

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 State Office Building
Portland, Oregon 97201

OPEN-FILE REPORT O-79-5

MICROPALEONTOLOGICAL STUDY
OF
FOUR DEEP WELLS
IN COOS COUNTY, OREGON

by

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1979

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MICROPALEONTOLOGICAL STUDY OF FOUR DEEP WELLS
IN COOS COUNTY, OREGON

by Daniel R. McKeel

The Department of Geology and Mineral Industries contracted Daniel McKeel, Consulting Micropaleontologist, to work samples from four deep oil and gas test holes in southwestern Oregon. Geologic ages have been assigned by Mr. McKeel to rock units penetrated in the wells. This work was done as support for a study by the Department to evaluate oil and gas potential of the Coos Basin and the adjacent continental shelf. The Department initiated this investigation in the spring of 1978. Results of the paleontologic work will be useful for future geologic investigations of southwestern Oregon.

Of the four wells selected for paleontologic study, two were drilled onshore and two offshore. E.M. Warren "Coos County #1-7" and Phillips Petroleum Co. "Dobbys #1" were drilled in the central Coos Basin. The Pan American Petroleum "OCS-P112 #1" was drilled 10 miles off the coast from Bandon, and Union Oil Co. "OCS-P130 #1" was drilled 35 miles off the coast from Florence.

The Department published paleontologic studies by Weldon Rau of two deep wells in 1973 under its Oil and Gas Investigation series. E.M. Warren's well was first worked by Rau in 1973 and redone in the current studies since the section described as upper Eocene was much thicker than surface mapping indicated. Daniel McKeel concluded that the bottom 1000 feet of the Warren samples is barren of microfossils so the age of samples in the Warren well below a depth of 5710 feet is indeterminate.

E. M. WARREN "COOS COUNTY #1-7"
SE $\frac{1}{4}$ sec. 7, T. 27 S., R. 13 W.
COOS COUNTY, OREGON

This study was undertaken to determine how deep indigenous Narizian foraminiferal faunas extend in the well, and if the well possibly penetrated older than Narizian horizons.

The deepest indigenous Narizian fauna, in the opinion of this author occurs at about 5710 feet. The interval from 5710 feet to 6340 feet (T.D.) is interpreted to be probably barren of indigenous Foraminifera; therefore the age of this part of the section is indeterminate.

The possibility of repeated section in the well was suggested to this author by Dick Robertson, Northwest Exploration Company, Denver. An examination of Rau's (1973) preliminary checklist with this in mind, plus re-examination of approximately 40 samples throughout the well, did indicate a possible repeated section in the lower half. However, a detailed quantitative study of consecutive samples (both float and tailings) would be necessary to confirm this possibility. A project of this nature would exceed the budgeted funds for the present study.

Below are species lists for eleven selected samples near the bottom of the well.

5200' Amphimorphina jenkinsi (juvenile) VR*, Arenaceous indeterminate VR, Bolivina basisenta VR, Bulimina schencki C, Cribronion cf. roemerii (juv.) R, Gyroidina simiensis C, Haplophragmoides sp. (small, crushed) VR, Lenticulina spp. R, Nonionella? sp. VR, Ostracods VR.

5680' Amphimorphina jenkinsi VR, Bolivina basisenta VR, Bolivina klein-pelli? VR, Bulimina schencki C, Gastropods VR, Globobulimina sp. VR, Gyroidina condoni R, Gyroidina simiensis C, Haplophragmoides sp. (small, crushed) R, Ostracods VR.

5710' Bulimina schencki R, Cribronion cf. roemerii VR, Eponides yeguaensis VR, Gyroidina condoni? (broken) VR, Gyroidina simiensis C, Lenticulina sp. VR, Nonion/Nonionella sp. R, Quinqueloculina spp. R, Spumellaria VR.

5770' Bolivina basisenta VR, Bulimina schencki R, Diatoms (pyritized) VR, Gyroidina simiensis R. Probably barren of indigenous Foraminifera.

5830' Arenaceous indeterminate VR, Bolivina sp. VR, Bulimina schencki VR, Eponides yeguaensis VR, Lenticulina spp. R, Plectofrondicularia searsii VR. Probably barren of indigenous Foraminifera.

*VR = 1-2 specimens; R = 2-10; C = 11-32.

(E. M. WARREN COOS COUNTY #1-7)

5890' Amphimorphina jenkinsi VR, Arenaceous indeterminate VR, Bathysiphon sp. (small, thin) VR, Cibicides sp. (small) VR, Diatoms (pyritized) R, Gyroidina condoni R, Gyroidina simiensis R, Nonion sp. VR, Ostracods VR. Probably barren of indigenous Foraminifera.

5980' Bulimina schencki VR, Cassidulina globosa VR, Globobulimina sp. VR, Gyroidina simiensis VR, Lenticulina spp. R, Spumellaria VR. Barren of indigenous Foraminifera.

6070' Bathysiphon? sp. VR, Bulimina schencki VR, Cassidulina globosa VR, Gyroidina simiensis R. Barren of indigenous Foraminifera.

6160' Arenaceous indeterminate (very small) VR, Bulimina schencki VR, Spumellaria VR. Barren of indigenous Foraminifera.

6280' Arenaceous indeterminate VR. Barren of indigenous Foraminifera.

6340' Plectofrondicularia vokesi (of Mallory, 1959) VR. Barren of indigenous Foraminifera.

REFERENCES CITED

- Mallory, V. S., 1959, Lower Tertiary biostratigraphy of the California Coast Ranges: Am. Assoc. Petroleum Geologists, Tulsa, Oklahoma, 416 p.
- Rau, W. W., 1973, Preliminary identifications of Foraminifera from the E. M. Warren Coos County No. 1-7 well, Oregon: Oregon State Department of Geology and Mineral Ind., Oil and Gas Investigations No. 4.

Interpreted by:

Daniel R. McFaul

Date 2/1/79

PHILLIPS PETROLEUM "DOBBYNS #1"
SW $\frac{1}{4}$ sec. 28, T. 26 S., R. 13 W.
COOS COUNTY, OREGON

The following foraminiferal report lists interpretations of 50 ditch sample residues within the interval from 50 to 6938 feet. Processed samples were borrowed from the Oregon Department of Geology and Mineral Industries in Portland.

There are essentially two fossiliferous intervals in the well. The higher one, from 1800 to 2330 feet, presents a problem. It contains a cold water, nearshore benthonic foraminiferal fauna. Some of the species present are incompatible with regard to both age and paleobathymetry. Abundant specimens of the bathyal genus Gyroidina occur with rare inner neritic Elphidium californicum. E. californicum and Gyroidina guayabalensis, considered restricted to Ulatisian sediments or older in California (Mallory, 1959), occur with common Cribrononion cf. roemeri, which is believed to be restricted to the Refugian in the Gulf of Alaska (R. S. Boettcher, personal communication). Hence the present author's interpretation of Narizian, Coaledo Formation for this interval (1800 to 2330 feet) is probable at best. Since the benthonic fauna in this interval represents cold bottom water (very low species diversity), an outer neritic environment is suggested here; the deep water species of Gyroidina could have migrated onto the outer shelf, finding similar temperatures to their normal bathyal habitat.

The lower fossiliferous interval, from 5040 to 6410 feet, contains an offshore open marine fauna, consisting almost entirely of diminutive planktonic foraminifers and radiolarians. However, a few mature identifiable specimens of planktonic Foraminifera are known in southwestern Oregon only from the Roseburg Formation (see Miles, 1977). These fossils, plus the predominantly volcanic lithology from 2340 feet to total depth, indicate that the bottom two-thirds of the well is in the lower member of the Roseburg. Indigenous fossils were not seen in the upper and lower parts of the volcanic interval (from 2340 to 5030, and 6420 to 6938 feet), but interbeds of shale yielded faunas from 5040 to 6410 feet, thus documenting the submarine nature and lower Paleogene age of the basalts (see also Baldwin, 1973, p. 18). The fossiliferous interval (5040 to 6410 feet) could not be assigned directly to California benthonic Stages, due to the extreme rarity of diagnostic benthonic Foraminifera. The interval from 5400 to 6230 feet is probably Bulitian to Penutian in age, and the sample from 6240 to 6290 feet is possibly Ynezian to Bulitian.

Appendices include a key to abbreviated genera, and species lists for each sample examined.

(PHILLIPS DOBBYNS # 1)
FORAMINIFERAL REPORT

<u>DEPTH (FEET)</u>	<u>AGE/STAGE</u>	<u>FORMATION</u>	<u>PALEOENVIRONMENT</u>
50 - 104	Indeterminate	Indeterminate	Indeterminate
240 - 290	Indet.	Indet.	Indet.
415 - 460	Indet.	Indet.	Marginal Marine
600 - 650	Indet.	Indet.	Marginal Marine
780 - 830	Indet.	Indet.	Indet.
900 - 950	Indet.	Indet.	Indet.
1020 -1070	Indet.	Indet.	Indet.
1140 -1190	Indet.	Indet.	Indet.
1260 -1310	Indet.	Indet.	Indet.
1380 -1430	Indet.	Indet.	Indet.
1560 -1610	Indet.	Indet.	Indet.
1740 -1790	Indet.	Indet.	Indet.
1800 -1850	Probable Narizian	Probable Coaledo	Prob. Outer Neritic
1860 -1910	Probable Narizian	Probable Coaledo	Prob. Outer Neritic
1920 -1970	Probable Narizian	Probable Coaledo	Prob. Outer Neritic
1980 -2030	Probable Narizian	Probable Coaledo	Prob. Outer Neritic
2040 -2090	Probable Narizian	Probable Coaledo	Prob. Outer Neritic
2100 -2150	Probable Narizian	Probable Coaledo	Prob. Outer Neritic
2160 -2210	Probable Narizian	Probable Coaledo	Prob. Outer Neritic
2220 -2270	Probable Narizian	Probable Coaledo	Prob. Outer Neritic
2280 -2330	Probable Narizian	Probable Coaledo	Prob. Outer Neritic
Unconformity - Flounroy, Lookingglass and Upper Roseburg Formations missing.			
2340 -2390	Prob. Lower Paleogene*	Prob. Lower Roseburg*	Indet.
2400 -2450	Prob. Lower Paleogene*	Prob. Lower Roseburg*	Indet.
2760 -2810	Prob. Lower Paleogene*	Prob. Lower Roseburg*	Indet.
3180 -3230	Prob. Lower Paleogene*	Prob. Lower Roseburg*	Indet.
3600 -3650	Prob. Lower Paleogene*	Prob. Lower Roseburg*	Indet.
3960 -4010	Prob. Lower Paleogene*	Prob. Lower Roseburg*	Indet.
4380 -4430	Prob. Lower Paleogene*	Prob. Lower Roseburg*	Indet.
4800 -4850	Prob. Lower Paleogene*	Prob. Lower Roseburg*	Indet.
4980 -5030	Prob. Lower Paleogene*	Prob. Lower Roseburg*	Indet.
5040 -5090	Prob. Lower Paleogene*	Prob. Lower Roseburg*	Probable Marine
5100 -5150	Paleogene	Prob. Lower Roseburg**	Open Marine
5160 -5210	Paleogene	Prob. Lower Roseburg**	Open Marine
5340 -5390	Paleogene	Prob. Lower Roseburg**	Open Marine
5400 -5450	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
5460 -5510	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
5520 -5570	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
5580 -5630	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
5760 -5810	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine

* Based on lithology only.

** Based primarily on lithology.

(PHILLIPS DOBBYNS #1)

<u>DEPTH (FEET)</u>	<u>AGE/STAGE</u>	<u>FORMATION</u>	<u>PALEOENVIRONMENT</u>
5880 -5930	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
5940 -5990	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
6060 -6110	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
6120 -6170	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
6180 -6230	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
6240 -6290	Possible Paleocene	Lower Roseburg	Open Marine
6300 -6350	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
6360 -6410	U. Paleocene - L. Eocene	Lower Roseburg	Open Marine
6420 -6470	Prob. Lower Paleogene	Prob. Lower Roseburg*	Indet.
6660 -6710	Prob. Lower Paleogene	Prob. Lower Roseburg*	Indet.
6900 -6938	Prob. Lower Paleogene	Prob. Lower Roseburg*	Indet.

APPENDIX A

Below is a key to all abbreviations used in Appendix B.

AC	Acarinina	EPS	Epistomina
ANO	Anomalina	GL	Globigerina
AREN.	Arenaceous	GY	Gyroidina
AS	Asterigerina	HP	Haplophragmoides
B.O.F.	Barren of Foraminifera	LNT	Lenticulina
B.O.I.F.	Barren of indigenous Foraminifera	MRZ	Morozovella
CB	Cibicides	NN	Nonion
CHG	Chiloguembelina	PLL	Pullenia
CRN	Cribrononion	PLR	Planorotalites
CS	Cassidulina	QN	Quinqueloculina
EL	Elphidium	SBT	Subbotina
ELA	Elphidiella	SPUM.	Spumellarian Radiolaria
EPN	Eponides	TRCR	Truncorotaloides

APPENDIX B

Below are species lists for each sample examined.

50 - 104' Sponge spicules VR**. B.O.F.***

* Based on lithology only.

** VR = 1-2 specimens; R = 2-10; C = 11-32; A = 33-100; VA = > 100.

*** See Appendix A for key to abbreviations.

(PHILLIPS DOBBYNS # 1)

<u>240 - 290'</u>	Sponge spicules R. B.O.F.
<u>415 - 460'</u>	AREN. spp. (crushed) R.
<u>600 - 650'</u>	AREN. sp. (crushed) VR, HP sp (crushed) VR.
<u>780 - 830'</u>	B.O.F.
<u>900 - 950'</u>	B.O.F.
<u>1020 - 1070'</u>	B.O.F.
<u>1140 - 1190'</u>	B.O.F.
<u>1260 - 1310'</u>	B.O.F.
<u>1380 - 1430'</u>	B.O.F.
<u>1560 - 1610'</u>	B.O.F.
<u>1740 - 1790'</u>	B.O.F.
<u>1800 - 1850'</u>	AREN. sp. (crushed) R, EPN gaviotaensis? (juvenile) R, GY guayabalensis (of Mallory, 1959)/orbicularis planata* A, HP spp. R, LNT sp. VR.
<u>1860 - 1910'</u>	AC rugosoaculeata VR, BLM schencki A, CRN cf. roemeri C, CS sp. VR, DIATOMS (pyritized) VR, "EL" californicum (of Mallory, 1959, pl. 15, fig. 10) VR, EPN gaviotaensis? (juveniles) R, GY guayabalensis (of Mallory, 1959)/orbicularis planata* VA, HP sp. (crushed) VR, LNT aff. limbosa hockleyensis (small) VR, LNT inornatus VR, LNT simplex? VR, LNT spp. R, NN applini VR, NN cf. incisum R, OSTRACODS R.
<u>1920 - 1970'</u>	BLM schencki C, CRN cf. roemeri C, "EL" californicum (of Mallory, 1959, pl. 15, fig. 10) R, DIATOMS (pyritized) R, EPN? sp. VR, GASTROPODS VR, GL? (SBT?) sp. (crushed) VR, GY guayabalensis (of Mallory, 1959)/orbicularis planata* A, LNT cf. hockleyensis limbosus VR, LNT inornata VR, LNT sp. VR, NN cf. applini VR, NN incisum VR, SPUM. R.
<u>1980 - 2030'</u>	BLM schencki VR, CRN cf. roemeri R, DIATOMS (pyritized) R, EPN gaviotaensis? (juvenile) VR, GY guayabalensis (of Mallory, 1959)/orbicularis planata*R-C, SHELL? fragments R, NN incisum VR, OSTRACODS (juvenile) VR, PTEROPOD?? (encrusted) VR, QN goodspeedi? VR, QN imperialis? (juvenile) VR.

* Forms of both species plus transitional forms appear to be present.

(PHILLIPS DOBBYNS # 1)

- 2040 - 2090' BLM schencki R, CRN cf. roemeri R, EPN gaviotaensis R, EPN yeguaensis VR, GY guayabalensis (of Mallory, 1959)/orbicularis planata* A, HP sp. R, LNT inornata VR, LNT sp. VR, SHELL fragments VR, QN sp. (fragment) VR.
- 2100 - 2150' BLM schencki VR, CRN cf. roemeri R, EPN gaviotaensis VR, EPN yeguaensis (juvenile) R, GASTROPODS R, GY guayabalensis (of Mallory, 1959)/orbicularis planata* C, LNT inornata R, NN incisum VR, SHELL fragments R.
- 2160 - 2210' BLM schencki VR, CRN cf. roemeri C, DIATOMS (pyritized) R, GASTROPODS R, GY guayabalensis (of Mallory, 1959)/orbicularis planata* C, LNT inornata R, OSTRACOD (juvenile) VR, QN sp. VR, SHELL fragments VR.
- 2220 - 2270' BLM schencki R, CRN cf. roemeri C, DIATOMS (pyritized) R, EL sp. R, EPN yeguaensis R, GASTROPODS R, GY guayabalensis (of Mallory, 1959)/orbicularis planata* A, LNT inornata C, NN incisum R, OSTRACOD (juvenile) VR, PELECYPOD (small, smooth, pyritized) VR, QN imperialis? (juvenile) VR, QN sp. R, SHELL fragments VR.
- 2280 - 2330' CRN cf. roemeri R, EPN yeguaensis VR, GY guayabalensis (of Mallory, 1959)/orbicularis planata* R, HP sp. VR, LNT inornata VR, OSTRACOD VR, SHELL fragments R.
- 2340 - 2390' GY guayabalensis (of Mallory, 1959)/orbicularis planata* R, LNT inornata VR, NN incisum VR. Probably B.O.I.F.
- 2400 - 2450' GY guayabalensis (of Mallory, 1959) VR. B.O.I.F.
- 2760 - 2810' B.O.F.
- 3180 - 3230' B.O.F.
- 3600 - 3650' B.O.F.
- 3960 - 4010' B.O.F.
- 4380 - 4430' B.O.F.
- 4800 - 4850' B.O.F.

* Forms of both species plus transitional forms appear to be present.

(PHILLIPS DOBBYNS # 1)

- 4980 - 5030' B.O.F.
- 5040 - 5090' SPUM. VR.
- 5100 - 5150' SBT spp. R, SBT/GL* sp. (juvenile) VR, SPUM. R.
- 5160 - 5210' CB cf. sandiegensis (of Mallory, 1959) R, SBT spp. R, SPUM. VR.
- 5340 - 5390' SBT sp. VR, SBT/GL sp.* (juvenile) R-C, SPUM. R.
- 5400 - 5450' CB? sp. (juvenile) VR, "GL" aquiensis? VR, "GL" inaequispira VR, SBT spp. R, SBT/GL spp.* (juvenile) R, SBT triloculinoides, s.l. VR, TRCR nitidus VR, TRCR primitivus VR.
- 5460 - 5510' BULIMINA spp. (unidentifiable) R, SBT spp. R, SBT/GL spp.* (juvenile) A, SPUM. R, TRCR mckannai (juvenile) R, TRCR mckannai/spiralis VR, TRCR primitivus R.
- 5520 - 5570' "GL" inaequispira R, SBT spp. R, SBT/GL spp.* (juvenile) R, TRCR mckannai VR, TRCR nitidus VR, TRCR primitivus VR, "TRCR" pseudotopilensis VR.
- 5580 - 5630' CB cf. sandiegensis (of Mallory, 1959) VR, CB?? sp. VR, CS? sp. VR, "GL" inaequispira R, MRZ aequa (diminutive) R, SBT spp. C, SPUM. C, TRCR mckannai VR, TRCR nitidus R.
- 5760 - 5810' "GL" inaequispira VR, SBT spp. R, SBT/GL spp.* (juvenile) R-C, TRCR nitidus VR, TRCR primitivus VR.
- 5880 - 5930' SBT spp. R, SPUM. R, TRCR nitidus VR, TRCR spiralis? VR.
- 5940 - 5990' EPN umbonatus VR, LNT? sp. VR, SBT spp. R, SBT/GL* spp. (juvenile) R, SPUM. R, TRCR primitivus VR, TRCR soldadoensis VR.
- 6060 - 6110' CB whitei (of Mallory, 1959) R, EPS? sp. VR, SBT spp. R, SBT/GL spp.* (juvenile) R-C, TRCR mckannai VR.
- 6120 - 6170' ANO? sp. (juvenile) VR, CB cf. sandiegensis VR, CB whitei (of Mallory, 1959) VR, GY florealis VR, LNT sp. VR, SBT triloculinoides, s.l. VR, SBT spp. C, SBT/GL spp.* (juvenile) C, SPUM. R, TRCR primitivus R, TRCR soldadoensis VR.

* Specimens too small to determine wall texture.

(PHILLIPS DOBBYNS # 1)

- 6180 - 6230' PLL sp. (crushed) VR, SBT spp. R-C, SPUM. R, TRCR soldado-
ensis? (juvenile) VR, TRCR cf. soldadoensis VR, TRCR sp. VR.
- 6240 - 6290' ANO sp. (fragment) VR, CHG sp. (juvenile, rough surface) VR,
MRZ aequa? VR, MRZ sp. VR, PLR sp. (?planoconica of Miles,
1977) VR, PLR pseudomenardii? (diminutive) VR, QN? sp. VR,
SBT spp. C, SPUM. A, TRCR pseudotopilensis VR, TRCR soldado-
ensis/mckannai VR.
- 6300 - 6350' CB sp. B (of Mallory, 1959) VR, SPUM. C., SBT sp. VR.
- 6360 - 6410' CB sp. B (of Mallory, 1959) VR, GY (AS?) sp. (broken) VR,
MRZ sp. (juvenile) VR, SBT spp. R, Sponge spicules VR, SPUM.
C.
- 6420 - 6470' SBT sp. VR, SPUM. VR. Probably B.O.I.F.
- 6660 - 6710' B.O.F.
- 6900 - 6938' B.O.F.

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Coast Ranges: Am. Assoc. Petroleum Geologists, Tulsa, Oklahoma, 416 p.
- Miles, G. A., 1977, Planktonic foraminifera of the Lower Tertiary Roseburg,
Lookingglass, and Flournoy Formations, southwest Oregon: Univ. Oregon,
Eugene, PhD dissertation, 360 p., unpubl.

Interpreted by:

Daniel R. McKee

Date 9/27/78

PAN AMERICAN PETROLEUM "OCS - P0112 #1"
 Lat. 43.24603, Long. 124.59268
 OFFSHORE BANDON, OREGON

The following foraminiferal report lists interpretations of 33 (28 ditch and five sidewall cores) sample residues within the interval from 950 to 6140 feet. The samples were processed by Pan American Petroleum Corporation (now AMOCO Production Company).

The interval examined represents all or part of the Saucesian, Zemorrian, Refugian, Narizian, Ulatisian, and Penutian California benthonic foraminiferal Stages (Lower Miocene to Lower Eocene) of Kleinpell (1938), Schenck and Kleinpell (1936), and Mallory (1959). Traditionally, West Coast workers have considered the Refugian, Narizian, and Ulatisian Stages to be Oligocene, Upper Eocene, and Middle Eocene in age, respectively. Recent work, however, suggests that: (1) the Lower Refugian is Upper Eocene (Tipton, 1975); (2) the Lower Narizian is Middle Eocene (Poore and Brabb, 1977); and (3) the Lower Ulatisian is Lower Eocene (Berggren and Van Couvering, 1973). To avoid confusion, the report below correlates the California benthonic foraminiferal Stages (as recognized in the OCS - P0112 #1) with the Oregon coastal Formations (see McKeel and Lipps, 1975, Rau, 1975, Thoms, 1975, and Tipton, 1975).

Appendices include a key to abbreviated genera, and species lists with paleobathymetric interpretations for each sample.

FORAMINIFERAL REPORT

<u>DEPTH (FEET)</u>	<u>STAGE</u>	<u>FORMATION</u>
1010 - 1040	Saucesian	Nye equivalent
1040 - 1070	Saucesian	Nye equivalent
1430 - 1460	Saucesian	Nye equivalent
1550 - 1580	Saucesian	Nye equivalent
1580 - 1610	Saucesian	Nye equivalent
1820 - 1850	Saucesian	Nye equivalent
2090 - 2120	U. Zemorrian - L. Saucesian	U. Alsea to Nye equiv.
2270 - 2300	U. Zemorrian - L. Saucesian	U. Alsea to Nye equiv.
2510 - 2540	Upper Zemorrian	U. Alsea - Yaquina equiv.
2660 - 2690	Upper Zemorrian	U. Alsea - Yaquina equiv.
2780 - 2810	Upper Zemorrian	U. Alsea - Yaquina equiv.
2930 - 2960	Upper Zemorrian	U. Alsea - Yaquina equiv.
Hiatus - Tunnel Point Sandstone and uppermost Bastendorff Formation missing.		

(PAN AM OCS - P0112 #1)

<u>DEPTH (FEET)</u>	<u>STAGE</u>	<u>FORMATION</u>
2960 - 2990	Lower Refugian	Upper Bastendorff
3020 - 3050	Lower Refugian	Upper Bastendorff
3290 - 3320	Lower Refugian	Upper Bastendorff
3500 - 3530	Lower Refugian	Upper Bastendorff
3740 - 3770	Narizian	U. Coaledo or L. Bast.
3890 - 3920	Lower Narizian	Lower to Middle Coaledo
3918 SWC	Lower Narizian	Lower to Middle Coaledo
4220 - 4250	Lower Narizian	Lower to Middle Coaledo
4490 SWC	Upper Ulatisian	Flournoy
4550 - 4580	Upper Ulatisian	Flournoy
Unconformity - Lower Ulatisian not represented (see Miles, 1977).		
4610 SWC	Penutian	Roseburg/Lookingglass
4610 - 4640	Penutian	Roseburg/Lookingglass
4850 - 4880	Penutian	Roseburg/Lookingglass
4852 SWC	Penutian	Roseburg/Lookingglass
Possible unconformity.		
5030 - 5060	Possible Cretaceous	Possible Hunters Cove
5060 - 5090	Possible Cretaceous	Possible Hunters Cove
5210 - 5240	Indeterminate	Indeterminate
5510 - 5540	Indeterminate	Indeterminate
5810 - 5840	Indeterminate	Indeterminate
6110 - 6140	Indeterminate	Indeterminate
6131 SWC	Indeterminate	Indeterminate

APPENDIX A

All foraminiferal genera mentioned in Appendix B are abbreviated as follows:

AC	Acarinina	BLMA	Buliminella	CY	Cyclamina
ALA	Alabamina	BLV	Bolivina	DN	Dentalina
AMD	Ammodiscus	BT	Bathysiphon	DRT	"Dorothia"
AMPS	Amphistegina	CB	Cibicides	DSCR	"Discorbis"
AMPM	Amphimorphina	CBD	Cibicidoides	EG	Eggerella
ANO	Anomalina	CL	Clavulina	EL	Elphidium
AS	Asterigerina	CN	Cancris	ELA	Elphidiella
BC	Buccella	CS	Cassidulina	EPN	Eponides
BF	Bifarina	CSD	Cassidulinoides	EPS	Epistomina
BLM	Bulimina	CT	Catapsydrax	EPSL	Epistominella

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FS	Fissurina	NDG	Nodogenerina	SL	Silicosigmoilina
GBB	Globobulimina	NDS	Nodosaria	SPD	Sphaeroidina
GDL	Glandulina	NN	Nonion	SPN	Siphonina
GL	Globigerina	NNA	Nonionella	SPR	Spirillina
GLQ	Globoquadrina	PGD	Pseudoglandulina	SR	Saracenaria
GLR	Globorotalia	PLF	Plectofrondicularia	TRCR	Truncorotaloides
GLTH	Globigerinatheka	PLL	Pullenia	TRF	Trifarina
GM	Glomospira	PLR	Planorotalites	TRT	Tritaxilina
GY	Gyroidina	PRG	Pyrgo	TX	Textularia
HP	Haplophragmoides	PSH	Pseudohastigerina	U	Uvigerina
KR	Karrerella	QN	Quinqueloculina	UA	Uvigerinella
LNT	Lenticulina	RT	Rotalia	VAL	Valvulineria
MRZ	Morozovella	SBT	Subbotina	VRG	Virgulina

APPENDIX B

Below are foraminiferal species lists and paleobathymetric interpretations for each sample.

- 1010 - 1040' BC* cf. frigida VR**, BLM cf. ovata VR, CS crassipunctata C, GL cf. praibulloides VR, PLF miocenica R, UA cf. obesa impolita R, VAL menloensis VR. Upper Bathyal.
- 1040 - 1070' BC cf. frigida VR, B. mansfieldi oregonensis, s.l. VR, CS crassipunctata VR, EL cf. minutum VR, GL cf. praebulloides VR, U garzaensis? VR, UA cf. obesa impolita VR, VAL menloensis R. Upper Bathyal.
- 1430 - 1460' BC cf. frigida R, CS crassipunctata R, PLL aff. bulloides VR, U cf. montesanensis VR, UA sparsicostata? (juv.) VR. Upper Bathyal.
- 1550 - 1580' BC mansfieldi oregonensis, s.l. R, BT sp. R, CL communis pallida VR, CS cf. globosa VR, CY incisa R, EL cf. minutum VR, GL cf. praebulloides VR, HP trullissata R, PGD cf. inflata VR, U beccarii VR, U cf. montesanensis R. Outer Neritic to Upper Bathyal.

* See Appendix A for explanation of abbreviated genera.

** VR = 1-2 specimens; R = 2-10; C = 11-32; A = 33-100.

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- 1580 - 1610' BC frigida VR, B. mansfieldi oregonensis, s.l. R, BLM cf. pyrula (of Rau, 1951) VR, BT sp. VR, CB aff. fletcheri R, CB aff. perlucida VR, CY incisa R, EL cf. minutum R, ELA sp. VR, EPN umbonatus VR, EPSL parva C, HP trullissata R, PLL cf. multilobata VR, U beccarii R, U cf. montesanensis C. Outer Neritic to Upper Bathyal.
- 1820 - 1850' BLM cf. ovata R, CL communis pallida R, CSD sp. R, CY incisa VR, GDL? sp. VR, HP trullissata R, UA cf. obesa impolita R. Outer Neritic to Upper Bathyal.
- 2090 - 2120' BLMA subfusiformis VR, CL communis pallida VR, CS crassipunctata R, CY incisa R, FS sp. VR, GL cf. euapertura VR, G. cf. opima R, G. opima nana R, G. spp. C, HP trullissata R, U cf. galloway VR, U cf. montesanensis VR, U sp. (hispidocostate) VR, UA obesa impolita R, UA cf. sparsicostata R, VAL menloensis VR. Upper Bathyal.
- 2270 - 2300' BLM alsatica (of Rau, 1964) VR, BT sp. R, CL communis pallida R, CS crassipunctata R, CSD sp. VR, EG sp. (large) VR, EPN umbonatus R, GL aff. ampliapertura VR, G. cf. euapertura VR, GL spp. A, HP trullissata C, PGD cf. inflata R, PLF miocenica VR, QN weaveri R, RT sp. R, VRG? sp. VR. Upper Bathyal.
- 2510 - 2540' BT sp. VR, CL communis pallida A, CS crassipunctata R, C. Globosa R, EPN umbonata VR, GL spp. R, GLR cf. scitula VR, GY orbicularis planata VR, HP trullissata R, NDS grandis VR, NNA pauciloba (of Tipton, et. al., 1973) VR, RT sp. R, SPD variabilis R, U gallowayi (of Rau, 1951) VR, UA cf. obesa impolita R, UA cf. sparsicostata VR. Upper Bathyal.
- 2660 - 2690' BC mansfieldi oregonensis, s.l. R, BLM inflata alligata R, B. cf. ovata VR, B. cf. pyrula (of Rau, 1951) VR, BLMA subfusiformis R, BT sp. VR, CB elmaensis, s.l. R, CL communis pallida C, CS crassipunctata A, EPN umbonata VR, GBB hannah VR, GLQ venezuelana? VR, HP trullissata C, NNA miocenica R, QN weaveri VR, SR sp. VR, TX sp. VR, U garzaensis R, UA obesa? VR, U. cf. sparsicostata VR, VRG bramlettei R. Upper Bathyal.
- 2780 - 2810' BC mansfieldi oregonensis VR, BLM alsatica VR, B. inflata alligata R, BLMA brevior VR, B. curta VR, B. cf. elegantissima (large) VR, B. subfusiformis R, BLV chehalisensis R, BT sp. VR, CB elmaensis, s.l. VR, CL communis pallida R,

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- (cont.) CS globosa VR, CY incisa VR, EPN umbonata VR, EPSL parva VR, GL cf. praebulloides VR, G. spp. R, GY orbicularis planata VR, G. soldanii VR, HP trullissata R, NDG aff. koina VR, NN pompilioides VR, N. sp. (of Rau, 1951) VR, NNA miocenica VR, PGD inflata VR, QN weaveri VR, U garzaensis R, UA cf. obesa impolita VR. Upper Bathyal.
- 2930 - 2960' BLMA cf. subfusiformis VR, CL communis pallida R, CS crassipunctata R, C. aff. cushmani VR, EL cf. minutum VR, EPSL parva VR, GL sp. VR, HP trullissata R, NN incisum VR, QN cf. weaveri VR, UA cf. obesa impolita VR. Middle to Outer Neritic.
- 2960 - 2990' ANO rosana? VR, A. sp. R, BLM inflata alligata VR, B. spp. R, BLV basisenta VR, CB elmaensis, s.l. R, CS crassipunctata R, C. galvanensis VR, C. globosa R, GLTH index? (juv.) VR, GY condoni R, G. orbicularis planata VR, LNT cf. propinquus cowlitzensis VR, NDG sanctaecrucis VR, PGD inflata VR, PLF packardi VR, SPD variabilis VR, U cf. gallowayi VR, U garzaensis R, VAL jacksonensis welcomensis R, V. tumeyensis C. Outer Neritic to Upper Bathyal.
- 3020 - 3050' ALA kernensis VR, BC mansfieldi oregonensis VR, BLM cf. pyrula (of Rau, 1951) VR, B. schencki VR, BLV basisenta R, BT eocenica R, CN joaquinensis VR, CB aff. spiropunctatus VR, CS crassipunctata VR, C. galvanensis VR, C. globosa R, GL brevis VR, G. spp. R, GY condoni R, G. orbicularis planata VR, NDG sanctaecrucis VR, PLF packardi R, U beccarii VR, U aff. cocoaensis VR, U garzaensis R, VAL tumeyensis R, VRG bramlettei VR. Upper Bathyal.
- 3290 - 3320' ANO glabrata VR, BLM alsatica R, BLMA cf. subfusiformis VR, BT eocenica VR, CN joaquinensis VR, CB elmaensis, s.s. VR, CB aff. spiropunctatus VR, CS crassipunctata R, C. galvinensis VR, C. globosa R, GL sp. (brevis?) VR, GY condoni R, G. cf. soldanii VR, NN sp. (of Rau, 1951) VR, NNA miocenica R, U beccarii VR, U garzaensis R, VAL tumeyensis VR. Upper Bathyal.
- 3500 - 3530' CB haydoni R, CB aff. illingi VR, CBD coalingensis R, CN joaquinensis VR, GY guayabalensis (of Mallory, 1959) R, EPN gaviotaensis C, GL increbescens VR, GL spp. R, GY condoni VR, PLF packardi VR, VAL tumeyensis R. Upper Bathyal.

(PAN AM OCS - P0112 #1)

- 3740 - 3770' ALA scitula VR, AMPM? sp. VR, CS crassipunctata R, CS globosa VR, EPN gaviotaensis R, GL sp. VR, GY condoni VR, LNT spp. (large) R, PLF packardi VR, VAL tumeyensis R. Outer Neritic to Upper Bathyal.
- 3890 - 3920' AC sp. (juv.) VR, ANO umbonata (of Mallory, 1959) VR, AS crassaformis umbilicatulula VR, BLV basisenta VR, CB haydoni VR, CB pseudowuellorstorffi VR, EPN gaviotaensis R, EPN minimus VR, GL spp. R, GY sp. VR, NDG lepidula (of Mallory, 1959) VR, PLF packardi VR, PLF searsi VR, PRG sp. VR, SBT angiporoides VR, SBT frontosa VR, U beccarii VR. Outer Neritic to Upper Bathyal.
- 3918' SWC ANO dorri aragonensis VR, CB pseudowuellorstorffi VR, CB sandiegensis VR, CS globosa R, "DSCR" assulata (of Mallory, 1959) C, EPN umbonata VR, EPS sp. VR, PLR australiformis R, PLR laevigata VR, SBT frontosa VR, SPR sp. R. Outer Neritic to Upper Bathyal.
- 4220 - 4250' ALA scitula VR, AMD sp. VR, CN joaquinensis VR, CS globosa R, CY spp. R, EPN gaviotaensis R, GL prasaepis (of McKeel and Lipps, 1975) VR, GL spp. R, GY cf. soldanii VR, RT sp. (aff. garveyensis) R, U garzaensis VR, VAL tumeyensis VR. Upper Bathyal.
- 4490' SWC AC rotundimarginata VR, ANO cf. regina minor VR, ANO cf. sampsoni R, BLM callahani R, BLM whitei R, BLV aragonensis VR, BLV explicata lodoensis C, CB felix/spiopunctatus VR, CS globosa R, "DSCR" baintoni? VR, EPN minima VR, GY soldanii octocamerata VR, PLR laevigata VR, PLR cf. planoconica VR, SPN sp. (juv.) VR. Upper to Middle Bathyal.
- 4550 - 4580' AC bullbrookii VR, AC rotundimarginata VR, AMPM becki? VR, ANO sp. A? (see Mallory, 1959, pl. 23, fig. 5) VR, ANO sp. VR, AS crassaformis R, BLM whitei? R, BLV aragonensis R, CB pseudowuellorstorffi R, CB spiopunctatus R, CT primitiva R, EPN umbonatus VR, GY guayabalensis (of Mallory, 1959) VR, GY soldanii octocamerata VR, MRZ aragonensis R, MRZ crassata (of Subbotina, 1953) VR, MRZ sp. (small) C, NDS latejugata R, PSH micra A, PSH cf. micra R, PSH cf. wilcoxensis VR, SBT corpulenta VR, SBT frontosa VR, SBT senni VR, SBT spp. R, TRT colei VR. Upper to Middle Bathyal.

(PAN AM OCS - P0112 #1)

- 4610' SWC AC pseudotopilensis R, BLMA grata convoluta R, "BLV" cf. louisiana (of Mallory, 1959 - see pl. 16, fig. 22) VR, CB fortunatus VR, KR sp. (see Mallory, 1959, pl. 5, fig. 2) VR, MRZ subbotinae R, PLR capdevilensis A, PLR cf. indiscriminata VR, PSH cf. wilcoxensis VR. Middle to Outer Neritic.
- 4610 - 4640' BLM callahani (of Mallory, 1959) R, BLM lirata? R, CB fortunatus R, CB pachyderma (of Mallory, 1959) VR, "DRT" cubana VR, KR elongata VR, MRZ aragonensis R, MRZ lensiformis VR, MRZ subbotinae R, PSH wilcoxensis R, TRCR primitivus VR, VAL childsi R. Middle to Outer Neritic.
- 4850 - 4880' ALA cf. wilcoxensis R, AS crassaformis umbilicatula R, BLM impendens VR, BT eocenica R, CB felix? (small, of Mallory, 1959) VR, CB fortunatus VR, DN colei VR, GY florealis VR, LNT vortex VR, LNT sp. (thin) VR, NN applini VR, PLF kerni VR, PSH micra VR, SBT spp. R. Outer Neritic to U. Bathyal.
- 4852' SWC ALA cf. wilcoxensis R, BF eleganta (of Mallory, 1959) VR, EL californicum VR, EPN mexicana VR, GY soldanii octocamerata VR, SPN claibornensis cowlitzensis R, TRF advena californica R, TX lajollaensis (of Mallory, 1959) VR, U lodoensis R. Outer Neritic to Upper Bathyal.
- 5030 - 5060' AMPS sp. VR, ANO dorri aragonensis VR, ARENACEOUS indeterminate VR, BT eocenica VR, BT sp. (thin, small, smooth) VR, EL californicum VR, GM sp. VR, INOCERAMUS sp. R. Neritic.
- 5060 - 5090' ANO dorri aragonensis VR, AS crassaformis umbilicatula VR, INOCERAMUS sp. VR. Marine.
- 5210 - 5240' BT spp. R, BT eocenica VR, SL californica (small) VR. Marine.
- 5510 - 5540' Barren of indigenous Foraminifera. Indeterminate.
- 5810 - 5840' BT sp. (small, thin, smooth) R, CB pachyderma (of Mallory, 1959) VR, EL? sp. VR. Probable Marine.
- 6110 - 6140' BT sp. VR. Probable Marine.
- 6131' SWC BT spp. R. Probable Marine.

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Interpreted by:

Daniel R. McKel

Date 8/27/78

UNION OIL COMPANY "OCS - PO130 FULMAR #1"
 Lat. 44.05987, Long. 124.64711
 OFFSHORE FLORENCE, OREGON

The following foraminiferal report contains interpretations of 26 (21 ditch and five sidewall cores) samples within the interval from 760 to 12,285 feet. The samples examined were previously processed for paleontology by Union Oil Company.

The interval examined contains faunas which represent all or part of the Venturian(?), Repettian, Mohnian, Luisian, Saucian, Zemorrian, Narizian, Penutian, and Bulitian California benthonic foraminiferal Stages of Natland (1952), Kleinpell (1938), Schenck and Kleinpell (1936), and Mallory (1959).

Several Paleogene age interpretations in this report are tentative, due to mixed faunas. For example, the sample at 4540 feet contains both Middle and Lower Eocene species; the younger assemblage is considered indigenous because the sample at 4720 feet contains no specimens older than Middle Eocene. The samples at 5000, 5041, 5370, and 5400 feet all contain mixed faunas. In each of these cases, the author has interpreted the older fauna to be indigenous. It is believed that these samples represent a relatively slow rate of sedimentation far from shore.

A single Cretaceous foraminifer was found at 5400 feet. Although well-preserved, the possibility that this specimen is reworked requires that the Cretaceous age call at 5400 feet be very tentative.

The age interpretations in the "SERIES" column of this report in some cases differ from the original published provincial age assignments of the California benthonic foraminiferal stages. The reason for these discrepancies primarily is that recent research with planktonic microfossils is taken into account here. For example, the Lower Mohnian Stage is now considered to be Middle Miocene in age (A.D. Warren, personal communication). Originally, Kleinpell (1938) assigned his Mohnian Stage to the Upper Miocene. In these cases, both the Oregon age interpretation by this author and the original California provincial age are listed.

Appendices include a key to abbreviated genera, and species lists with paleobathymetric interpretations for each sample studied.

FORAMINIFERAL REPORT

<u>DEPTH (FEET)</u>	<u>CALIFORNIA STAGE EQUIVALENT</u>	<u>SERIES</u>
760	Venturian? (Provincial Middle Pliocene)	Prob. Upper Pliocene
1340SWC	Repettian? (Provincial Lower Pliocene)	Pliocene
1450SWC	Repettian	Lower Pliocene
Probable hiatus		

(UNION OCS - P0130)

<u>DEPTH (FEET)</u>	<u>CALIFORNIA STAGE EQUIVALENT</u>	<u>SERIES</u>
1850SWC	Lower Mohnian (Provincial Upper Miocene)	Middle Miocene
2020SWC	Lowest Mohnian (Provincial Upper Miocene)	Middle Miocene
2140SWC	Uppermost Luisian	Middle Miocene
2800	Relizian to Luisian, undifferentiated (Provincial Middle Miocene)	Lower to Middle Miocene
2980	Saucesian	Lower Miocene
3250	Upper Zemorrian to Lower Saucesian	Upper Oligocene to Lower Miocene
3760	Zemorrian	Probable Oligocene
4240	Zemorrian	Probable Oligocene
4300	Upper Refugian to Zemorrian	Probable Oligocene
Probable hiatus		
4540	Probable Narizian (Provincial Upper Eocene)	Probable Middle Eocene
4720	Probable Narizian (Provincial Upper Eocene)	Probable Middle Eocene
Probable hiatus		
4930	Penutian	Lower Eocene
5000	Probable Bulitian	Probable Upper Paleocene
5041	Probable Bulitian	Probable Upper Paleocene
5370	Bulitian to Ynezian undifferentiated	Paleocene
Possible hiatus		
5400	Possible Campanian	Possible Upper Cretaceous
6330	Indeterminate	Indeterminate
7350	Indeterminate	Indeterminate
8340	Indeterminate	Indeterminate
9330	Indeterminate	Indeterminate
10320	Indeterminate	Indeterminate
11310	Indeterminate	Indeterminate
12285	Indeterminate	Indeterminate

APPENDIX A

All foraminiferal genera mentioned in Appendix B are abbreviated as follows:

ALA	Alabamina	ANO	Anomalina	BLM	Bulimina
AMPS	Amphistegina	AS	Asterigerina	BLMA	Buliminella
ANG	Angulogerina	BC	Buccella	BLV	Bolivina

(UNION OCS - P0130)

BT	Bathysiphon	GLTH	Globigerinatheka	SBT	Subbotina
CB	Cibicides	GY	Gyroidina	SG	Suggrunda
CL	Clavulina	GYD	Gyroidinoides	SPD	Sphaeroidina
CHG	Chiloguembelina	HP	Haplophragmoides	SPG	Siphogenerina
CN	Cancris	KR	Karrerella	SPN	Siphonina
CS	Cassidulina	LNT	Lenticulina	TPN	Tappanina
CSD	Cassidulinoides	MRZ	Morozovella	TRB	Turborotalia
CT	Catapsydrax	NDG	Nodogenerina	TRCH	Trochammina
CY	Cyclammina	NDS	Nodosaria	TRCR	Truncorotaloides
DN	Dentalina	NN	Nonion	TRF	Trifarina
EG	eggerella	NNA	Nonionella	U	Uvigerina
EL	Elphidium	PGD	Pseudoglandulina	UA	Uvigerinella
ELA	Elphidiella	PLF	Plectofrondicularia	VAL	Valvulineria
ELN	Ellipsonodosaria	PLL	Pullenia	VGP	Vaginulinopsis
EPN	Eponides	PLN	Planulina	VRG	Virgulina
EPSL	Epistominella	PLR	Planorotalites	NGQ	Neogloboquadrina
FR	Frondicularia	PRG	Pyrgo	AMPM	Amphimorphina
GDR	Gaudryina	PRL	Parrella		
GL	Globigerina	PSH	Pseudohastigerina		
GLB	Globanomalina	QDM	Quadriformina		
GLR	Globorotalia	QN	Quinqueloculina		

APPENDIX B

Below are foraminiferal species lists and paleobathymetric interpretations for each sample studied.

760' ANG* angulosa VVA**, BC frigida R, BC tenerrima VR, BLMA elegantissima VR, BLV spissa C, BLV interjuncta R, CB fletcheri R, CB lobatulus VR, CB mckannai suppressus R, CS californica C, CS limbata R, CS pulchella VR, CS sp. "A" (subrdd periphery, smooth) RC, EL cf. hughesi (large) R, ELA hannai R, EPSL pacifica VA, GL bulloides R, NDS tympaniplectriformis R, NGQ pachyderma form three of Keller (1978) C, NGQ pachyderma form two of Keller (1978) VA, NGQ pachyderma, sinistral (= form one of Keller, 1978) VVA, NN labradoricum R, QN ackneriana R, U cf. juncea C, U peregrina (large) C, U cf. peregrina VA, VAL araucana R. Upper Bathyal.

1340 SWC CS sp. "A" (see above) RC, Diatoms FL, EL cf. hughesi (large) C, EPSL pacifica (large) VVA, GL cf. bulloides R, GL umbilicata C, HP sp. (fat, small) C, NGQ humerosa R, NGQ pachyderma form three (see above) R, form two (dextral) RC, form one (dextral) VR, NNA sp. VA, PLL sp. R, TRB puncticulata (sinistral) R, U aff. juncea (upper portion smooth) R, VRG? sp. (very small, thin) A. Middle to Outer Neritic.

*See Appendix A for explanation of abbreviated genera.

** VR = 1-2 specimens; R = 2-10; C = 11-32; A = 33-100; VA = 101-320; VVA = 321-1000; FL (flood) = more than 1000.

(UNION OCS - P0130)

1450 SWC *Bulimina rostrata* RC, *BLM subacuminata* A, *CB mckannai* (small) R, *CS translucens* VA, *FR advena* R, *GL bulloides* C, *GL falconensis* R, *GL quinqueloba* R, *GLR scitula* (small, of Keller, 1978) VR, *GY altiformis* R, *Nassellaria* R, *NDG lepidula* VR, *NDS parexilis* R, *NDS tosta* C, *NN pompilioides* R, *PLF californica* A, *PRG* sp. R, *Spumellaria* VA, *SG* sp. VR, *U* cf. *subperegina* C. Lower Bathyal.

1850 SWC *BLMA brevior* RC, *BLMA curta* R, *BLV cuneiformis?* R, *EPSL bradyana* VA, *EPSL* cf. *gyroidinaformis* (juvenile) VR, *FR advena* VR, *Spongodiscidae* (large) C, *SG kleinpelli* R, *U* cf. *hootsi* R, *U subperegina* R, *U* aff. *subperegina* (very light costae) C, *VAL alicia* R. Upper to Middle Bathyal.

2020 SWC *BLMA* aff. *californica* (of Kleinpell, 1938), s.l. VR, *BLMA curta* VR, *CS quadrata* VR, *EPSL bradyana* R, *EPSL* cf. *gyroidinaformis* VR, *EPSL pacifica* VR, *GL bulloides* RC, *PLN* cf. *ariminensis* (of Kleinpell, 1938)? (juvenile) VR, *PLF californica* VR, *Spongodiscidae* (large) RC, *U subperegina* VR, *VRG* cf. *schreibersiana* (of Kleinpell, 1938) R. Upper to Middle Bathyal.

2140 SWC *BLV tumida* C, *BLMA brevior*, s.l. VR, *BLMA* aff. *californica* (of Kleinpell, 1938), s.s. RC, *BLMA subfusiformis* R, *EPSL bradyana* VA, *EPSL* aff. *gyroidinaformis* VR, *EPSL pacifica* VA, *FR advena* R, *GL* cf. *bulloides* R, *NDG advena* R *NDS?* sp. "A" VR, *PLF?* sp. (of Kleinpell, 1938) R, *SG kleinpelli* VR, *U* cf. *hootsi* (small neck) R *U* cf. *subperegina* A, *VRG* cf. *schreibersiana* R. Upper to Middle Bathyal.

2800' *BLV marginata* (of Kleinpell, 1938, pl. 9, fig. 2) R, *BLMA* aff. *californica?* (fragment) VR, *CS* aff. *limbata* (*laevigata carinata?*) A, *CB* aff. *elmaensis?* RC, *ELN?* *pecki?* A, *EPSL* aff./cf. *gyroidinaformis* VR, *EPSL pacifica* R, *EPSL subperuviana* A, *EPN healdi* R, *EPN* cf. *healdi* R, *EPN umbonata* R, *GL bulloides* R, *PLN* cf. *ariminensis/baggi?* VR, *SPD variabilis* VR, *Spongodiscidae* *VVA*, *U subperegina?* R. Upper to Middle Bathyal.

2980' *ANO* cf. *patella* (of Kleinpell, 1938) (juvenile) VR, *BLV* cf. *advena* (small) R, *BLV marginata* (of Kleinpell, 1938, pl. 9, fig. 2) RC, *BLV tumida* R, *DE quadrulata* R, *EPN umbonata* R, *LNT* sp. (straight, limbate sutures) R, *SPG transversa* R, *SPG transversa/cymricensis* R, *SPG* sp. (of Kleinpell, 1938) R, *Spongodiscidae* VA. Lower Bathyal.

3250' *ANO* cf. *patella* (juvenile) VR, *BLV marginata* A, *BLV pisciformis* R, *BLM alligata kernensis* R, *BLM inflata alligata* R, *CT stainforthi* VR (possibly contamination from up hole), *CS crassipunctata* C, *CS subglobosa* (elongate, uncoiled) RC, *CB americanus crassiseptus* R, *CB cushmani* VR, *CB elmaensis*, s.s. *VVA*, *CY* sp. VR, *DN quadrulata* R, *EPSL parva* C, *EPN duprei* R, *GDR* sp. (of Tipton, et. al., 1973) R, *GL euapertura* (of McKeel and Lipps, 1972) R, *HP trullisata* RC, *LNT alato-limbata* R, *LNT cymricensis?* R, *NN costiferum* R, *NN ynezianum?* RC, *Spumellaria* FL, *TRB gemma* R, *UA obesa impolita* R, *VRG bramlettei* VA. Middle to Lower Bathyal.

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3760' ANO garzaensis (juvenile) VR, BT eocenica R, BLV cf. advena VR, BLM corrugata R, BLM inflata alligata R, CS crassipunctata A, CB elmaensis, s.s. R, CB pseudoungerianus evolutus (of Tipton, et. al., 1973, s.s.) VR, CL communis pallida C, EPSL parva VA, GY soldanii C, Nassellaria VVA, PLF californica R, PGD inflata? (fat) R, Spumellaria VVA, VRG bramlettei R. Lower Bathyal.

4240' ANO garzaensis R, BLM alligata kernensis R, BLM corrugata, s.s. VR, BLM corrugata, s.l. R, BLM inflata alligata C, CS crassipunctata A, CB elmaensis, s.s. R, CL communis pallida A, EPSL parva C, GY orbicularis planata VA, Nassellaria A, PLF cf. californica R, PLF packardi multiligneata R, U garzaensis C, UA obesa impolita R, VRG zetina (of Tipton, et. al., 1973) R. Lower Bathyal.

4300' ANO garzaensis R, BLV marginata R, BLM inflata alligata R, CS crassipuncta A, CS galvanensis R, CB americanus crassiseptus R, CB elmaensis, s.s. R, CB cf. spiropunctatus (biconvex) VR, CSD sp. R, CL communis pallida C, EPSL parva VA, GY orbicularis planata VA, NN pompilioides C, PLF cf. californica R, PLF cf. vughani VR, U beccarii C, U garzaensis A, UA obesa VA. Reworked species include BLV explicata lodoensis VR, and VGP vacavillensis VR. Lower Bathyal.

4540' ALA scitula VR, ANO garzaensis R, BLM corrugata VR, BLM microcostata VR, CS subglobosa (uncoiling variety) VR, CB cushmani VR, CB cf. sandiegensis R, CB cf. spiropunctatus VR, EPN gaviotaensis? (juvenile) R, LNT alato-limbata VR, LNT cf. terryi (of Tipton, et. al., 1973) VR, MRZ densa? (juvenile) VR, PSH micra VR, TRCR aspensis? (juvenile) VR, VAL jacksonensis welcomensis R. Species considered reworked include BLV explicata lodoensis VR, BLM whitei (of Mallory, 1959) VR, GLB planoconica (of Miles, 1977) VR, TRF advena californica VR. Bathyal.

4720' BLM corrugata, s.s. R, BLM corrugata, s.l. VR, BLM sculptilus R, BLM sculptilus laciniata C, CN joaquinensis R, CT spp. R, CB cushmani/ANO crassisepta VR, CHG cubensis VR, EPN gaviotensis? R, GL prasaepis (of McKeel and Lipps, 1975, = GLTH index index juveniles) R, GLTH index index VR, GY condoni A, PLF packardi, s.s. RC, SPN sp. VR, U garzaensis, s.s. A. Bathyal.

4930' AST crassaformis umbilicatula R, BLV aragonensis VR, BLV explicata lodoensis R, "GLR" cf. naussi VR, GY childsi (diminutive) VR, MRZ aequa (diminutive) VR, MRZ subbotinae (broken) VR, MRZ wilcoxensis (juvenile) VR, PSH wilcoxensis (juvenile) VR, QDM sp. VR, SPN sp. VR, TRF advena californica R, TRCR nitida R, TRCR primitivus R, U wilcoxensis (juvenile) VR. Bathyal.

5000' ANO keenae/judas (diminutive) VR, AST crassaformis umbilicatula R, BLV aragonensis VR, BLV explicata lodoensis VR, CHG trinitatensis? R, CB pachecoensis VR, MRZ aequa (diminutive) VR, MRZ cf. subbotinae (juvenile) VR, PRL culter midwayana (of Mallory, 1959) VR, PLR pseudomenardii (diminutive) VR, TRCR mckannai? (diminutive) VR, TRCR nicoli R, TRCR nitidus C, TRCR cf. quetra (juvenile) VR. Bathyal.

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5041' AMPM ignota? (diminutive) VR, ANO keenae/judas VR, CHG midwayensis VR, CHG wilcoxensis? (diminutive) VR, EPN lodoensis VR, "GLR" perclara/reissi R, LNT vortex (of Mallory, 1959) VR, MRZ aequa (diminutive) VR, MRZ aequa, s.l. VR, MRZ apantesma VR, MRZ subbotinae VR, PLR elongata (diminutive) VR, PLR cf. imitata (diminutive) VR, PLR pseudomenardii (diminutive) VR, PLR pussilla/pseudoscitula R, TPN selmensis VR, TRCR mckannai R, TRCR primitiva R, TRCR pseudotopilensis R, TRCR quetra, s.s. VR, VGP kelleyi? (fragment) VR. Outer Neritic to Bathyal.

5370' AMPS sp. VR, BT vitta? R, BLV aragonensis VR, "GL" transitional soldadoensis/gravelli (see Bolli, 1957, pl. 16) VR, MRZ aequa (diminutive) R, MRZ angulata? (diminutive) VR, MRZ californica VR, MRZ convexa, s.l. (five chambers) VR, MRZ subbotinae (large) VR, Ostracods VR, PLR cf. pussilla laevigata VR, SBT cf. aquiensis VR, SBT pseudobulloides? (diminutive) VR, SBT triloculinoides, s.s. R, TRCH globigerinaformis VR, TRCR esnaensis VR, TRCR cf. mckannai C. Outer Neritic to Bathyal.

5400' BT vitta? R, CHG midwayensis Var. VR, SBT aquiensis VR, SBT spiralis, s.l. VR, TRCR mckannai, s.l. VR, GYD bandyi VR. The stratigraphic range of GYD bandyi in California is Coniacian to Campanian according to Sliter, 1968. Bathyal?.

6330' Arenaceous indeterminate R, BT vitta? C. Marine.

7350' Arenaceous indeterminate VR. Probably marine.

8340' Barren of Foraminifera. Paleobathymetry indeterminate.

9330' Arenaceous indeterminate VR, BT vitta? R. Marine.

10320' Barren of Foraminifera. Paleobathymetry indeterminate.

11310' BT vitta? R. Marine.

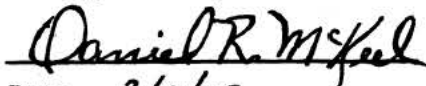
12285' T.D. BT vitta? R. Marine.

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Interpreted by:



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