite and frequent to common pyritized radiolaria.

5343C-6010'

Age. Early Cretaceous
Valanginian

Zone. F-13b

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

Fauna. *Bathysiphon scintillata*, arenaceous spp., *Lituotuba gallupi, Ammobaculites reophacoides, Gaudryina tailleuri, G. tappanae, Haplophragmoides coronis, H. duoflatis, Glomospira subarctica, Glomospirella arctica, Thuramminoides septagonalis, Ammodiscus mackenziensis*, fecal pellets, pelmatozoan fragments, ostracods, *Inoceramus* prisms, pyrite and rare to common scattered rounded frosted quartz floating sand grains.

6010-6700'

Age. Probable Jurassic
Undifferentiated

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

Fauna. *Glomospira pattoni*, arenaceous spp., *Ammodiscus asperus, Gaudryina dyscrita, G. tailleuri, G. milleri*, fecal pellets, *Inoceramus* prisms, spines or spicules, pyrite, rare to common radiolaria and rare to frequent scattered rounded frosted quartz floating sand grains.

6700-6970'

Age.	Early Jurassic Pliensbachian to Toarcian?
Zones.	F-18a? to F-18b
Environment.	Outer Neritic to Upper Bathyal (Outer Shelf to Upper Slope)
Fauna.	Arenaceous spp., *Ammodiscus* sp. (small), *A. asperus*, *Ammobaculites alaskensis*, pyrite and rare to common radiolaria.

6970-7000'

Age.	Early Jurassic Pliensbachian
Zone.	F-18b
Environment.	Middle to Outer Neritic (Middle to Outer Shelf)
Fauna.	Barren of Foraminifera. Rare conodonts, radiolaria and pyrite.

7000-7180'

Age.	Late Triassic Carnian to Norian
Zones.	F-19b to F-19c
Environment.	Inner to Middle Neritic (Inner to Middle Shelf)
Fauna.	*Ammodiscus* sp. (small), arenaceous spp., *Citharina entypomatus*, spines or spicules, pyrite and rare to frequent radiolaria.
Discussion.	Karen Creek Fm. (Shublik Fm. equivalent)

7180-7390'

Age.	Early Triassic Undifferentiated
Zone.	F-20a
Environment.	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
Fauna.	*Nodosaria larina, Ammodiscus* sp. P, *Glomospira* sp., *Pseudoglomospira* sp., pyrite and frequent to common radiolaria.
Discussion.	Sadlerochit Group. Ivishak Fm.

7390-7420'

Age.	Late Permian Undifferentiated
Zone.	F-20b
Environment.	Nonmarine to Marginal Marine (Alluvial Plain to Transitional)
Fauna.	*Trepeilopsis* sp., chert, pyrite and frequent stylolites.
Discussion.	Echooka Fm.

7420-8220'

Age.	Late Mississippian Meramecian to Chesterian
Zones.	M-14 to M-16
Environment.	Inner to Middle Neritic (Outer Lagoonal to Bank)
Fauna.	*Pseudoglomospira* sp., *Earlandia clavatula, E. elegans, Endothyra* spp., *E. bowmani* group, *Trepeilopsis* sp., *Girvanella ducii, Stacheoides meandriformis*, spines or spicules, pelmatozoan fragments, ostracods, pyrite, and frequent stylolites at the top of the interval.
Discussion.	Alapah Limestone (Lower Limy Unit)

8220-8610'

Age. Late Mississippian
Meramecian

Zones. M-12 to M-13

Environment. 8220-8400': Inner to Middle Neritic
(Outer Lagoonal to Bank)
8400-8610': Marginal Marine to Inner Neritic
(Lagoonal to Inner Bank)

Fauna. *Globoendothyra tomiliensis* group, *Earlandia clavatula, E. vulgaris*, *Earlandinella* sp. (pl. 26), *Endothyra bowmani* group, *Pseudoglomospira* sp., *Endothyranopsis compressa, Glomospiranella* sp. (pl. 28), *Trepeilopsis* sp., *Koninckopora inflata, Shartymophycus* sp., and frequent to abundant chert below 8430 feet.

Discussion. Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)

8610' THRUST FAULT

8610-9030'

Age.	Probable Jurassic Undifferentiated
Environment.	Outer Neritic to Middle Bathyal (Outer Shelf to Middle Slope)
Fauna.	Rare scattered occurrences of arenaceous spp. (large, coarse), a. spp., *Hyperammina* spp., *Glomospira* sp., and rare to common pyrite.
Discussion.	Probable Blankenship Fm. (Kingak Fm. equivalent)

9030-9420'

Age.	Late Triassic Carnian to Norian
Zones.	F-19b to F-19c
Environment.	Inner to Middle Neritic (Inner to Middle Shelf)
Fauna.	*Astacolus connudatus, Ammobaculites* cf. *vetusta, Nodosaria larina*, arenaceous spp., *Dentalina* sp. and rare to common siderite? or barite?.
Discussion.	Karen Creek Fm. (Shublik Fm. equivalent)

9420-9650'

Age.	Early Triassic Undifferentiated
Zone.	F-20a
Environment.	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
Fauna.	Barren of indigenous Foraminifera. Rare to common radiolaria and rare to frequent siderite? or barite?.
Discussion.	Sadlerochit Group. Ivishak Fm.

9650-9680'

Age.	Late Permian Undifferentiated
Zone.	F-20b
Environment.	Nonmarine to Marginal Marine (Alluvial Plain to Transitional)
Fauna.	Arenaceous spp. (large, coarse), *Archaediscus krestovnikovi*, glauconite and common pyrite.
Discussion.	Echooka Fm.

9680-10,540'

Age.	Late Mississippian Meramecian to Chesterian
Zones.	M-14 to M-16
Environment.	Inner to Middle Neritic (Outer Lagoonal to Bank)
Fauna.	*Priscella prisca, Earlandia clavatula, E. elegans, Endothyra* spp., *E. similis* group, *Earlandinella* sp. (pl. 26), *Trepeilopsis* sp., *Pseudoglomospira* sp., *Globoendothyra tomiliensis* group, *Eoendothyranopsis* sp., *Calcisphaera laevis, C. pachysphaerica* and rare to abundant chert.
Discussion.	Alapah Limestone (Lower Limy Unit)

10,540-10,900'

Age.	Late Mississippian Meramecian	
Zones.	M-12 to M-13	
Environment.	10,540-10,720':	Inner to Middle Neritic (Outer Lagoonal to Bank)
	10,720-10,900':	Marginal Marine to Inner Neritic (Lagoonal to Inner Bank)
Fauna.	*Earlandia elegans, E. clavatula, Pseudoglomospira* sp., *Eoendothyranopsis pressa-rara* group, *E. spiroides, Endothyra bowmani* group, *Earlandinella* sp. (pl. 26), *Globoendothyra baileyi* group, *G. tomiliensis* group, *Brunsia pulchra, B. lenensis, Skippella redwallensis, Eoforschia moelleri, Calcisphaera pachysphaerica*, ostracods and frequent to common chert.	
Discussion.	Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)	

10,900' THRUST FAULT

10,900-11,020'

Age.	Probable Jurassic Undifferentiated
Environment.	Outer Neritic to Middle Bathyal (Outer Shelf to Middle Slope)
Fauna.	Rare occurrences of nodosariids, along with rare to frequent radiolaria and pyrite.
Discussion.	Probable Blankenship Fm. (Kingak Fm. equivalent)

11,020-11,320'

Age.	Late Triassic Carnian to Norian
Zones.	F-19b to F-19c
Environment.	Inner to Middle Neritic (Inner to Middle Shelf)
Fauna.	Essentially barren of Foraminifera with a couple of rare occurrences of nodosariids, and possibly some rare to frequent radiolaria.
Discussion.	Karen Creek Fm. (Shublik Fm. equivalent)

11,320-11,540'

Age.	Early Triassic Undifferentiated
Zone.	F-20a
Environment.	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
Fauna.	Barren of Foraminifera with rare to frequent radiolaria.
Discussion.	Sadlerochit Group. Ivishak Fm.

11,540-11,570'

Age.	Late Permian Undifferentiated
Zone.	F-20b
Environment.	Nonmarine to Marginal Marine (Alluvial Plain to Transitional)
Fauna.	Barren of Foraminifera. Based on e-log only.
Discussion.	Echooka Fm.

11,570-12,240'

Age.	Late Mississippian Probable Meramecian to Chesterian
Zones.	Probable M-14 to M-16
Environment.	Marginal Marine to Inner Neritic (Outer Lagoonal to Inner Bank)
Fauna.	Arenaceous spp., *Endothyra* spp., *Pseudoglomospira* sp., *Paracaligelloides obicus*, *Girvanella ducii*, coral wall debris and rare to common chert.
Discussion.	Alapah Limestone (Lower Limy Unit)

12,240-13,370'

Age.	Late Mississippian Meramecian	
Zones.	M-12 to M-13	
Environment.	12,240-13,020':	Inner to Middle Neritic (Outer Lagoonal to Bank)
	13,020-13,370':	Marginal Marine to Inner Neritic (Lagoonal to Inner Bank)
Fauna.	*Eoendothyranopsis spiroides* group, *E. ermakiensis, Globoendothyra tomiliensis, G.* spp., *Earlandia elegans, E. vulgaris, E. clavatula, Pseudoglomospira* sp., *Priscella prisca, Endothyra* spp., *E. bowmani* group, *Glomospiranella* sp. (pl. 28), *Eoforschia moelleri, Latiendothyra parakosvensis, Earlandinella* sp. (pl. 26), *Endothyranella recta, Paracaligelloides obicus, Stacheia skimoensis, Calcisphaera pachysphaerica, C. laevis, Girvanella ducii, Stacheoides tenuis,* ostracods, spicules, algal chert and rare to common coral wall debris.	
Discussion.	Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)	

13,370' THRUST FAULT

13,370-13,700'

Age.	Early Triassic Undifferentiated
Zone.	F-20a
Environment.	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
Fauna.	*Bathysiphon* spp., *B. anomalocoelia, Ammodiscus* sp. P, arenaceous spp., *Thuramminoides* spp., pyrite and rare to frequent radiolaria.
Discussion.	Sadlerochit Group. Ivishak Fm.

13,700-13,730'

Age.	Late Permian Undifferentiated
Zone.	F-20b
Environment.	Nonmarine to Marginal Marine (Alluvial Plain to Transitional)
Fauna.	Barren of Foraminifera.
Discussion.	Echooka Fm.

13,730-14,450'

Age.	Late Mississippian Meramecian to Chesterian
Zones.	M-14 to M-16
Environment.	Inner to Middle Neritic (Outer Lagoonal to Bank)
Fauna.	*Globoendothyra* spp., *Earlandia elegans, Trepeilopsis* sp., *Brunsia lenensis, Endothyra* spp., *Girvanella ducii,* ostracods and rare scattered coral wall debris.
Discussion.	Alapah Limestone (Lower Limy Unit)

14,450-15,320'

Age.	Late Mississippian Meramecian	
Zones.	M-12 to M-13	
Environment.	14,450-14,720':	Inner to Middle Neritic (Outer Lagoonal to Bank)
	14,720-15,320':	Marginal Marine to Inner Neritic (Lagoonal to Inner Bank)
Fauna.	*Dainella anivikensis, Endothyra bowmani* group, *E.* spp., *Globoendothyra tomiliensis, G.* spp., *Earlandia moderata, E. elegans, E. clavatula, Brunsia lenensis, Trepeilopsis* sp., *Paracaligelloides obicus, Girvanella ducii, Stacheia skimoensis, Shartymophycus* sp., ostracods, glauconite and rare to common coral wall debris.	
Discussion.	Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)	

15,320' THRUST FAULT

15,320-15,380'

Age.	Early Triassic Undifferentiated
Zone.	F-20a
Environment.	Marginal Marine to Inner Neritic (Transitional to Inner Shelf)
Fauna.	Arenaceous spp., *Bathysiphon* spp., nodosariids, *Pseudoglandulina*? sp., ostracods and frequent to abundant pyrite.
Discussion.	Sadlerochit Group. Ivishak Fm.

15,380-16,090'

Age.	Late Mississippian Meramecian to Chesterian
Zones.	M-14 to M-16
Environment.	Inner to Middle Neritic (Outer Lagoonal to Bank)
Fauna.	*Trepeilopsis* sp., *Pseudoendothyra* sp., *Pseudoglomospira* sp., *Endothyra* spp., *Globoendothyra tomiliensis, G.* spp., *Earlandia moderata, E. clavatula, E. elegans, E.* spp., *Eoendothyranopsis*? sp., *Brunsia pulchra, Priscella prisca, Dainella anivikensis, Paleoaplysina* sp., *Stacheia skimoensis, Calcisphaera laevis, C. pachysphaerica, Paracaligelloides obicus*, ostracods and rare to frequent scattered coral wall debris.
Discussion.	Alapah Limestone (Lower Limy Unit)

16,090-17,000'T.D.

Age.	Late Mississippian Meramecian	
Zones.	M-12 to M-13	
Environment.	16,090-16,800':	Inner to Middle Neritic (Outer Lagoonal to Bank)
	16,800-17,000'T.D.:	Marginal Marine to Inner Neritic (Lagoonal to Inner Bank)
Fauna.	*Earlandinella* sp. (pl. 26), *Earlandia elegans, E. moderata, E. clavatula, E. vulgaris*, *Brunsia lenensis, B. irregularis*, *Endothyra bowmani* group, *E. similis* group, *E.* spp., *Eoendothyranopsis spiroides, E. pressa-rara, Globoendothyra tomiliensis, Priscella prisca, Endothyranopsis compressa, Eoforschia* sp., *E. moelleri, Trepeilopsis* sp., *Endothyranella recta*, archaediscids, *Asphaltina* sp., *Calcisphaera laevis, C. pachysphaerica, Koninckopora inflata, Stacheia skimoensis, Paracaligelloides obicus, P.* sp., *Girvanella ducii, Palaeocancellus* sp., *Pseudostacheoides* sp., *Stacheoides tenuis*, ostracods, echinoid spines, pyrite, glauconite and rare to abundant coral wall debris.	
Discussion.	Wachsmuth Limestone to Alapah Limestone (Lower Limy Unit)	

CONCLUSIONS

The USGS/Husky Lisburne No. 1 well penetrated the following biostratigraphic sequence based on foraminiferal analysis:

- 5213+ feet (130-5343'C) of Hauterivian to Albian age (Early Brookian & Beaufortian - Rift Sequence) generally upward shallowing alluvial plain to shelf topsets.

- 1657 feet (5343C-7000') of Pliensbachian to Valanginian age (Beaufortian - Incipient Rift Sequence) middle shelf to middle slope sedimentation.

- 420 feet (7000-7420') of undifferentiated Late Permian to Late Triassic (Carnian and/or Norian) age (Late Ellesmerian) nonmarine, marginal marine and inner to middle shelf deposition.

- 1190 feet (7420-8610') of Late Mississippian (Meramecian to Chesterian) age (Early Ellesmerian) Wachsmuth and/or Alapah equivalent dolomitic, cherty and argillaceous limestones.

- THRUST FAULT

- 420 feet (8610-9030') of probable undifferentiated Jurassic age (Beaufortian? or Early Brookian) outer shelf to middle slope radiolarian shales.

- 650 feet (9030-9680') of undifferentiated Late Permian to Late Triassic (Carnian and/or Norian) age (Late Ellesmerian) nonmarine, marginal marine and inner to middle shelf deposition.

- 1220 feet (9680-10,900') of Late Mississippian (Meramecian to Chesterian) age (Early Ellesmerian) Wachsmuth and/or Alapah equivalent dolomitic and cherty limestones.

- THRUST FAULT

- 120 feet (10,900-11,020') of probable undifferentiated Jurassic age (Beaufortian? or Early Brookian) outer shelf to middle slope radiolarian shales.

- 550 feet (11,020-11,570') of undifferentiated Late Permian to Late Triassic (Carnian and/or Norian) age (Late Ellesmerian) nonmarine, marginal marine and inner to middle shelf deposition.

- 1800 feet (11,570-13,370') of Late Mississippian (Meramecian to Chesterian) age (Early Ellesmerian) Wachsmuth and/or Alapah equivalent dolomitic, cherty and argillaceous limestones with minor shale beds.

- THRUST FAULT

- 360 feet (13,370-13,730') of undifferentiated Late Permian to Early Triassic age (Late Ellesmerian) nonmarine, marginal marine and inner shelf clastics.

- 1590 feet (13,730-15,320') of Late Mississippian (Meramecian to Chesterian) age (Early Ellesmerian) Wachsmuth and/or Alapah equivalent dolomitic, cherty and argillaceous limestones with minor shale beds.

- THRUST FAULT

- 60 feet (15,320-15,380') of undifferentiated Early Triassic age (Late Ellesmerian) marginal marine to inner shelf clastics.
- 1620+ feet (15,380-17,000'T.D.) of Late Mississippian (Meramecian to Chesterian) age (Early Ellesmerian) Wachsmuth and/or Alapah equivalent dolomitic, cherty and argillaceous limestones with minor sandstone, siltstone and shale beds.

APPENDICES

PALYNOLOGY REPORT

Interpreted by:

Hideyo Haga

PALYNOLOGY SUMMARY

130-2087'C

Age.	Early Cretaceous Aptian - Early Albian
Zone.	P-M18
Environment.	Marine
Remarks.	Abundant reworked palynomorphs.

2087C-5343'C

Age.	Early Cretaceous Hauterivian
Zone.	P-M19
Environment.	Marine
Remarks.	Slight decrease in reworked palynomorphs through this section.

5343C-7870'

Age.	Indeterminate
Environment.	Marginal Marine?

7870-8860'

Age. Carboniferous?
Undifferentiated

Zones. P-T21? to P-T19?

Environment. Nonmarine - Marginal Marine?

8860-9215'

Age. Indeterminate

Environment. Nonmarine

9215-9300'

Age. Probable Triassic
Undifferentiated

Environment. Nonmarine

9300-12,180'

Age. Indeterminate

Environment. Nonmarine - Marginal Marine

12,180-13,160'

Age. Carboniferous Undifferentiated

Zones. P-T21 to P-T19

Environment. Marginal Marine

13,160-14,510'

Age. Indeterminate

Environment. Nonmarine - Marginal Marine

14,510-15,330'C

Age. Carboniferous Undifferentiated

Zones. P-T21 to P-T19

Environment. Marginal Marine

15,330C-15,332.5'C

Age. Possible Permian - Triassic Undifferentiated

Zones. P-T18? to P-T15?

Environment. Nonmarine

15,332.5C-16,220'

Age. Indeterminate

Environment. Nonmarine - Marginal Marine

16,220-16,590'

Age. Mississippian Undifferentiated

Zone. Probable P-T21

Environment. Marginal Marine

16,590-17,000'T.D.

Age. Indeterminate

Environment. Marginal Marine

INTRODUCTION

Purpose and Scope

The USGS/Husky Lisburne No. 1 well completed drilling in June, 1980. During the drilling process, a palynological study was conducted on selected sample material from the well. A total of 316 palynology samples were examined in the course of that investigation. The sample total consisted of 190 ditch-cutting composites and 126 conventional core fragments taken between 130 feet and the total depth of 17,000 feet.

The cores were originally sampled and examined at very close intervals. For this report, many of the core data are combined into larger intervals where the contained assemblages are similar or were barren of palynomorphs. The combining was made where no biostratigraphic boundaries would be affected.

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

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 pockets.

Palynomorph Distribution Charts (Figure P-1 & P-2) lists the occurrence and abundance of recorded taxa in each sample. Included on these charts 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 samples begin at 130 feet, and the youngest units encountered at that depth are of Aptian - Albian age. The in-hole dips are very steep (60 - 70 degrees) through the Mesozoic section. Below the Mesozoic section, the dips are shallower but numerous thrust sheets, consisting mainly of Carboniferous strata, are encountered. Rare evidence of Permian and/or Triassic strata was also seen. The palynomorph evidence through the sub-Mesozoic section is very poor.

130-2087'C

Age. Early Cretaceous
Aptian to Early Albian

Zone. P-M18

Environment. Marine

Palynomorphs. The uppermost interval is marked by an abundance of reworked palynomorphs.

The indigenous spore-pollen forms include undifferentiated bisaccates, *Classopollis classoides*, *Rogalskaisporites cicatricosus*, *Trilobosporites apiverrucatus* and *Vitreisporites pallidus*.

The dinocyst assemblage includes *Cyclonephelium distinctum*, *Odontochitina operculata*, *Oligosphaeridium complex* and *Pseudoceratium anaphrissum*.

The reworked palynomorphs consist of forms from the Mississippian, Triassic, Jurassic and Neocomian ages.

Discussion. Based on the absent of restrictive Albian species, an age of Aptian - Early Albian is assigned.

2087C-5343'C

Age. Early Cretaceous
Hauterivian

Zone. P-M19

Environment. Marine

Palynomorphs. The reworked palynomorphs continue through this interval in nearly the same diversity, but slightly less abundant than noted above.

The Hauterivian age is based on the consistent occurrence of certain dinocyst markers. These include *Herendeenia alaskaensis*, *Oligosphaeridium complex* (thick-wall), *Pseudoceratium nudum* and *Tubotuberella uncinata*. Other important species present are *Clathroctenocystis elegans*, *Florentinia cooksoniae*, *Gardodinium trabeculosum* and *Imbatodinium micropodum*.

5343C-7870'

Age. Indeterminate

Environment. Marginal Marine?

Palynomorphs. The palynomorph occurrences are greatly decreased in this section. The core samples indicate that most of the recovered palynomorphs in the ditch samples are derived from up-hole.

7870-8860'

Age. Carboniferous?
Undifferentiated

Zones. P-T21? to P-T19?

Environment. Nonmarine - Marginal Marine?

Palynomorphs. The rare presence of *Densosporites* is the basis for the tentative Carboniferous age assignment.

Rare occurrences of scolecodonts suggest at least some neritic marine deposition within this interval.

8860-9215'

Age. Indeterminate

Environment. Nonmarine

Palynomorphs. Only nondiagnostic spore and spore fragments were recorded through this interval.

9215-9300'

Age. Probable Triassic
Undifferentiated

Environment. Nonmarine

Palynomorphs. A single sample within this interval recovered *Classopollis classoides* and *Taeniaesporites* sp. If these forms are indigenous, a Triassic age is appropriate.

9300-12,180'

Age. Indeterminate

Environment. Nonmarine to Marginal Marine

Palynomorphs. Essentially barren of palynomorphs. Mainly nondiagnostic spore and spore fragments were recovered. Scolecodonts recovered in the core samples indicate that parts of the interval represent marginal marine deposition.

12,180-13,160'

Age.	Carboniferous Undifferentiated
Zones.	P-T21 to P-T19
Environment.	Marginal Marine
Palynomorphs.	The rare presence of *Densosporites* in this interval is the basis for the Carboniferous age assignment. Consistent occurrences of scolecodonts indicate a marginal marine depositional environment.

13,160-14,510'

Age.	Indeterminate
Environment.	Nonmarine to Marginal Marine
Palynomorphs.	Mainly nondiagnostic spore and spore fragments were recovered. Some scolecodonts were recovered and indicate that parts of the interval represent marginal marine deposition.

14,510-15,330'C

Age.	Carboniferous Undifferentiated
Zones.	P-T21 to P-T19
Environment.	Marginal Marine
Palynomorphs.	The presence of *Densosporites* in this interval is the basis for the Carboniferous age assignment. Consistent occurrences of scolecodonts indicate a marginal marine depositional environment.

15,330C-15,332.5'C

Age.	Possible Permian - Triassic Undifferentiated
Zones.	P-T18? to P-T15?
Environment.	Nonmarine
Palynomorphs.	The occurrence of *Kraeuselisporites* in core samples suggests a possible Permian to Triassic age for this narrow interval.

15,332.5C-16,220'

Age. Indeterminate

Environment. Nonmarine to Marginal Marine

Palynomorphs. Mainly nondiagnostic spore and spore fragments were recovered. Some scolecodonts were recovered and indicate that parts of the interval represent marginal marine.

16,220-16,590'

Age. Mississippian
Undifferentiated

Zone. Probable P-T21

Environment. Marginal Marine

Palynomorphs. A slight increase in spore recoveries was recorded. The assemblage included *Calamospora*, *Densosporites*, *Lycospora* and ?*Tripartites*. Scolecodonts continue through the interval.

Discussion. The spore assemblage suggests that this section probably equates to the P-T21 zonule.

16,590-17,000'T.D.

Age. Indeterminate

Environment. Marginal Marine

Palynomorphs. Mainly nondiagnostic spore and spore fragments were recovered. Consistent occurrences of scolecodonts indicate a marginal marine depositional environment.

Specimens of *Densosporites* in a core sample at 16,993.2 feet may be evidence for the presence of Carboniferous strata.

CONCLUSIONS

Palynological analysis of the USGS/Husky Lisburne No. 1 well provides the following generalized palynostratigraphic succession:

- Marine Aptian - Early Albian strata are indicated for the interval 130 feet to 2087C feet. Abundant reworked palynomorphs were recorded in this section.

- Marine Hauterivian age strata are placed from 2087C feet to 5343C feet. The reworked palynomorphs continue through the interval.

- The interval from 5343C feet to 7870 feet is of indeterminate age.

- The remaining section of the well is a complex repeat of thrust sheets consisting mostly of Carboniferous strata. Some thin intervals of Triassic or Permo - Triassic strata are suggested in two intervals within these repeated sections.

USGS/Husky Lisburne #1 API No. 50-137-20003 MCI Job No. 22-113 April, 2003 Numbers = Percentages P = Present		LITHOLOGIES																												MINERALS				MISC.				
Top	Base	LITHOLOGIC UNITS	CALCILUTITE	CHERT	SHALE	ARGILLACEOUS LIMESTONE	CALCILUTITE OR ARGILLACEOUS LIMESTONE	SILICEOUS SHALE	WACKESTONE	DOLOMITE	LIME MUDSTONE	PACKSTONE (RECRYSTALLIZED)	WACKESTONE (RECRYSTALLIZED)	GRAINSTONE (RECRYSTALLIZED)	RED SHALE	LIME MUDSTONE (RECRYSTALLIZED)	SILICIFIED LIMESTONE	DOLOMITIZED LIME MUDSTONE	MOZAIC TEXTURED RECRYSTALLIZED LIMESTONE	DOLOMITE (OIL STAINED?)	DOLOMITIC WACKESTONE	DOLOMITIC SHALE	DOLOMITIZED LIMESTONE	DOLOMITIZED RECRYSTALLIZED PACKSTONE (OIL STAINED?)	SILSTONE	PACKSTONE	PYRITE	SIDERITE? (BARITE?)	TAR	GLAUCONITE	FORAMINIFERA	RADIOLARIA	OSTRACODS	ALGAE	STYOLITES
6760	6790		9	10	75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	1	.	P	P	.	.	.
6790	6820	A	13	10	75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.
6820	6850		10	20	68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.
6850	6880		10	10	75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	.	.	.	.	.	.	.
6880	6910	B	20	10	65	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	.	.	.	.	.	.
6910	6940		10	15	70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	.	P	P	.	.	.
6940	6970	C	.	10	20	65	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	.	.	P	P	.	.	.
6970	7000		.	25	10	67	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	P	.	.	.
7000	7030		.	25	.	.	80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.
7030	7060		.	10	.	.	90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.
7060	7090		.	9	.	.	90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	P	P	.	.	.
7090	7120	D	.	5	.	.	92	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	P	P	.	.	.
7120	7150		.	4	.	.	95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	P	.	.	.
7150	7180		.	19	.	.	80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	P	.	.	.
7180	7210		.	30	.	.	67	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	P	.	.	.
7210	7240		38	10	50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	P	.	.	.
7240	7270	E	38	10	50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	P	P	.	.	.
7270	7300		24	15	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	P	.	.	.
7300	7330		23	15	.	.	.	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	P	P	.	.	.
7330	7360	F	8	50	.	.	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	P	P	.	.
7360	7390		4	60	.	.	.	30	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	P	P	.	.	.
7390	7420		4	20	.	.	.	.	.	5	1	35	32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	P	P	.	.	.
7420	7450		.	20	.	.	.	.	.	5	5	35	35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.
7450	7480		.	35	.	.	.	.	.	5	.	50	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
7480	7510		.	20	.	.	.	.	.	.	.	50	25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	P	.
7510	7540		.	20	.	.	.	.	.	5	.	50	25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	P
7540	7560		.	1	.	.	.	.	.	.	.	50	45	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	P	.
7560	7590		.	.	.	.	.	.	.	.	.	50	40	.	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	P	.	.	.
7590	7620		10	.	.	.	.	.	.	.	.	30	35	.	5	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.
7620	7650		15	.	.	.	.	.	.	.	.	40	45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7650	7680		25	.	.	.	.	.	.	.	.	35	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	.
7680	7710		70	.	.	.	.	.	.	.	.	10	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7710	7740	G	40	.	.	.	.	.	.	.	.	30	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.
7740	7770		20	.	.	.	.	.	.	.	.	40	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7770	7800		50	.	.	.	.	.	.	.	.	10	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7800	7830		50	.	5	.	.	.	.	.	.	10	35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.
7830	7860		10	.	.	.	.	.	.	.	.	40	50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7860	7890		10	.	.	.	.	.	.	.	.	40	50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7890	7920		8	2	.	.	.	.	.	.	.	40	50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7920	7950		.	2	.	.	.	.	.	.	.	40	50	.	.	.	18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.
7950	7980		.	2	.	.	.	.	.	5	.	40	40	.	.	.	5	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7980	8010		.	5	.	.	.	.	.	.	.	40	45	.	.	.	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8010	8040		.	.	40	.	.	.	.	.	.	30	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8040	8070		10	.	30	.	.	.	.	.	.	20	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8070	8100		.	.	10	.	.	.	.	.	.	20	20	.	.	.	10	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8100	8130		.	3	.	.	.	.	.	.	.	7	10	.	.	.	10	.	60	10	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.
8130	8160		.	.	.	.	.	.	.	.	.	.	5	.	.	.	5	.	80	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8160	8190	H	.	.	.	.	.	.	.	.	.	5	15	.	.	.	10	.	70	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	.
8190	8220		.	.	.	.	.	.	.	.	.	5	10	.	.	.	10	.	70	5	.	.	.	.	.	.	.	.	.	.	P	.	P	.	.
8220	8250		.	.	.	.	.	.	.	.	.	5	.	.	.	.	5	30	.	.	60	.	.	.	.	.	.	.	.	.	P	.	P	.	.
8250	8280		.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5	.	.	9	80	1	.	.	.	.	.	.	.	P	.	.	.	.
8280	8310		.	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	57	.	.	.	.	3	P	.	.	.	.
8310	8340	I	.	.	45	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	50	.	.	.	.	3	P	.	.	.	.
8340	8370		.	.	57	.	.	.	.	.	5	.	5	.	.	.	.	.	.	.	.	.	.	.	.	30	.	.	.	.	3	.	.	.	.	.
8370	8400		.	.	58	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	40	.	.	.	.	2	P	.	.	.	.
8400	8430		.	5	45	.	.	.	.	.	.	20	.	.	.	.	.	.	.	.	.	.	.	.	10	20	.	.	.	.	.	P	.	.	.	.
8430	8460		.	.	.	.	.	.	.	5	.	35	30	.	.	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	P	.
8460	8490		.	.	.	.	.	.	.	.	.	.	.	10	.	.	40	.	.	.	.	.	5	.	1	.	.	.	.	.	P	.	.	P	.
8490	8520	J	.	.	10	.	.	.	.	.	.	10	10	.	.	.	70	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.
8520	8550		.	.	.	.	.	.	.	5	10	.	.	.	.	.	80	.	.	.	.	.	.	.	.	5	.	.	.	.	P	P	.	.	.
8550	8580		.	.	.	.	.	.	.	5	5	.	.	.	.	.	85	.	.	.	.	.	.	.	.	5	.	.	.	.	P	.	.	.	.
8580	8610		.	.	.	.	.	.	.	5	10	.	.	.	.	.	85	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	.

USGS/Husky Lisburne #1
API No. 50-137-20003

MCI Job No. 22-113

April, 2003

Numbers = Percentages
P = Present

Top	Base	LITHOLOGIC UNITS	LITHOLOGIES																				MINERALS					MISC.			
			CHERT	SILICEOUS SHALE	CALCAREOUS SHALE	CALCILUTITE	SHALE	ARGILLACEOUS LIMESTONE	CALCILUTITE OR ARGILLACEOUS LIMESTONE	DOLOMITE	PACKSTONE (RECRYSTALLIZED)	WACKESTONE (RECRYSTALLIZED)	LIME MUDSTONE	LIME MUDSTONE (RECRYSTALLIZED)	MICRODOLOMITE (<10 MICRONS)	DOLOMITE (OIL STAINED?)	GRAINSTONE (RECRYSTALLIZED)	SILICIFIED LIMESTONE	DOLOMITIC LIMESTONE (OIL STAINED?)	MOZAIC TEXTURED RECRYSTALLIZED LIMESTONE	DOLOMITIC LIMESTONE	PACKSTONE	PYRITE	SIDERITE? (BARITE?)	COAL	TAR	GLAUCONITE	FORAMINIFERA	RADIOLARIA	ALGAE	OSTRACODS
8610	8640		15	76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.
8640	8670		20	65	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5	.	.	.	.	.	.	.
8670	8700		20	55	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	P	P	.	.
8700	8730	A	10	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10	10	.	.	.	P	P	.	.
8730	8760		13	80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	5	.	.	.	.	.	.	.
8760	8790		10	75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	10	2	.	.	.	P	.	.
8790	8820		37	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	P	.	.
8820	8850		20	40	32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	3	.	.	.	P	.	.
8850	8880		19	40	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	P	P	.
8880	8910	B	10	45	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	P	P	P	.
8910	8940		12	55	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	P	.	.
8940	8970		12	55	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	P	.	.
8970	9000	C	13	20	.	2	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	.	.	.	.	P	.	.
9000	9030		7	20	.	10	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	1	.	.	P	.	.
9030	9060		10	.	.	.	20	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	5	.	1	.	P	P	.	.
9060	9090		19	.	.	10	70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
9090	9120		60	.	.	20	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.
9120	9150		26	.	.	.	18	.	60	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	P	.	.	.
9150	9180		20	.	.	.	20	.	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.
9180	9210		40	.	.	.	10	.	50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9210	9210		50	.	.	.	10	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.
9210	9240	D	40	.	.	.	18	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	P	.	.	.
9215	9215		52	.	.	.	8	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	P	.	.
9240	9270		18	.	.	.	20	.	60	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	P	P	.	.
9270	9300		25	19	.	.	.	.	55	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
9300	9330		35	17	.	.	.	.	45	1	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.
9330	9360		30	25	.	.	.	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	.	.	.	P	P	.	.
9360	9390		40	18	.	.	.	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	P	.	.
9390	9420		35	13	.	.	.	.	50	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	P	.	.
9420	9450		3	.	.	10	85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	P	P	.	.
9450	9480		.	.	.	18	80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	P	.	.
9480	9510	E	2	.	.	15	80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	P	.	.
9510	9540		.	.	.	15	80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	.	.	.	P	.	.
9540	9570		5	.	.	10	80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	.	.	.	.	.	.	.
9570	9600		15	.	.	23	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	P	.	.
9600	9630	F	16	.	.	14	25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	P	.	.
9630	9650		35	.	.	7	55	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	P	.	.
9650	9680		10	.	.	.	45	.	.	4	30	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	P	P	.	.
9680	9710		5	.	.	.	.	.	.	.	40	25	15	15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9710	9740		4	.	.	.	.	.	.	.	33	15	10	35	3	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.
9740	9770		5	.	.	75	.	.	.	.	10	.	.	10	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.
9770	9800		5	.	.	50	.	.	.	.	35	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.
9800	9830		5	.	.	10	.	.	.	.	50	.	.	18	.	.	25	.	.	.	.	.	.	.	.	.	.	P	.	.	.
9830	9860		10	.	.	20	.	.	.	.	35	.	.	28	.	.	15	.	.	.	.	.	.	.	.	.	.	P	.	.	.
9860	9900		.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	95	.	.	.	.	.	.	.	.	.	.	.	.	.
9900	9930		.	.	.	.	.	.	.	.	20	10	.	.	.	.	.	70	.	.	.	.	.	.	.	.	.	.	.	.	.
9930	9960		5	.	.	.	.	.	.	.	10	10	.	.	.	.	.	75	.	.	.	.	.	.	.	.	.	.	.	.	.
9960	9990		.	.	.	.	.	.	.	.	15	5	.	.	.	.	.	80	.	.	.	.	.	.	.	.	.	.	P	.	.
9990	10020	G	.	.	.	.	.	.	.	.	40	10	.	.	.	.	.	50	.	.	.	.	.	.	.	.	.	.	P	.	.
10020	10050		.	.	.	.	.	.	.	.	50	10	.	.	.	.	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.
10050	10080		.	.	.	.	.	.	.	.	65	15	.	.	.	.	.	20	.	.	.	.	.	.	.	.	.	.	.	.	.
10080	10100		.	.	.	10	.	.	.	.	50	20	.	.	.	.	.	20	.	.	.	.	.	.	.	.	.	.	.	.	.
10100	10130		.	.	.	.	.	.	.	.	60	20	.	.	.	.	.	20	.	.	.	.	.	.	.	.	.	.	.	.	.
10130	10160		.	.	.	.	.	.	.	.	65	20	.	.	.	.	.	15	.	.	.	.	.	.	.	.	.	.	.	.	.
10160	10190		5	.	.	.	.	.	.	2	60	10	.	.	.	.	.	15	8	.	.	.	.	.	.	.	.	P	.	.	.
10190	10220		10	.	.	.	.	.	.	.	60	10	.	.	.	.	.	20	.	.	.	.	.	.	.	.	.	.	.	.	.
10220	10250		5	.	.	.	.	.	.	.	45	25	.	.	.	.	.	20	.	.	.	.	.	.	.	.	.	.	.	.	.
10250	10280		.	.	.	.	.	.	.	.	65	20	.	.	.	.	.	15	.	.	.	.	.	.	.	.	.	.	.	.	.
10280	10300		.	.	.	.	.	.	.	.	40	30	.	.	.	.	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.
10300	10330		10	.	.	.	.	.	.	.	30	20	.	.	.	.	.	30	10	.	.	.	.	.	.	.	.	.	.	.	.
10330	10360		5	.	.	.	.	.	.	.	40	30	.	.	.	.	.	20	.	5	.	.	.	.	.	.	.	.	.	.	.
10360	10390		.	.	.	.	.	.	.	.	40	30	.	.	.	.	.	38	.	2	.	.	.	.	.	.	.	.	.	.	.
10390	10420		10	.	.	.	.	.	.	.	30	20	.	.	.	.	.	30	.	10	.	.	.	.	.	.	.	.	.	.	.
10420	10450	H	5	.	.	.	.	.	.	.	20	20	.	.	.	.	.	35	.	20	.	.	.	.	.	.	.	P	.	.	.
10450	10480		60	.	.	.	.	.	.	.	10	10	.	.	.	.	.	20	.	.	.	.	.	.	.	.	.	.	.	P	.
10480	10510		40	.	.	.	.	.	.	.	10	10	.	.	.	.	.	30	10	.	.	.	.	.	.	.	.	.	.	P	.
10510	10540		20	.	.	.	.	.	.	.	20	20	.	.	.	5	.	25	10	.	.	.	.	.	.	.	.	.	.	P	.
10540	10570		5	.	.	.	.	.	.	.	40	30	.	.	.	.	.	15	10	.	.	.	.	.	.	.	.	.	.	.	.
10570	10600		9	.	.	.	1	.	.	.	40	30	.	.	.	.	.	15	5	.	.	.	.	.	.	.	.	P	.	.	.
10600	10630	I	5	.	.	.	.	.	.	.	35	20	.	.	.	.	.	35	5	.	.	.	.	.	.	.	.	P	.	.	.
10630	10660		50	.	.	.	.	.	.	.	10	20	.	.	.	.	.	20	.	.	.	.	.	.	.	.	.	P	P	.	.
10660	10690		10	.	.	.	.	.	.	.	20	10	.	.	.	.	.	50	.	.	10	.	.	.	.	.	.	.	P	.	.
10690	10720		20	.	.	.	5	.	.	.	40	5	.	.	.	.	.	20	.	.	.	.	.	.	.	.	.	P	P	.	P
10720	10750		5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10	.	.	.	85	.	.	.	.	.	P	P	.	P
10750	10780		5	.	.	.	1	.	.	.	9	.	.	.	.	.	.	.	.	.	.	85	.	.	.	.	.	P	P	.	P
10780	10810	J	50	.	.	.	.	.	.	.	10	10	.	.	.	.	.	20	.	.	.	10	.	.	.	.	.	P	P	.	P
10810	10840		9	.	.	.	.	.	.	.	20	20	.	.	.	1	.	30	.	.	.	20	.	.	.	.	.	P	P	.	.
10840	10870		20	.	.	.	2	.	.	.	20	10	.	.	.	.	.	40	.	.	.	8	.	.	.	.	.	P	P	.	P
10870	10900		10	.	.	.	.	.	.	.	30	50	.	.	.	.	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.

USGS/Husky Lisburne #1
API No. 50-137-20003

MCI Job No. 22-113

April, 2003

Numbers = Percentages
P = Present

Top	Base	LITHOLOGIC UNITS	LITHOLOGIES																							MINS.			MISC.				
			CHERT	CALCILUTITE	SILICEOUS SHALE	CALCILUTITE OR ARGILLACEOUS LIMESTONE	SHALE	ARGILLACEOUS LIMESTONE	DOLOMITE	PACKSTONE (RECRYSTALLIZED)	SILICIFIED LIMESTONE	SILSTONE	WACKESTONE (RECRYSTALLIZED)	MOZAIC TEXTURED RECRYSTALLIZED LIMESTONE	LIME MUDSTONE	DOLOMITIC LIMESTONE	DOLOMITIC LIMESTONE (OIL STAINED?)	PACKSTONE	WACKESTONE	DOLOMITE (OIL STAINED?)	DOLOMITIC LIME MUDSTONE	GRAINSTONE (RECRYSTALLIZED)	SPICULITIC LIME MUDSTONE	PYRITE	VEIN CALCITE	GLAUCONITE	RADIOLARIA	FORAMINIFERA	ALGAE	OSTRACODS	STYOLITES
10900	10930		20	60	19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	P	.	.	.	.
10930	10960		20	60	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.
10960	10990	B	10	30	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	P	P	.	.	.
10990	11020		9	50	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	P	P	.	.	.
11020	11050		40	28	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	P	.	.	.	.
11050	11080	C	70	.	5	24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	P	P	.	.	.
11080	11110		50	.	8	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	P	P	.	.	.
11110	11140		40	.	20	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	.
11140	11170		47	.	30	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.
11170	11200		20	.	15	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	.	P	.	.	.	.
11200	11230	D	20	.	17	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
11230	11260		40	.	19	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	P	.	.	.	.
11260	11290		40	.	.	30	29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	P	.	.	.	.
11290	11320		40	.	30	29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
11320	11350		20	.	.	18	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
11350	11370		10	.	15	23	50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	P	.	.	.	.
11370	11390	E	5	.	20	23	50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	P	.	.	.	.
11390	11420		.	.	5	17	75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
11420	11450		.	.	.	27	70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	P	.	.	.	.
11450	11480		74	.	.	.	5	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
11480	11510	F	80	.	.	.	4	15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	P	.	.	.	.
11510	11540		5	.	80	.	5	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	P	.	.	.	.
11540	11570		.	.	.	.	30	.	5	34	10	20	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
11570	11600		.	.	.	.	5	.	20	35	20	.	19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11600	11630		.	.	.	.	.	.	30	20	40	.	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11630	11660		.	.	.	.	.	.	.	10	70	.	.	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11660	11680		.	.	.	.	.	.	.	10	60	.	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11680	11710		20	.	.	.	.	.	.	15	40	.	10	10	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11710	11740		20	.	.	.	.	.	1	.	69	.	10	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11740	11770		10	.	.	.	.	.	.	15	65	.	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11770	11800		10	.	.	.	.	.	.	20	55	.	15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11800	11830	G	10	.	.	.	.	.	3	30	30	.	27	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11830	11860		10	.	.	.	.	.	.	30	30	.	28	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
11860	11890		10	.	.	.	.	.	1	30	29	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11890	11920		10	.	.	.	.	.	.	30	20	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11920	11950		10	.	.	.	.	.	.	30	20	.	40	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	.
11950	11970		5	.	.	.	.	.	.	50	15	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11970	12000		10	10	.	.	.	.	.	40	19	.	20	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
12000	12030		5	.	.	.	.	.	.	50	15	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12030	12060		5	.	.	.	.	.	.	52	15	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12060	12090		4	2	.	.	.	.	1	50	13	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.
12090	12120		5	15	.	.	.	.	.	40	10	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12120	12150		1	2	.	.	.	.	.	10	10	.	5	60	.	.	2	.	.	.	.	.	.	.	.	.	.	P	.	.	.
12150	12180		.	10	.	.	.	.	.	15	10	.	14	50	.	.	.	.	.	.	.	.	.	.	.	1	.	P	.	.	.
12180	12210	H	.	.	.	.	.	.	.	.	10	.	.	10	20	.	.	10	50	.	.	.	.	.	.	.	P	.	.	.	.
12210	12240		5	.	.	.	.	.	3	.	12	.	.	10	25	.	.	.	45	.	.	.	.	.	.	.	.	.	P	.	.	.
12240	12270		.	3	.	.	.	.	.	10	7	.	20	30	.	.	.	10	20	.	.	.	.	.	.	.	P	.	.	.	.
12270	12300		.	.	.	.	.	.	.	15	.	.	10	.	10	5	.	20	35	.	.	.	.	.	5	.	.	P	P	P	.
12300	12330		.	.	.	.	.	.	.	20	10	.	35	.	10	.	5	10	10	.	.	.	.	.	.	.	.	P	.	.	.	.
12330	12360	I	.	.	.	.	.	.	.	20	20	.	.	.	.	.	.	10	40	10	.	.	.	.	.	.	.	P	P	P	.
12360	12390		10	.	.	.	.	.	.	10	20	.	.	.	.	.	.	20	30	10	.	.	.	.	.	.	.	P	P	P	.	.
12390	12420		5	.	.	.	.	.	.	10	10	.	.	.	10	.	5	30	30	.	.	.	.	.	.	.	.	P	P	P	.	.
12420	12450		8	.	.	.	.	.	.	10	10	.	.	.	.	.	.	10	40	2	20	.	.	.	.	.	.	P	.	P	.	.
12450	12480		.	.	.	.	.	.	.	10	20	.	.	.	.	.	.	40	20	.	10	.	.	.	.	.	.	P	P	.	.	.
12480	12510		.	.	.	.	.	.	.	20	10	.	.	.	.	.	.	20	40	.	10	.	.	.	.	.	.	P	P	P	.	.
12510	12540		.	.	.	.	.	.	.	10	5	.	.	.	.	.	.	10	50	.	25	.	.	.	.	.	.	.	P	.	.	.
12540	12570		.	.	.	.	.	.	.	15	5	.	.	.	.	.	.	30	25	5	20	.	.	.	.	.	.	P	P	P	.	.
12570	12600	J	.	.	.	.	.	.	3	15	5	.	.	.	.	.	.	52	25	.	.	.	.	.	.	.	.	P	.	P	.	.
12600	12630		.	.	.	.	.	.	.	7	10	.	.	.	.	.	.	40	25	.	3	15	.	.	.	.	.	P	.	P	.	.
12630	12660		.	.	.	.	.	.	.	20	30	.	.	.	.	.	.	25	20	5	.	.	.	.	.	.	.	P	P	.	.	.
12660	12690		20	.	.	.	.	.	.	.	30	.	.	.	.	.	.	10	40	.	.	.	.	.	.	.	.	.	.	.	.	.
12690	12720		9	.	.	.	.	.	.	20	40	.	.	.	.	.	.	.	30	1	.	.	.	.	.	.	.	P	P	.	.	.
12720	12750		.	.	.	.	.	.	.	40	40	.	.	.	.	.	.	.	20	.	.	.	.	.	.	.	.	P	P	.	.	.
12750	12780		.	.	.	.	.	.	.	4	30	.	.	.	.	.	.	.	15	1	.	.	50	.	.	.	P	.	.	P	P	.
12780	12810		.	.	.	.	.	.	.	10	20	.	.	.	.	.	.	.	28	2	.	.	40	.	.	.	P	.	P	P	P	.
12810	12840		.	.	.	.	.	.	.	14	20	.	.	.	.	.	.	.	25	1	.	.	40	.	.	.	P	.	.	P	.	.
12840	12870		.	.	.	.	.	.	.	10	20	.	.	.	.	.	.	.	47	3	.	.	20	.	.	.	.	.	P	.	P	.
12870	12900		.	.	.	.	.	.	.	10	60	.	.	.	10	.	.	.	18	2	.	.	.	.	.	.	.	.	.	P	.	.
12900	12930		10	.	.	.	.	.	.	10	20	.	.	.	50	.	.	.	.	10	.	.	.	.	.	.	.	.	.	.	.	.
12930	12960		.	.	.	.	.	.	.	.	80	.	.	.	10	.	.	.	5	5	.	.	.	.	.	.	.	.	.	.	.	.
12960	12990		.	.	.	.	.	.	.	.	60	.	.	.	17	.	.	.	20	3	.	.	.	.	.	.	.	.	.	.	.	.
12990	13020		.	.	.	.	.	.	.	.	60	.	.	.	18	.	.	.	20	2	.	.	.	.	.	.	.	.	P	.	.	.
13020	13050		20	.	.	.	.	.	.	10	40	.	.	.	10	.	.	.	20	.	.	.	.	.	.	.	P	.	.	.	.	P
13050	13070	K	.	.	.	.	.	.	1	10	.	.	.	.	50	.	.	10	29	.	.	.	.	.	.	.	P	.	P	.	.
13070	13100		5	.	.	.	.	.	.	60	.	.	.	.	15	.	.	.	20	.	.	.	.	.	.	.	P	.	.	.	.
13100	13130		.	.	.	.	.	.	.	10	.	.	.	.	60	.	.	.	30	.	.	.	.	.	.	.	.	.	.	.	.	.
13130	13160		.	.	.	.	.	.	.	10	.	.	.	.	20	.	.	10	60	.	.	.	.	.	.	.	.	.	.	.	.	.
13160	13190		.	.	.	.	.	.	.	20	.	.	.	.	20	.	.	30	30	.	.	.	.	.	.	.	.	.	.	.	.	.
13190	13220		5	.	.	.	.	.	.	.	20	.	.	.	25	.	.	20	50	.	.	.	.	.	.	.	.	.	P	.	.
13220	13250		.	.	.	.	.	.	.	.	20	.	.	.	.	.	.	30	30	.	.	.	20	.	.	.	.	.	.	.	.	.
13250	13280		.	.	.	.	.	.	.	.	20	.	.	.	.	.	.	30	30	.	.	.	20	.	.	.	.	.	.	.	.	.
13280	13310		.	.	.	.	.	.	.	5	5	.	.	.	.	.	.	30	50	.	.	.	10	.	.	.	.	.	.	.	.	.
13310	13340		45	.	.	.	.	.	.	5	32	.	.	.	.	.	.	5	10	3	.	.	.	.	.	.	.	.	.	.	.	.
13340	13370		20	.	.	.	33	.	.	2	20	.	.	.	20	.	.	.	.	5	.	.	.	.	.	.	.	.	.	P	.

USGS/Husky Lisburne #1
API No. 50-137-20003

MCI Job No. 22-113

April, 2003

Numbers = Percentages
P = Present

Top	Base	LITHOLOGIC UNITS	LITHOLOGIES																		MINS.		MISC.			
			CHERT	CALCILUTITE	SHALE	DOLOMITE	CALCILUTITE OR ARGILLACEOUS LIMESTONE	DOLOMITIC SHALE	SILICEOUS SHALE	PACKSTONE (RECRYSTALLIZED)	SILICIFIED LIMESTONE	DOLOMITE (OIL STAINED?)	WACKESTONE (RECRYSTALLIZED)	MOZAIC TEXTURED RECRYSTALLIZED LIMESTONE	PACKSTONE	DOLOMITIC LIME MUDSTONE	WACKESTONE	DOLOMITIC LIMESTONE (OIL STAINED?)	SPICULITIC LIME MUDSTONE	PYRITE	GLAUCONITE	RADIOLARIA	FORAMINIFERA	OSTRACODS	ALGAE
13370	13400		10	20	70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.
13400	13430		5	23	70	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	P	.	.	.
13430	13460		8	30	60	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	P	.	.
13460	13490	E	10	.	60	.	28	.	.	.	.	.	.	.	.	.	.	.	.	2	.	P	.	.	.
13490	13520		.	14	85	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
13520	13550		.	8	90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	P	.	.
13550	13580		.	10	37	.	.	50	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.
13580	13610		.	10	38	.	.	50	.	.	.	.	.	.	.	.	.	.	.	2	.	P	.	.	.
13610	13640		20	9	.	.	.	.	70	.	.	.	.	.	.	.	.	.	.	1	.	.	P	.	.
13640	13670	F	20	20	.	.	.	.	60	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.
13670	13700		29	.	.	.	.	.	70	.	.	.	.	.	.	.	.	.	.	1	.	P	.	.	.
13700	13730		19	5	.	.	.	.	75	.	.	.	.	.	.	.	.	.	.	1	.	P	.	.	.
13730	13760		20	.	.	.	.	.	70	10	20	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13760	13790		20	.	.	.	.	.	.	10	50	18	.	.	.	.	.	.	.	1	1	.	.	.	.
13790	13820		25	.	.	.	.	.	.	.	60	15	.	.	.	.	.	.	.	.	.	.	.	.	.
13820	13850		10	.	.	.	.	.	.	45	35	10	.	.	.	.	.	.	.	.	.	.	.	.	.
13850	13880		15	.	.	.	.	.	.	25	30	5	25	.	.	.	.	.	.	.	.	.	.	.	.
13880	13910		15	.	.	.	.	.	.	25	30	5	25	.	.	.	.	.	.	.	.	.	.	.	.
13910	13940		3	.	.	.	.	.	.	40	10	2	45	.	.	.	.	.	.	.	.	.	P	.	.
13940	13970		10	.	.	.	.	.	.	30	40	.	20	.	.	.	.	.	.	.	.	.	.	.	.
13970	14000		10	.	.	.	.	.	.	30	40	.	20	.	.	.	.	.	.	.	.	.	.	.	.
14000	14030		10	.	.	.	.	.	.	20	50	.	20	.	.	.	.	.	.	.	.	.	P	.	.
14030	14060	G	10	.	.	.	.	.	.	30	40	.	20	.	.	.	.	.	.	.	.	.	.	P	.
14060	14090		10	.	.	.	.	.	.	30	40	.	20	.	.	.	.	.	.	.	.	.	.	.	P
14090	14120		8	.	.	.	.	.	.	40	20	2	30	.	.	.	.	.	.	.	.	.	.	.	.
14120	14150		.	.	.	.	.	.	.	40	29	1	30	.	.	.	.	.	.	.	.	.	.	.	P
14150	14180		10	.	.	.	.	.	.	30	30	.	30	.	.	.	.	.	.	.	.	.	.	.	.
14180	14210		5	.	.	.	.	.	.	30	35	.	30	.	.	.	.	.	.	.	.	.	.	.	.
14210	14240		10	.	.	.	.	.	.	30	40	.	20	.	.	.	.	.	.	.	.	.	.	.	.
14240	14270		10	.	.	.	.	.	.	40	20	.	30	.	.	.	.	.	.	.	.	.	.	.	.
14270	14300		5	.	.	.	.	.	.	40	25	.	30	.	.	.	.	.	.	.	.	.	.	.	.
14300	14330		5	.	.	.	.	.	.	30	35	.	30	.	.	.	.	.	.	.	.	.	.	.	.
14330	14360		29	.	.	.	.	.	.	20	40	1	10	.	.	.	.	.	.	.	.	.	.	.	P
14360	14390		35	.	.	.	.	.	.	10	45	.	10	.	.	.	.	.	.	.	.	.	.	.	P
14390	14420		10	.	.	.	.	.	.	20	40	1	19	10	.	.	.	.	.	.	.	.	.	.	.
14420	14450	H	10	.	.	.	.	.	.	20	40	.	20	10	.	.	.	.	.	.	.	.	.	.	P
14450	14480		10	.	.	.	.	.	.	25	40	1	20	4	.	.	.	.	.	.	.	.	.	P	.
14480	14510		4	.	10	.	.	.	.	20	20	.	20	.	5	20	.	.	.	.	1	.	P	P	.
14510	14540	I	.	.	7	.	.	.	.	.	35	2	.	.	15	20	20	.	.	.	1	.	P	P	.
14540	14570		.	.	.	.	.	.	.	10	10	20	.	.	15	30	15	.	.	.	.	.	P	P	.
14570	14600		.	.	.	.	.	.	.	.	20	50	.	.	15	15	.	20	.	.	.	.	P	.	.
14600	14630		5	.	.	.	.	.	.	5	10	40	.	.	10	.	10	55	.	.	.	.	.	.	.
14630	14660		.	.	.	.	.	.	.	10	10	5	.	.	10	.	10	30	.	.	.	.	.	.	.
14660	14690		.	.	.	.	.	.	.	10	10	10	.	.	20	.	20	20	.	.	.	.	P	.	.
14690	14720	J	.	.	10	.	.	.	.	20	10	30	.	.	10	.	.	20	.	.	.	.	.	.	.
14720	14750		.	.	.	.	.	.	.	20	10	10	20	.	5	.	15	10	.	.	.	P	P	P	.
14750	14780		.	.	.	.	.	.	.	30	20	5	.	.	5	.	30	40	.	.	.	P	.	.	.
14780	14810		.	.	.	.	.	.	.	15	10	10	15	.	5	.	5	40	.	.	.	.	.	P	P
14810	14840		.	.	.	.	.	.	.	10	10	20	.	.	.	.	20	50	.	.	.	.	.	.	.
14840	14870		5	.	.	.	.	.	.	.	10	20	5	.	.	.	.	35	10	.	.	.	.	.	.
14870	14900		.	.	5	.	.	.	.	10	20	10	.	.	.	.	.	15	20	.	.	.	.	P	.
14900	14930		20	.	.	.	.	.	.	20	20	5	.	.	.	.	.	.	20	.	.	.	.	.	.
14930	14960		15	.	.	.	.	.	.	.	20	5	.	.	.	.	.	.	60	.	.	.	.	.	.
14960	14990		15	.	.	.	.	.	.	.	20	5	.	.	.	.	.	10	60	.	.	P	.	.	.
14990	15020		20	.	.	.	.	.	.	10	40	5	.	.	.	.	.	.	15	.	.	.	P	.	.
15020	15040		15	.	.	.	.	.	.	.	35	.	.	.	.	.	.	5	50	.	.	.	P	.	.
15040	15060		10	.	.	.	.	.	.	.	35	.	.	.	20	.	.	.	30	.	.	.	P	.	P
15060	15090		20	.	.	.	.	.	.	.	30	.	.	.	.	.	20	.	30	.	.	P	.	.	.
15090	15120	K	10	.	.	.	.	.	.	.	15	5	.	.	50	.	20	.	.	.	.	.	P	P	.
15120	15150		5	.	.	.	.	.	.	.	15	.	.	.	25	.	25	5	25	.	.	P	P	P	P
15150	15180		10	.	.	.	.	.	.	.	20	.	.	.	10	.	20	.	40	.	.	P	.	P	.
15180	15200		10	.	.	.	.	.	.	.	20	.	.	.	10	.	20	.	40	.	.	P	.	P	.
15200	15220		.	.	.	.	.	.	.	.	30	.	.	.	.	.	30	.	40	.	.	.	.	.	.
15220	15250		9	.	10	.	.	.	.	.	40	.	.	.	10	.	10	1	20	.	.	.	.	.	.
15250	15280		10	.	.	.	.	.	.	.	40	.	.	.	15	.	10	5	20	.	.	.	.	.	.
15280	15300		.	.	15	.	.	.	.	.	14	.	.	.	30	.	10	1	30	.	.	.	P	P	.
15300	15320		.	.	5	.	.	.	.	.	5	.	.	.	30	.	20	10	30	.	.	.	.	P	.

USGS/Husky Lisburne #1
API No. 50-137-20003

MCI Job No. 22-113

April, 2003

Numbers = Percentages
P = Present

Top	Base	LITHOLOGIC UNITS	LITHOLOGIES																MINS.		MISC.			
			CHERT	SHALE	SILICIFIED LIMESTONE	WACKESTONE	DOLOMITE (OIL STAINED?)	GRAINSTONE (RECRYSTALLIZED)	GRAINSTONE	PACKSTONE (RECRYSTALLIZED)	PACKSTONE	DOLOMITIC LIMESTONE	WACKESTONE (RECRYSTALLIZED)	DOLOMITIC LIMESTONE (OIL STAINED?)	SILSTONE	SPICULITIC LIME MUDSTONE	LIME MUDSTONE	PYRITE	GLAUCONITE	FORAMINIFERA	ALGAE	OSTRACODS	RADIOLARIA
15320	15350		5	70	15	10	.	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.
15350	15380	F	50	.	45	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15380	15410		40	.	45	.	10	5	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.
15410	15440		5	.	10	.	10	30	15	30	.	.	.	.	.	.	.	.	.	P	P	.	.
15440	15470		5	.	.	.	5	40	30	20	.	.	.	.	.	.	.	.	.	P	.	.	.
15470	15490		.	.	.	.	5	40	10	45	.	.	.	.	.	.	.	.	.	P	.	.	.
15490	15510		5	.	25	.	60	10	.	10	.	.	.	.	.	.	.	.	.	.	.	.	.
15510	15540		10	.	20	.	20	10	.	20	20	.	.	.	.	.	.	.	.	P	.	.	.
15540	15570		30	.	.	.	10	.	.	40	.	20	.	.	.	.	.	.	.	.	.	.	.
15570	15590		5	.	10	.	5	.	.	40	.	.	40	.	.	.	.	.	.	P	.	.	.
15590	15620		8	.	20	.	2	.	.	25	30	.	25	.	.	.	.	.	.	P	.	.	.
15620	15650		10	.	10	.	.	.	.	40	10	.	30	.	.	.	.	.	.	.	.	.	.
15650	15680		20	.	40	.	.	.	.	20	.	.	20	.	.	.	.	.	.	.	.	.	.
15680	15710	"G"	5	.	20	.	.	.	.	15	.	.	60	.	.	.	.	.	.	.	.	.	.
15710	15740		.	.	10	20	.	.	.	25	20	.	25	.	.	.	.	.	.	P	.	P	.
15740	15770		.	.	10	20	.	.	.	25	20	.	25	.	.	.	.	.	.	.	.	P	.
15770	15790		10	.	20	10	.	.	.	30	.	.	30	.	.	.	.	.	.	.	.	.	.
15790	15820		.	.	40	.	.	.	.	30	.	.	30	.	.	.	.	.	.	P	.	.	.
15820	15850		.	.	40	.	.	.	.	30	.	.	30	.	.	.	.	.	.	.	.	.	.
15850	15880		.	.	30	.	.	.	.	30	.	.	40	.	.	.	.	.	.	.	.	.	.
15880	15910		10	.	30	.	.	.	.	30	.	.	30	.	.	.	.	.	.	P	.	.	.
15910	15940		10	.	30	.	.	.	.	30	.	.	30	.	.	.	.	.	.	.	.	.	.
15940	15970		10	.	40	25	.	.	.	.	25	.	.	.	.	.	.	.	.	.	.	.	.
15970	16000		10	.	20	.	10	.	10	20	30	.	.	.	.	.	.	.	.	.	P	P	.
16000	16030		.	.	25	30	5	.	15	.	25	.	.	.	.	.	.	.	.	P	P	.	P
16030	16060		.	.	20	20	.	.	.	20	.	.	40	.	.	.	.	.	.	P	.	.	.
16060	16090		.	.	40	25	2	.	.	15	13	.	.	5	.	.	.	.	.	P	.	.	.
16090	16120	H	.	.	50	25	.	.	.	25	.	.	.	.	.	.	.	.	.	.	.	.	.
16120	16150		5	.	20	.	.	.	.	40	35	.	.	.	.	.	.	.	.	.	.	.	.
16150	16180		.	.	40	.	.	.	.	30	30	.	.	.	.	.	.	.	.	P	.	.	.
16180	16200		10	.	40	.	.	.	.	50	.	.	.	.	.	.	.	.	.	.	.	.	.
16200	16220		9	.	50	.	.	.	.	40	.	.	.	.	.	.	.	.	1	.	.	.	.	.
16220	16250		.	8	5	20	.	.	.	.	10	.	.	10	45	.	.	.	2	P	P	P	.
16250	16280	I	.	20	.	15	.	.	.	.	10	.	.	.	45	.	.	5	5	P	.	P	.
16280	16310		.	5	.	.	.	.	10	31	30	.	.	3	15	.	.	3	3	P	.	P	.
16310	16340		.	5	7	.	.	.	.	40	37	.	.	5	.	.	.	3	3	P	.	P	.
16340	16370	J	.	2	5	36	3	.	.	25	25	.	.	.	.	.	.	3	1	P	.	P	.
16370	16390		.	1	30	43	1	.	.	20	5	.	.	.	.	.	.	.	.	P	.	P	.
16390	16410		.	.	5	50	5	.	.	20	20	.	.	.	.	.	.	.	.	P	.	P	.
16410	16440		.	.	30	20	.	.	.	15	20	.	.	.	.	5	.	.	.	P	P	P	.
16440	16470		.	.	10	35	.	.	.	10	35	.	.	.	.	10	.	.	.	P	.	P	.
16470	16500		.	.	9	40	1	.	.	15	20	.	.	.	.	15	.	.	.	P	.	P	.
16500	16530		.	.	10	40	.	.	.	10	40	.	.	.	.	.	.	.	.	P	P	P	.
16530	16560		10	.	10	.	.	.	.	20	30	.	.	.	.	.	.	.	.	P	.	P	P
16560	16590		20	.	30	20	.	.	.	10	20	.	.	.	.	.	.	.	.	P	.	P	P
16590	16620		.	.	5	50	.	.	.	.	45	.	.	.	.	.	.	.	.	P	.	P	.
16620	16650		.	.	20	40	.	.	.	.	40	.	.	.	.	.	.	.	.	P	.	P	.
16650	16680		.	2	15	55	3	.	.	.	25	.	.	.	.	.	.	.	.	P	P	P	.
16680	16710	K	20	.	40	.	10	.	.	.	.	.	.	30	.	.	.	.	.	.	.	.	.
16710	16740		20	.	40	.	5	.	.	.	.	.	.	35	.	.	.	.	.	.	.	.	.
16740	16770		55	.	30	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	.	.	.
16770	16800		16	.	35	25	3	.	.	.	.	.	.	.	.	20	.	1	.	P	P	.	.
16800	16830		17	.	.	20	2	.	.	.	.	.	.	.	.	40	.	1	.	P	.	.	.
16830	16860		8	.	20	30	1	.	.	.	.	.	.	.	.	40	.	1	.	.	P	.	.
16860	16890		8	.	20	40	1	.	.	.	30	.	.	.	.	.	.	1	.	.	.	P	P
16890	16920		.	.	10	25	.	.	.	.	48	.	.	.	.	.	15	2	.	.	P	P	.
16920	16950		.	.	10	10	.	.	.	.	20	.	.	.	.	.	59	1	.	P	.	P	.
16950	16980		.	.	5	39	.	.	.	.	25	.	.	.	.	.	30	1	.	P	P	P	P
16980	17000		8	.	20	25	2	.	.	.	20	.	.	.	.	.	24	1	.	P	P	P	.