

BIOSTRATIGRAPHY OF EXPLORATORY WELLS IN WESTERN COOS, DOUGLAS, AND LANE COUNTIES, OREGON

1984

**STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
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DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
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OIL AND GAS INVESTIGATION 11

**BIOSTRATIGRAPHY OF EXPLORATORY WELLS
IN WESTERN COOS, DOUGLAS,
AND LANE COUNTIES, OREGON**

by
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1984

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SECTION I. OVERVIEW

INTRODUCTION

This report documents sequences of foraminiferal highest occurrences in nine southwestern Oregon exploratory well sections. From these fossil distributions, subsurface geologic ages and marine environments are presented for each of the nine well localities. Age and environment also are illustrated in a generalized (composited) subsurface section for the study area.

Detailed biostratigraphic data for six of the wells has not been available previously. Foraminiferal data for the other three may be found in Rau (1973), Newton, et. al. (1980), and the Oregon Department of Geology and Mineral Industries (D.O.G.A.M.I.) Open File Report O-80-13. The open file report is available at D.O.G.A.M.I.'s Portland office.

Section II includes individual foraminiferal reports for each of the nine wells. Each well report contains an introductory summary followed by sample-by-sample listings of fossil and key lithologic highest occurrences. Highest occurrences only are used because of extensive downhole contamination in ditch samples. Each well report is concluded by interpretations of age (benthic foraminiferal Stage) and paleobathymetry for each distinctive well interval.

Concluding this report (back cover) is a subsurface illustration which contains a surface location map and key fossil correlations for all the wells in the form of two separate generally north-south cross sections.

The writer is most grateful to Northwest Exploration and Florida Exploration Companies for their cooperative release of proprietary data for publication. Thanks are extended to A.D. Warren, ARCO Exploration Company, Lafayette, for his careful review of the manuscript.

SAMPLE COVERAGE AND PROCESSING

Correlations in this report are based on analyses by the writer of nearly 800 samples. Interpretive detail varies greatly with sampling density from well to well. Coverage is most complete in Florida Exploration's Harris No. 1-4 in Douglas County and Northwest Exploration's Coos County No. 1. Numerous horizons were examined from the General Petroleum Long Bell No. 1. However, data presented for this well are somewhat biased. Many of the Long Bell samples examined were faunal slides picked by another worker rather than raw sample material. Sample coverage is poorest for the Community Oil and Gas Scott No. 1. Fairly rich faunas in the uppermost part, however, enabled correlation of the Scott well to others in the study area.

Many thick intervals believed to be barren of marine fossils were not examined. They include: (a) a thick Tyee? interval at the top of the Sinclair Mapleton Federal No. 1; (b) apparently solid Roseburg volcanics occurring in the deepest portions of most wells; (c) coaly parts of the Coaledo Formation in Northwest Exploration's Westport, Coos County, and Fat Elk wells.

Raw samples processed in the writer's laboratory were boiled for 20 minutes in a 32 to 1 water to Quaternary "0" (Zingula, 1968) solution. Fossils were not concentrated by flotation, thereby eliminating the possibility of losing replaced, infilled, pyritized or arenaceous specimens in the tailings.

AGE AND CORRELATION

Mallory's (1959) California benthic foraminiferal Stages are routinely referred to in each individual well report of this study. However, it was not possible to precisely define pre-Narizian Stage boundaries. Previous workers have had the same difficulties with Mallory's Ulatisian and older Stages, especially when only benthic foraminifers were examined. Rau (1973) could not pick Stage boundaries in the General Petroleum Long Bell No. 1. Thoms (1975) noticed conflicts in Mallory's California benthic species ranges, particularly in pre-Flournoy Oregon sediments. Poore (1980), after studying fossil marine plankton from Mallory's type sections, states "...the Ynezian through Ulatisian Stages as currently recognized on the basis of benthic foraminifers are in large part coeval".

This writer has found Mallory's pre-Narizian Stages to be useful as a link between southwestern Oregon's pre-Tyee Formations and the Late Paleocene to Middle Eocene Series (Figure 1). In this study, highest occurrences of both planktic and benthic Foraminifera are combined to make this correlation. It is important to note, however, that all references to specific formational units herein are subject to error. They are based only upon foraminiferal distributions which at this time cannot be adequately correlated to those in type surface sections.

It is the opinion of this writer that pre-Narizian planktic Foraminifera are superior to benthic Foraminifera for biostratigraphic correlation of southwestern Oregon well sections. Although abundant, Oregon planktics are difficult to work with. They are generally diminutive in size and there is a sparsity of key tropical index species. Miles (1977), for example, could not differentiate planktic foraminiferal faunas from surface sections of the Lookingglass Formation from those of the underlying Roseburg. However, Miles (1977) did not

SERIES	PLANKTIC ZONE	STAGE	FORMATION	MAXIMUM THICKNESS (WELLS OF THIS STUDY)
LATE PALEOCENE	?	?	ROSEBURG	3100'
EARLY EOCENE	P6	BUL- ITIAN		1330'
		PENU- TIAN	LOOKINGGLASS	1560'
MIDDLE EOCENE	P8	ULATISIAN	FLOURNOY	?
	P10, P11		TYEE	6000'
			ELKTON	1230'
			BATEMAN	
LATE EOCENE	P12 - P15	NARIZIAN	COALEDO	3350'
				1030'
				720'

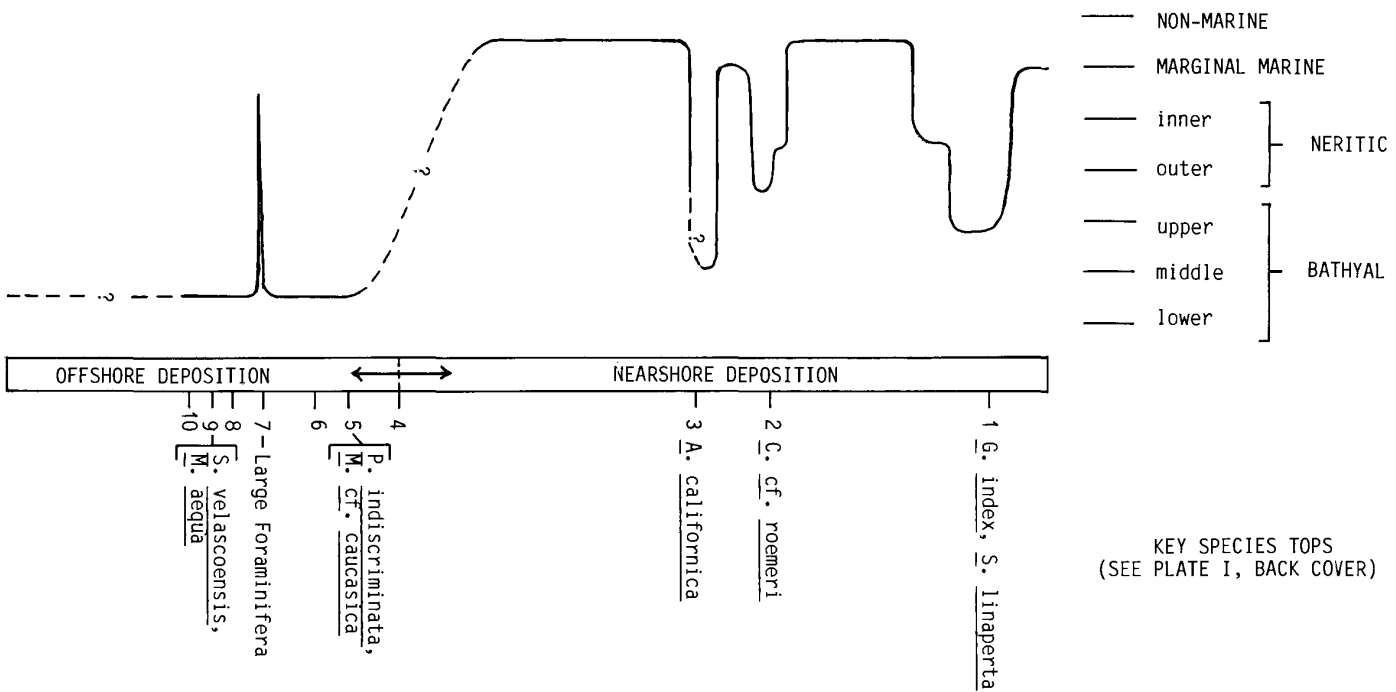


Figure 1. Generalized biostratigraphy and paleobathymetric curve for composited well section, southwest Oregon. Paleogene planktic zones after Blow (1979).

have the opportunity to analyze continuous sections as complete as those recovered from the wells in this study.

This report establishes a sequence of planktic foraminiferal extinctions through subsurface sections which probably contain Flournoy, Lookingglass, and Roseburg sediments. Continued refinement and documentation of this sequence in type surface sections and other wells will gradually solve subsurface formational boundary problems.

PALEOENVIRONMENTAL TRENDS

A generalized paleobathymetric curve for a composite southwestern Oregon well section is shown in Figure 1. Plankton to benthos ratios indicate that Flournoy deposition was a transition from earlier offshore deposits to later nearshore ones.

A striking marine event documented by Foraminifera in this study occurred at the proposed Lookingglass - Roseburg boundary in Early Eocene time. It is marked by a relatively restricted occurrence of the large foraminiferal genera *Amphistegina* and/or *Operculina* (?). These distinctive occurrences indicate that shallow shelf or reef deposits of short duration interrupted otherwise continuous deep bathyal deposition.

This Early Eocene shoaling event was widespread in southwestern Oregon, as it is evident in well sections from three counties (see Plate I, back cover). Indeed, this event seems to be regional over the west coast of the United States. Mallory (1959) mentions widespread shoaling in numerous California localities during his upper Penutian. Fossil reef dwellers found by Durham (see Mallory, 1959, p. 35) in the Crescent Formation of Washington, in the opinion of this writer, probably reflect this same major event.

As a result of extensive Early Eocene shoaling, terrestrial sedimentation rates must have slowed on a wide, submarine Oregon shelf. This allowed an abundance of glauconite to form. It occurs as infillings in many foraminiferal and radiolarian tests, which gives these fossils a green appearance. This "green" fauna brackets each occurrence of large Foraminifera in well sections of this study.

SECTION II. FORAMINIFERAL REPORTS

NORTHWEST EXPLORATION COMPANY
 WESTPORT NO. 1
 SE¼ SEC. 16, T26S, R13W
 COOS COUNTY

Summary

Age diagnostic marine faunas were encountered in two intervals; both are Narizian (undifferentiated) in age. Although widely spaced (60 to 480 ft and 2850 to 3120 ft), the two faunas are very similar with one exception. *Cribrononion* cf. *C. roemeri* occurs only in the lower one, which is just above the volcanics. The local highest occurrence of *C. cf. C. roemeri* appears to provide a useful correlation to nearby wells. A fauna in the Phillips Dobbys No. 1 (from 1850 to 2330 ft) also contains *C. cf. C. roemeri*, and is otherwise almost identical to the lower Westport fauna.

Most of the Westport well section is barren of marine fossils, and probably was deposited under marginal marine or non-marine conditions. The above mentioned marine sections are nearshore, probably neritic deposits.

BIOSTRATIGRAPHIC RESULTS

The following data were derived from selected previously unprocessed wet ditch samples. All single depths noted below represent bottoms of 30 ft intervals.

- 60' Very abundant*shell fragments. Barren of Foraminifera. Fine-grained sandstone, iron-stained.
- 90' As above. Sandstone, gray and micaceous.
- 120' *Eponides mexicana*, ostracod. Rare lignite and coal. Highest gray micaceous siltstone.
- 150' *Gyroidina simiensis*, *Caucasina schencki*, *Quinqueloculina* sp., *Haplophragmoides* sp., arenaceous spp. (indeterminate), *Lenticulina* spp., diatom (pyritized, centrate). Highest light brownish-gray mudstone.
- 180' Barren of Foraminifera.
- 210' *Elphidiella* sp. Common gilsonite/coal.
- 240' Barren of marine fossils. Abundant pyrite. Sub-rounded sand.
- 270' Barren of marine fossils. Abundant bentonitic mudstone.

* Very rare = one specimen per sample; rare = two to ten; common = 11 to 32; abundant = 33 to 100; very abundant = 100+.

- 300' Barren of marine fossils. Very abundant gilsonite.
- 330' Barren of marine fossils. 90+% coal/gilsonite.
- 360' Barren of marine fossils. Decrease in coal.
- 390' Gastropod. Barren of Foraminifera.
- 420' Barren of marine fossils.
- 450' Barren of marine fossils. Increase in coal.
- 480' Common sponge spicules. Barren of Foraminifera.
- 510' Barren of marine fossils. Greenish-gray fine to medium-grained coaly sandstone.
- 540' Barren of marine fossils. 80+% coal on 20 mesh screen. Brown silty mudstone on 50 mesh screen.
- 570' Barren of marine fossils. Highest rock fragments.
- 600' Barren of marine fossils. Coal still abundant.
- 630' Barren of fossils. Sand and volcanic rock fragments, some rounded. Possible hiatus.
- 720' Barren of fossils. 95+% fine-grained slightly micaceous sandstone with salt and pepper appearance.
- 840' Barren of marine fossils. Clean very fine to fine-grained sand. Very abundant coal on 50 mesh screen only.
- 930' Barren of marine fossils. Gray lignitic silty mudstone and abundant lignite/coal on 50 mesh screen. Sand and very abundant mica in finer fractions.
- 1050' Barren of marine fossils. Lithology as above plus very abundant gilsonite.
- 1170' Barren of marine fossils. Sandstone and very abundant coal and lignite.
- 1260' Barren of marine fossils. Lignite/coal flood.
- 1290-2820' Interval not examined. Suspected to be barren of marine fossils.
- 2850' No new species. Rare *Gyroidina simiensis*.
- 2880' No new species. Common *Gyroidina simiensis*.
- 2910' *Gaudryina coalingensis*, with abundant *Gyroidina simiensis*.
- 2940' *Cyclammina?* sp. (small, crushed), *Nonionellina applini*.
- 2970' *Cribrononion* cf. *roemeri*, ostracod var. (deep median sulcus).
- 3000' No new species.

3030' No new species. Common Gyroidina simiensis.
 3060' No new species. Gyroidina simiensis and
 Cribrononion cf. roemeri both common.
 3090' No new species. Common Gyroidina simiensis.
 3120' No new species. Common Gyroidina simiensis.

CONCLUSIONS

DEPTH (FEET)	STAGE	PALEOENVIRONMENT
60-120	Indeterminate	Inner to Middle Neritic
150	Narizian undifferentiated	Middle to Outer Neritic
180, 210	Indeterminate	Inner Neritic
240-1260	Indeterminate	Probably Non-marine to Marginal Marine
1290-2820	Interval not examined.	
2850-3120	Narizian, undifferentiated	Middle to Outer Neritic
3150-3700	Interval not examined.	

PHILLIPS PETROLEUM COMPANY
 DOBBYNS NO. 1
 SW¼ SEC. 28, T26S, R13W
 COOS COUNTY, OREGON

Summary

A previous Dobbys No. 1 foraminiferal report by this writer may be found in Newton, et. al. (1980). An interval species list is available through D.O.G.A.M.I.'s Portland office in Open File Report 0-80-13.

In this report, sample-by-sample species tops are listed below with updated taxonomy, followed by conclusions. The Dobbys well is correlated to others of this study on Plate I (back cover).

One important correction of the previous (1980) report should be noted. *Gyroidina guayabalensis* of the earlier study is actually *G. simiensis*. *G. simiensis* is a widespread marker for Narizian sediments throughout the Oregon Coast Range which are older than the producing Narizian Clark and Wilson Sand in Columbia County.

BIOSTRATIGRAPHIC RESULTS

The following data were derived from selected previously processed dry ditch samples which were borrowed from the D.O.G.A.M.I. collection. All single depths noted below represent bottoms of 50 ft intervals.

50-104' Sponge spicules. Barren of Foraminifera.
 290' As above.
 415-460' Arenaceous spp. (unidentifiable).
 650' Haplophragmoides sp. (unidentifiable).
 830' Barren of marine fossils. Very abundant gilsonite.
 950' Barren of marine fossils. Abundant gilsonite.
 1070' Barren of marine fossils. Very abundant gilsonite.

1190' Barren of marine fossils. Abundant gilsonite.
 1310' Barren of marine fossils. Decrease in sample size. Increase in brown shale.
 1430' Barren of marine fossils. Further decrease in sample size. Increase in coal. Rare pyrite.
 1610' Barren of marine fossils. Increase in sand.
 1790' Barren of marine fossils. Decrease in shale.
 1850' Gyroidina simiensis (abundant), Lenticulina sp., Eponides mexicana var.
 1910' Truncorotaloides rugosoaculeatus, Caucasina schencki (abundant), Cribrononion cf. roemeri (common), Cassidulina sp., diatoms (pyritized, centrate), Elphidiella sp., Lenticulina inornatus, Nonionellina applini, ostracods. Also, Gyroidina simiensis very abundant.
 1970' Lenticulina cf. limbosus, gastropods, Subbotina? sp. (crushed), Spumellaria.
 2030' Shell fragments, Quinqueloculina goodspeedi?, Q. imperialis? (juvenile).
 2090' Eponides gaviotaensis.
 2150' No new species. Gyroidina simiensis common.
 2210' No new species. Gyroidina simiensis common, Cribrononion cf. roemeri common.
 2270' No new species. Gyroidina simiensis abundant, Cribrononion cf. roemeri common, Lenticulina inornata common.
 2330' No new species. Faunal decrease.
 2390' No new species. Further faunal decrease. Barren of indigenous Foraminifera. Volcanic lithology.
 2450' Barren of indigenous Foraminifera. Volcanics.
 2810' Barren of fossils. Volcanics.
 3230' Barren of fossils. Volcanics.
 3650' Barren of fossils. Volcanics.
 4010' Barren of fossils. Volcanics.
 4430' Barren of fossils. Volcanics.
 4850' Barren of fossils. Volcanics.
 5030' Barren of fossils. Volcanics.
 5090' No new species. Spumellaria. Rare shale lithology.
 5150' Subbotina spp. (rare).
 5210' Cibicides cf. sandiegensis (of Mallory, 1959).
 5390' No new species.
 5450' "Globigerina" inaequispira, "G." aquiensis?, Subbotina triloculinoides, s.l., Truncorotaloides nitidus, T. primitivus.
 5510' Bulimina spp. (costate, unidentifiable, rare), Truncorotaloides mckannai (juvenile), T. mckannai/spiralis (intermediate form).
 5570' Truncorotaloides pseudotopilensis.
 5630' Morozovella aequa (diminutive).
 5690' No new species. Subbotina spp. (rare).
 5750' No new foraminiferal species. Spongodiscid? (large).

- 5810' No new species. Subbotina spp. (mostly juveniles) common.
- 5930' Truncorotaloides spiralis?.
- 5990' Oridorsalis umbonatus, Truncorotaloides soldadoensis, Lenticulina? sp.
- 6050' Cassidulina? sp.
- 6110' Cibicides whitei (of Mallory, 1959, pl. 26, fig. 2), Epistomina? sp.
- 6170' Gyroidina florealis, Anomalina? sp. (juvenile), plus several others mentioned above.
- 6230' Pullenia sp. (crushed).
- 6290' Anomalina sp. (fragment), Chiloguembelina sp. (juvenile, roughened surface), Morozovella sp., Planorotalites sp. (probably planoconica of Miles, 1977), P. cf. pseudomenardii? (diminutive). Also Spumellaria abundant.
- 6350' Cibicides sp. B (of Mallory, 1959, pl. 25, fig. 4). Also Spumellaria common.
- 6410' Asterigerina? sp. (broken). Also Spumellaria common.
- 6470' No new species. Faunal decrease. Probably barren of indigenous marine fossils. Highest noted dumbbell-shaped inorganic grains.
- 6530' Barren of fossils.
- 6590' Barren of fossils.
- 6650' Barren of fossils.
- 6710' Barren of fossils.
- 6770' No new species. Barren of indigenous fossils.
- 6830' No new species. Barren of indigenous fossils.
- 6890' Barren of fossils.
- 6900-6938' Barren of fossils.

CONCLUSIONS

DEPTH (FEET)	STAGE/AGE	PALEOENVIRONMENT
104-650'	Indeterminate	Marginal Marine
830-1790'	Indeterminate	Indeterminate
1850-2330'	Narizian, undifferentiated	Nearshore Middle to Outer Neritic
2390-5030'	Indeterminate	Indeterminate
5040-5630'	Upper Bulitian to Penutian (Early Eocene)	Offshore Open Marine, Bathyal undifferentiated
5690-6410'	Probably Late Paleocene	Offshore Open Marine, probably Middle Bathyal or deeper
6470-6938'	Indeterminate	Indeterminate

NORTHWEST EXPLORATION COMPANY
COOS COUNTY NO. 1
SW¼ SEC. 14, T27S, R13W
COOS COUNTY, OREGON

Summary

This well penetrated fossiliferous sediments representing the Narizian through Bulitian Stages

of Mallory (1959). The deepest probably indigenous fauna occurs at 5170 ft. It is Late Paleocene (lower Bulitian) in age. Two sparse faunas at 5350 and 6700 ft are probably caved. Highest noted volcanics in abundance occur at 5260 ft.

Two distinctive horizons indicate possible hiatuses. One is between 3220 and 3250 ft. Some of the lower Ulatisian appears to be missing here. The other possible hiatus occurs somewhere between 4510 and 4750 ft. This interval is probably barren of indigenous marine fossils. There was deep (bathyal) deposition immediately above, and shallow (neritic) deposition immediately below it, the latter based on the presence of Amphistegina.

Open marine conditions persisted from the Late Paleocene at 5170 ft into the Ulatisian at 3130 ft. During deposition of this part of the section there was a gradual shift from intermediate distances from shore to nearshore at this locality. Restriction from open sea circulation occurred during deposition from 3010 up to 2500 ft. In the upper Narizian (from 1750 to 750 ft), conditions were intermittently open marine.

BIOSTRATIGRAPHIC RESULTS

The following data were derived from previously unprocessed wet ditch samples. Single depths noted below represent bottoms of 30 ft intervals.

- 30-720' Interval not examined - suspected to be barren of marine fossils.
- 750' Cyclamina sp., Quinqueloculina imperialis, Lenticulina spp., Caucasina schencki.
- 780' Eponides mexicana, Cibicides sp. var. (thin test, thick sutures and peripheral rim), C. sp. var. (granular surface texture), Valvulineria? involuta?.
- 810' Shell fragments, gastropod.
- 840' Cassidulina globosa.
- 870' Nonion inflatum, Subbotina sp., Eponides mexicana var. (high trochospiral).
- 900' Plectofrondicularia packardii.
- 930' Subbotina linaperta, Bolivina basiscurta, B. oregonensis, Globigerinatheka? index? (juvenile).
- 960' Lenticulina welchi, Gyroidina cf. scalata, Plectofrondicularia vokesi, Bulimina microcostata (abundant), Pseudohastigerina micra, Bolivina kleinpelli, Plectofrondicularia sp. var. (thin, small, smooth test).
- 990' No new species.
- 1020' Lenticulina cf. terryi.
- 1050' Gyroidina condoni.
- 1080' Sphaeroidina sp., ostracods, calcareous spp. indeterminate (common), Uvigerina sp. var. (small test, lightly costate). Fauna poorly preserved (sucrosic).
- 1110' No new species.
- 1140' Chilostomella sp. var. (large, obese test).
- 1170' Ceratobulimina? sp. (pyritized).
- 1200' Epistomina sp., Bulimina lirata, Nodosaria longiscata.

- 1230' Lenticulina sp. var. (obese), Bathysiphon eocenica, Plectofrondicularia aff. californica, Amphimorphina jenkinsi, Eponides mexicana var. (biconvex test), Globigerinatheka sp. (juvenile).
- 1260' "Angulogerina" sp. var. (very small test).
- 1290' Nonionellina aplini, Boldia hodgei, Plectofrondicularia gracilis, Bulimina sp. var. (costate lower half of test). Also Cassidulina globosa abundant.
- 1320' Gaudryina coalingensis, Plectofrondicularia searsi. Also Lenticulina spp. abundant.
- 1350' No new species.
- 1380' Spumellaria, diatoms (pyritized, centrate). Light bluish-gray bentonitic? mudstone.
- 1420' No new species.
- 1450' No new species.
- 1480' Bolivina aff. californica, B. kleinpelli/marginata (intermediate form, small test), Virgulina sp. var. (striate). Lost circulation material flood.
- 1510' Plectofrondicularia cf. multilineata (common), Cassidulina cf. globosa var. (uncoiling). Greenish-gray siltstone.
- 1540' No new species.
- 1570' Nonion cf. halkyardi.
- 1600' Cassidulina globosa/galvinensis (intermediate form). Bentonitic mudstone very, very abundant.
- 1630' No new species. Highest glauconitic mudstone.
- 1660' Saracenaria sp., Pseudoglandulina conica, Cibicides natlandi/haydoni (intermediate form). Glauconite very, very abundant.
- 1690' No new species. Molds of shell fragments locked in glauconitic mudstone lithology.
- 1720' No new species.
- 1750' No new species. Well-consolidated glauconitic mudstone.
- 1780' Faunal decrease. Probably barren of indigenous Foraminifera. Large increase in sand through 100 mesh screen.
- 1810' Barren of indigenous Foraminifera. Very fine to fine-grained sandstone.
- 1840-2050' Barren of indigenous marine fossils.
- 2080' No new species. Gastropod (pyritized).
- 2110' Elphidium (or Elphidiella) sp.
- 2140' Barren of Foraminifera.
- 2170' Elphidium sp.
- 2200' Elphidiella or Elphidium sp. var. (acute periphery), sponge spicules.
- 2230' Barren of Foraminifera. Fine to medium-grained sandstone.
- 2260' Barren of Foraminifera. Coarse sub-angular to sub-rounded sand on 20 mesh screen.
- 2290-2890' No new species. Rare intermittent occurrences of Lenticulina spp., Nonionellina aplini, and Elphidium or
- 2290-2890', Elphidiella sp., all possibly indigenous. Pyrite very abundant at 2650 and 2800 ft. Coal/lignite abundant at 2830 to 2860 ft.
- 2920-3100' Probably barren of indigenous marine fossils. Coal/gilsonite common to abundant @ 2950 to 3010 ft. Coal/lignite abundant @ 3040 to 3100 ft.
- 3130' Pullenia cf. salisburyi, Eponides minima, Trifarina californica, Cibicides mcmastersi?. Also, Spumellaria abundant.
- 3160' Gyroidina cf. soldanii, G. octocamerata, Truncorotaloides aspensis, Amphimorphina californica, Planorotalites indiscriminata? (poorly preserved), Nodosaria sp. var. (small test, five costae), Bolivina "pisciformis" (of Mallory, 1959, pl. 16, fig. 23), Cibicidoides venezuelanus? (juvenile).
- 3190' Planulina sp. (of Mallory, 1959, pl. 23, fig. 11).
- 3220' No new species.
- 3250' Subbotina eocaena, Truncorotaloides densus, T. cf. angulosa, T. collacteus, Alabama wilcoxensis, Morozovella cf. subbotinae, M. cf. aequa, M. cf. caucasica, M. mattseensis, Lenticulina cf. terryi (of Mallory, 1959), Cibicidoides coalingensis, C. venezuelanus, Nodosaria cf. latejugata, Spiroplectammina? sp. (obese), Anomalinoidea aragonensis, Cibicides pachyderma (of Mallory, 1959), Planorotalites indiscriminata, "Angulogerina" wilcoxensis (of Mallory, 1959), Bulimina whitei.
- 3280' Truncorotaloides primitivus.
- 3310' No new species.
- 3340' No new species. Possibly barren of indigenous Foraminifera.
- 3370' Nodosaria latejugata. Possibly barren of indigenous Foraminifera.
- 3400' Anomalina judas, "Valvulineria" cf. childsi, Cibicides spiro-punctatus, Eponides lodoensis, Truncorotaloides cf. esnaensis, Morozovella aragonensis, s.l., Parrella midwayana (of Mallory, 1959), Uvigerina lodoensis, U. elongata, Spongodiscidae.
- 3430' Faunal decrease. Glauconitic fine-grained sandstone. Possibly barren of indigenous Foraminifera.
- 3460' No new species. Elphidium/Elphidiella sp., Nodosaria latejugata.
- 3490' No new species. Cibicides spp., Nodosaria latejugata.
- 3520' As above.
- 3550' No new species. Gastropods.
- 3580' As above.
- 3610' No new species. Cibicides? spp.
- 3640' As above.
- 3670' Siphonina sp. (thin test).
- 3700' No new species. Rare Narizian species (cavings).
- 3730' Planorotalites planoconica, Subbotina cf. triloculinoidea, Pseudohastigerina wilcoxensis? (juvenile), Bolivina lodoensis,

- 3730' Morozovella? lensiformis? (juvenile), M. cf. (cont.) rex (of Bolli, 1957, high umbilical shoulder).
- 3760' Vaginulinopsis vacavillensis.
- 3790' Truncorotaloides wartsteinensis.
- 3820' Allomorphina sp.
- 3850' Anomalina midwayensis (of Mallory, 1959), Asterigerina? crassaformis?.
- 3880' Dentalina communis (of Mallory, 1959, pl. 41), Asterigerina crassaformis.
- 3910' No new species. Lost circulation material flood.
- 3940' "Angulogerina" wilcoxensis? var. (twisted test). Lost circulation material flood.
- 3970' Vaginulinopsis nudicostata. Lost circulation material flood.
- 4000' Cibicides cf. pseudowuellerstorffi.
- 4030' Siphonina cf. jacksonensis (of Mallory, 1959, pl. 41).
- 4060' Cibicides fortunatus.
- 4090-4150' No new species.
- 4180' Anomalina umbonata (of Mallory, 1970).
- 4210' No new species.
- 4240' Gyroidina obliquata.
- 4270, 4300' No new species.
- 4330' Lenticulina vortex (of Mallory, 1959, pl. 7).
- 4360' Bulimina instabilis (of Mallory, 1970).
- 4390-4450' No new species.
- 4480' Quadrimorphina allomorphinoides, Lenticulina ulatisensis, Tritaxilina colei.
- 4510' No new species. Increase in greenish-gray sand.
- 4540' Probably barren of indigenous Foraminifera. Greenish-gray calcareous mudstone.
- 4570' As above.
- 4600' Probably barren of indigenous Foraminifera. Lignite/coal abundant.
- 4630' Probably barren of indigenous Foraminifera. Lignite abundant.
- 4660' Probably barren of indigenous Foraminifera.
- 4690' Silicosigmoilina californica var. (small, thin test), Subbotina cf. bolivariana.
- 4720' Probably barren of indigenous Foraminifera. Narizian species common (caved).
- 4750' Barren of indigenous Foraminifera.
- 4780' Amphistegina sp., plus unidentifiable large foraminiferal specimens, poorly preserved (also possibly Amphistegina).
- 4810, 4840' No new species. Unidentifiable large specimens as above.
- 4870' Asterigerina umbilicatula.
- 4900' Bulimina impendens (of Mallory, 1959), B. callahani, Truncorotaloides pseudotopilensis, T. wilcoxensis (juvenile, through 100 mesh screen).
- 4930' Anomalina keenae, Cibicides cf. beatus, Anomalinoidea dorri (small, "green"), Loxostomum applinae.
- 4960' Planorotalites pseudomenardii, s.l. (diminutive).
- 4990' No new species.
- 5020' Truncorotaloides soldadoensis. Also, Bulimina callahani common.
- 5050' Bulimina curtissima, Truncorotaloides primitivus.
- 5080' Vaginulinopsis asperuliformis, Silicosigmoilina californica var. (on 80 mesh screen), Subbotina cf. triloculinoides, "Globorotalia" canariensis (of Mallory, 1959).
- 5110' Vaginulinopsis kerni, Uvigerina lodoensis, s. s., Planorotalites cf. imitata (greenish), P. pseudoscitula (diminutive, greenish), Cassidulina globosa (greenish), Subbotina sp. (greenish), Bulimina cf. impendens (greenish).
- 5140' Truncorotaloides pseudotopilensis, s.s., T. wilcoxensis (on 100 mesh screen), Morozovella aragonensis, s.l., "Parrella" tenuicarinata, Dorothisa principiensis, Bulimina carlsoni, B. minsseni.
- 5170' Morozovella aequa, s.s. (on 100 mesh screen). Reduced fauna. Increase in sand.
- 5200' (5260'?) Probably barren of indigenous Foraminifera.
- 5230' Probably barren of indigenous Foraminifera. Lost circulation material flood.
- 5260' (5200'?) Probably barren of indigenous Foraminifera. Volcanic rock fragments.
- 5290' Barren of indigenous Foraminifera. Volcanic rock fragments and lost circulation material both very, very abundant.
- 5320' Barren of indigenous Foraminifera. Major increase in volcanics, all size fractions.
- 5350' Probably barren of indigenous Foraminifera. Arenaceous sp. indeterminate (greenish), shell fragment.
- 5380' Barren of Foraminifera. Frosted quartz spheres.
- 5410-5680' Barren of Foraminifera. Volcanics.
- 5710-5920' Samples not processed. Depths washed off sample bags.
- 5950, 5980' Barren of Foraminifera. Volcanics.
- 6010, 6040' Barren of indigenous Foraminifera. Volcanics.
- 6070-6670' Barren of Foraminifera. Volcanics.
- 6700' Probably barren of indigenous Foraminifera. Vaginulinopsis rex, s.s., others mentioned above.
- 6730-6820' Barren of Foraminifera. Volcanics.

CONCLUSIONS

DEPTH (FEET)	STAGE/AGE	PALEOENVIRONMENT
750-900	Probably Upper Narizian	Outer Neritic to Upper Bathyal

BIOSTRATIGRAPHIC RESULTS

930	Upper Narizian	Upper Bathyal
960	Upper Narizian	Upper Middle Bathyal
990-1570	Upper Narizian	Upper to Upper Middle Bathyal
1600-1750	Probably Upper Narizian	Probably Upper Bathyal
1780-2050	Indeterminate	Indeterminate
2080-2200	Indeterminate	Inner Neritic
2230-3100	Indeterminate	Indeterminate
3130-3220	Ulatisian, undifferentiated	Middle Bathyal, undifferentiated
3250	Lower Ulatisian (Early Eocene)	Probably Lower Middle Bathyal
3280-3370	Indeterminate	Indeterminate
3400	Lower Ulatisian (Early Eocene)	Probably Lower Middle Bathyal
3430	Indeterminate	Indeterminate
3460-3700	Indeterminate	Inner to Middle Neritic
3730	Penutian to Lower Ulatisian (Early Eocene)	Probably Lower Middle Bathyal
3760-4270	As above	Outer Neritic to Upper Bathyal
4300-4480	As above	Middle Bathyal, undifferentiated
4510-4750	Indeterminate	Marginal Marine?
4780-4870	Upper Bulitian to Penutian (Early Eocene)	Inner to Middle Neritic
4900-5140	As above	Probably Lower Middle Bathyal
5170	Late Paleocene (Lower Bulitian or older)	Probably Lower Middle Bathyal
5200-6820	Indeterminate	Indeterminate

NORTHWEST EXPLORATION COMPANY
 FAT ELK NO. 1
 SW¼ SEC. 15, T28S, R13W
 COOS COUNTY

Summary

This well penetrated fossiliferous section representing the Ulatisian and possibly Penutian or older Stages of Mallory (1959). Faunas are monotonous with little change from 810 ft to total depth. This could indicate repeated section or steeply dipping beds. The presence of *Truncorotaloides pseudotopilensis* and others without *Pseudohastigerina wilcoxensis* below 3030 ft indicate possibly Late Paleocene deposition. However, faunas are not well developed enough for precise age determination.

Water depths were also monotonous, being middle bathyal from 840 ft to total depth.

Distribution of planktic Foraminifera and radiolaria suggest nearshore, intermittently open marine conditions, with deposition occurring farther from shore at the bottom of the section (from 3030 to 3090 ft).

The following data were derived from previously unprocessed wet ditch samples. Single depths noted below represent bottoms of 30 ft intervals.

30-720'	Interval not examined - suspected to be barren of marine fossils.
750'	Barren of marine fossils. Gilsonite/lignite abundant.
780'	Barren of Foraminifera. Sponge spicule.
810'	Barren of fossils.
840'	Bathysiphon eocenica, Haplophragmoides spp. (crushed), arenaceous spp. indeterminate (crushed).
870'	Spumellaria (spheres), Globobulimina sp., Quadrimorphina sp., Lenticulina spp., L. ulatimensis, Anomalina sp. var. (thin test), Spiroplectamina cf. adamsi (of Mallory, 1959), Bulimina sp. var. (costate lower half of test), Spongodiscidae, Subbotina sp., Planorotalites planoconica, Bolivina kleinPELLI?, "Angulogerina" wilcoxensis.
900'	Nodosaria latejugata, Vaginulinopsis sp. (fragment), V. nudicostata, Morozovella aragonensis, s.l., Pseudohastigerina cf. micra? (crushed).
930'	Cyclammina sp. var. (large), Cibicides san-diegensis, C. spp. (very abundant), ostracod var. (deep median sulcus), echinoid spines, Siphonina sp. var. (thick test, plano-convex), S. cowlitzensis, Gyroidina octocamerata, Gaudryina spp., Spiroplectamina richardi, Anomalina crassisepta, gastropod, Lagena sp., Eponides minima, Plectofrondicularia aff. californica.
960'	Dentalina cf. wilcoxensis (of Mallory, 1959).
990'	No new species. Possibly barren of indigenous fossils.
1020'	Nodosaria deliciae, Cibicides spiro-punctatus, Guttulina irregularis, Gaudryina sp. var. (thin test).
1050'	No new species.
1080'	Barren of indigenous fossils. Highest greenish-gray mudstone. Bentonite rare.
1110'	Cassidulina globosa, Uvigerina sp. var. (spinose, juvenile).
1140'	Subbotina eocaena, Globigerinatheka(?) senni, Oridorsalis umbonatus, Chilostomella sp., Bulimina corrugata, Bolivina lodoensis.
1170'	No new species.
1200'	Siphonina cf. jacksonensis (of Mallory, 1959, pl. 41, fig. 16), Cibicidoides coalingsensis.
1230'	Cibicides pseudowuellerstorffi, C. blanpiedi (of Mallory, 1959), "Nodogenerina" lepidula, Discorbis baintoni.
1260'	No new species. Possibly barren of indigenous Foraminifera.
1290'	No new species. Possibly barren of indigenous Foraminifera. Highest lignitic siltstone. Lost circulation material very abundant.

- 1320' *Bulimina callahani* (juvenile), *Asterigerina umbilicatula*.
- 1350' *Bulimina curtissima*, *Planorotalites indiscriminata?*, *Morozovella* sp. (juvenile, acute periphery).
- 1380' *Buliminella?* *convoluta?*.
- 1410' *Silicosigmoilina californica*, *Uvigerina lodensis?* (juvenile), *Truncorotaloides? nicoli?* (internal mold).
- 1440-1530' No new species.
- 1560' *Nassellaria*.
- 1590' *Morozovella* spp. (small).
- 1620-2010' No new species. Possibly intermittently barren of indigenous marine fossils.
- 2040' *Alabamina californica?*
- 2070' *Truncorotaloides primitivus*.
- 2100' No new species. Possibly barren of indigenous marine fossils.
- 2130' *Cibicidoides venezuelanus*.
- 2160' No new species.
- 2190' "*Globorotalia*" *canariensis* (of Mallory, 1959), "*Valvulineria*" *childsi*, s.s.
- 2220-2400' No new species.
- 2430' *Anomalina tennesseensis* (of Mallory, 1959), *Silicosigmoilina californica* var. (large).
- 2460, 2490' No new species.
- 2520' *Bulimina impendens* (of Mallory, 1959).
- 2550' *Tritaxilina colei*.
- 2580, 2610' No new species.
- 2640' *Gyroidina obliquata*, *Anomalina judas* (diminutive).
- 2670-2760' No new species.
- 2790' *Planorotalites* cf. *pseudomenardii*.
- 2820-2910' No new species.
- 2940' No sample received.
- 2970, 3000' No new species.
- 3030' *Planorotalites capdevilensis?*, *Bulimina whitei*, *Truncorotaloides pseudotopilensis* (juvenile), *Morozovella aequa*, s.l.(?) (juvenile).
- 3060' *Truncorotaloides pseudotopilensis*, *Discorbis coalingensis* (of Mallory, 1959, pl. 29, fig. 15).
- 3090' No new species.

CONCLUSIONS

DEPTH (FEET)	STAGE/AGE	PALEOENVIRONMENT
750-840	Paleogene, undifferentiated	Intermittently Marine
870-1260	Upper Ulatisian?	Middle Bathyal, undifferentiated
1290	Indeterminate	Possibly Non-marine
1320-3000	Probably Lower Ulatisian (Early Eocene)	Primarily Middle Bathyal, undifferentiated

3030-3090 Lower Ulatisian Middle Bathyal, (Early Eocene) or undifferentiated older

SINCLAIR OIL AND GAS COMPANY
 MAPLETON FEDERAL NO. 1
 SE¼ SEC. 12, T16S, R10W
 LANE COUNTY, OREGON

Summary

A previous foraminiferal report and species list (both by this writer) on this well may be found in Newton, et. al. (1980), and D.O.G.A.M.I. Open File Report O-80-13, respectively. Both publications are available at the Portland office.

Interpretations herein are tentative due to sparse sample coverage.

The well penetrated fossiliferous Eocene strata of Ulatisian, Penutian, and possibly Bulitian age from 2790 to 6550 ft. Age-diagnostic faunas are virtually absent above 5790 ft. However, an upper Bulitian to Penutian (Early Eocene) age below 6030 ft is indicated by *Pseudohastigerina wilcoxensis*, *Morozovella subbotinae*, and *Bulimina bradburyi*.

Planktic Foraminifera and radiolaria indicate open marine conditions from 2790 to 6150 ft. Generally high plankton to benthos ratios from 2790 to 6550 ft suggest offshore (as opposed to nearshore) deposition for this part of the well section.

Rare benthic forms, primarily species of *Bulimina* with surface ornamentation, indicate depths of upper middle bathyal at least for much of the interval from 2790 to 5790 ft.

The presence of large, probably light dependent *Amphistegina* and *Operculina*(?) from 6030 to 6550 ft reveal extensive shoaling in contrast to faunas above. These large forms probably are not displaced downslope, because there is an absence of middle bathyal benthic species (e.g., ornamented *Bulimina*) in this same interval.

BIOSTRATIGRAPHIC RESULTS

The following data were derived from selected previously unprocessed dry ditch samples which were borrowed from the D.O.G.A.M.I. collection.

- 970-990' Barren of fossils.
- 2170-2190' Barren of fossils.
- 2530-2550' Barren of fossils.
- 2770-2790' *Spumellaria* (spheres), *Subbotina* sp., *Morozovella twisselmanni?* (juvenile), *Oridorsalis umbonatus?* (etched).
- 3190-3210' *Oridorsalis umbonatus*, *Truncorotaloides bullbrookii*, *T. collacteus?* (juveniles), *Spongurus* sp. Also *Spumellaria* (spheres) very abundant.
- 3370-3390' *Truncorotaloides nitidus*, *T. quetrus?*, *T. cf. nicoli*, *Lenticulina* spp., *Chilostomella* spp. vars. (large), *Glomospira* sp., *Karriella elongata*, *Subbotina frontosus*, *S. cf. soldadoensis* (four chambers last whorl), *Cibicidoides* cf. *venezuelanus* (sub-acute periphery), *Cibicides malloryi?*, *Planorotalites planoconica*, *P. aff. pseudomenardii?* (juvenile), *Morozovella* spp. (juvenile).

3550-3570' Limestone? lithology. Sparse fauna. No new species.

3730-3750' *Truncorotaloides* aff. *wilcoxensis* (juvenile).

4090-4110' *Bathysiphon eocenica*, *Bulimina guayabalensis* (of Mallory, 1959), diatom (pyritized, pennate). Also *Spumellaria* (spheres, pyritized) common, *Quadrimorphina* sp.

4270-4290' *Subbotina* cf. *turgida*, *Turborotalia*? sp.

4510-4530' *Bolivina* sp. var. (small test, oblique sutures).

4750-4770' *Planorotalites indiscriminata*?, *P. capdevilensis*? (diminutive), *Bifarina nuttalli*, *Bulimina whitei*? (juvenile).

4870-4890' *Uvigerina* sp. var. (very small test with thin, elongate neck), *Bolivina lodoensis*.

5170-5190' *Asterigerina crassaformis*. Also, *Spumellaria* (crushed elongated spheres, dark reddish colored), *Plectofrondicularia*? sp. (fragment).

5530-5550' No new species.

5770-5790' *Anomalinoidea dorri*, *Bulimina curtissima* (of Mallory, 1959), *Karrerriella monumentensis* (diminutive, crushed), *Ammodiscus*? sp. (fragment), *Vaginulinopsis*? sp. (crushed).

6010-6030' Large Foraminifera (*Amphistegina*?), *Cibicides spiropunctatus*?, *Gyroldina octocamerata*, "*Valvulineria*" *childsi*, *Truncorotaloides primitivus*, *T. esnaensis*, "*Globorotalia*" cf. *obesa*, *Parrella tenuicarinata* (of Mallory, 1959), *Pseudohastigerina wilcoxensis*, s.s., *Marssonella oxycona*. Also *Glomospira* sp. ("green"), *arenaceous* sp. indeterminate (elongate, cylindrical test, "green").

6030-6040' *Morozovella subbotinae*? (worn, broken), *Subbotina* cf. *triloculinoides* ("green"). Also *Subbotina* spp. ("green").

6150-6200' *Operculina cushmani*? (of Mallory, 1959), *Amphistegina* sp., *Subbotina* cf. *velascoensis*, *Truncorotaloides quetrus*, *Gyroldina florealis* (s.s., Mallory's 1959 illustration), *Bulimina bradburyi* (juvenile), *B.* sp. var. (juvenile, smooth test wall, "green"), gastropod (ornate), *Discorbis*? sp. var. (incised ventral sutures, pitted spiral side, obese), *Morozovella subbotinae* ("green"). Also *Spumellaria* (spheres, "green").

6350-6400' *Spiroplectammina* cf. *richardi*, *Parrella midwayana* (of Mallory, 1959). Also large Foraminifera (poorly preserved) common.

6520-6550' *Asterigerina umbilicatula* ("green"), *Morozovella aequa*? (*lensiformis*?) (juvenile), *Truncorotaloides* cf. *soldadoensis*, *Planorotalites* cf. *pseudomenardii*. Also *Anomalinoidea dorri* ("green"), *Pseudohastigerina wilcoxensis*, *Amphistegina* sp.

6620-6650' *Morozovella marksii*? (juvenile), prism (white, *Inoceramus*??). Possibly barren of indigenous marine fossils.

CONCLUSIONS

DEPTH (FEET)	STAGE/AGE	PALEOENVIRONMENT
990-2550	Indeterminate	Indeterminate
2790-4530	Ulatisian, undifferentiated	Upper to Middle Bathyal, undifferentiated
4570-5790	Probably Lower Ulatisian (Early Eocene)	Middle Bathyal, undifferentiated
6030-6550	Upper Bulitian to Penutian (Early Eocene)	Neritic to Upper Bathyal, undifferentiated
6650	Indeterminate	Indeterminate

GENERAL PETROLEUM CORPORATION
LONG BELL NO. 1
SW¼ SEC. 27, T20S, R10W
DOUGLAS COUNTY, OREGON

Summary

The shaly intervals in the top half of this well section (540 to 4420 ft) are essentially barren of fossils. The depositional rate was probably high, diluting any fossils in the marine portions. Gilsonite at 1760 ft indicates a possible non-marine environment.

The bottom half of the well (4420 to 8660 ft) represents all or parts of the Ulatisian, Penutian, and Bulitian Stages of Mallory (1959), which in this case range from early Middle Eocene to Late Paleocene in age. Abundant plankton in this interval indicate offshore (as opposed to nearshore) waters, open marine, with paleodepths as deep as bathyal at least down to 7940 ft.

Rau (1973) noted *Amphistegina* at 7220 ft, which reveals a shoaling to perhaps neritic depths for a relatively brief period. This "regressive" event is widespread, as it can be traced east to the Harris No. 1-4 in cross section two and southwest to the Coos County No. 1 in cross section one (see Plate I, back cover).

BIOSTRATIGRAPHIC RESULTS

The following data were derived from previously processed dry ditch samples, one core, and previously picked faunal slides of ditch samples and cores. All samples and slides were borrowed from the D.O.G. A.M.I. collection in Portland. All single depths noted below represent bottoms of 20 ft intervals.

540-4400' Essentially barren of marine fossils. Lignitic and gilsonitic sandstone at 1740 to 1760 ft.

4420' *Spumellaria*, *Bathysiphon eocenica*.

4460' *Epistomina* sp.

4480' No new foraminiferal species. Echinoid spines.

4500' *Subbotina* sp.

- 4520, 4540' No new species.
4560' *Bulimina*/*Globobulimina* sp. (crushed).
4580' Barren of fossils.
4600-4640' No new species.
4660' *Planorotalites planoconica*.
4680-4760' No new species.
4780' *Bifarina nuttalli*, *Cibicides pseudouellorstorffi*.
4800, 4820' No new species.
4840' *Oridorsalis umbonatus*, *Asterigerina crassiformis*, *Gyroidina planata*, *Lenticulina* sp.
4860' "*Globorotalia*" *canariensis* (of Mallory, 1959), *Cibicides spiropunctatus*.
4880' No new species.
4900' *Dorothia principiensis*, *Vulvulina curta*.
4920' *Truncorotaloides decepta*.
4940' No new species.
4960' *Anomalina garzaensis*.
4980' *Morozovella aragonensis* var. (*caucasica*?).
5000' *Morozovella* cf. *naussi*.
5020-5060' No new species.
5080' *Subbotina frontosa*?, *Silicosigmoilina californica*.
5100' *Amphimorphina ignota* (juvenile), *Morozovella broedermanni*, *Truncorotaloides collacteus*.
5120' *Planorotalites capdevilensis*, *Truncorotaloides rotundimarginatus*.
5140' *Clavigerinella* sp. (fragment).
5160' *Truncorotaloides densus*.
5180' No new species.
5200' *Vaginulinopsis asperuliformis*.
5220' *Cibicides felix*?.
5215-5221' (core) No new species.
5240, 5260' No new species.
5300' *Bolivina lodoensis*.
5420' *Anomalinoides dorri*, "*Valvulineria*" *childsi*.
5480' *Karrerriella* n. sp. of Cook (in: Mallory, 1959), "*Globigerinoides*" *higginsii*?, *Subbotina turgida*.
5520' *Truncorotaloides* cf. *primitivus*, *T. pentacameratus*, s.l., "*Globigerina*" sp. (of Robertson, 1972).
5540' *Lenticulina pseudovortex*.
5600' *Eggerella elongata*, *Bulimina lirata*, *Subbotina trilobata*.
5620' No new species.
5660' *Catapsydrax primitiva*.
5680' *Martinottiella eocenica*.
5720' *Gaudryina coalingensis*.
5900' *Bulimina macilenta*.
5960' *Truncorotaloides nicoli*.
6000' *Subbotina linaperta*.
6052½-6055'* *Bulimina whitei*, *Morozovella?* *pseudomayeri*.
6055-6057½'* *Allomorphina conica*.
6060' *Pseudohastigerina* cf. *micra*.
6180' *Pseudoglandulina bistegia*.
6440' *Pleurostomella acuta*.
6540' *Karrerriella media-aguaensis*.
6576'* *Planorotalites indiscriminata*.
6585'* *Bolivina kleinpelli* (of Mallory, 1959).
6740' *Spongurus* sp.
6780' *Truncorotaloides pseudotopilensis*.
7000' *Nodosaria longiscata*.
7080' *Bulimina curtissima*.
7100' *Karrerriella* sp. var. (*small, monumentensis?*).
7120' *Buliminella convoluta*.
7160' *Morozovella subbotinae*.
7220' *Amphistegina* cf. *californica* (from Rau, 1973).
7280' *Truncorotaloides primitivus*.
7300' *Pseudohastigerina* cf. *wilcoxensis*.
7480' *Glomospira* sp.
7560' *Morozovella* cf. *aequa*.
7680' *Morozovella lensiformis*.
7740' *Bulimina* cf. *impedens*.
7940' *Marginulina sischoae*.
7980' *Truncorotaloides wilcoxensis*.
8020' *Morozovella aequa*, s.l.
8040' *Morozovella aequa*, s.s., *Truncorotaloides mckannai*.
8060' *Subbotina triloculinoides*, s.l.
8100' *Subbotina velascoensis*, s.l., *Cibicides fortunatus*, s.s.
8120' *Planorotalites imitata*.
8180' *Planorotalites* cf. *pseudomenardii* (juvenile), *P. elongata* (juvenile), *P. cf. membranacea* (of *Subbotina*, 1953, pl. 16, fig. 11).
8220' *Morozovella apantesma*, *Truncorotaloides aquiensis*, *Subbotina* cf. *pseudobulloidis*.
8280' *Subbotina varianta*.
8300' *Morozovella* cf. *crosswicksensis*.
8340' *Morozovella crosswicksensis*.
8380' *Subbotina velascoensis* ("*green*").
8440' *Planorotalites membranacea* (of *Subbotina*, 1953, pl. 16, fig. 11).
8460' *Morozovella laevigata*.
8500' *Morozovella convexa*.
8600' *Planorotalites luxorensis*.
8620' *Spiroplectamina* cf. *gryzbowskii*.
8640' *Planorotalites ehrenbergi*.
8660' *Morozovella* cf. *angulata*.
8680-9000' Probably barren of indigenous fossils.
* Core sample.

CONCLUSIONS

DEPTH (FEET)	STAGE/AGE	PALEOENVIRONMENT
540-4209	Indeterminate	Indeterminate
4420-5540	Ulatisian (Early Middle Eocene)	Upper Bathyal
5600-6057½	As above	Upper Middle Bathyal
6180-6540	As above	Middle Bathyal, undifferentiated
6576-6780	Ulatisian (Early Eocene)	As above
7000-7160	Penutian to Lower Ulatisian (Early Eocene)	As above
7220'	Indeterminate	Neritic
7280-8040	Upper Bulitian to Lower Penutian (Early Eocene)	Middle Bathyal, undifferentiated
8060-8660	Late Paleocene (Probably Lower Bulitian)	Probably Outer Neritic or deeper

NORTHWEST EXPLORATION COMPANY
SAWYER RAPIDS NO. 1
NE¼ SEC. 3, T23S, R9W
DOUGLAS COUNTY

Summary

This well probably did not penetrate pre-Tyee sediments. The upper quarter (35 to 1230 ft) penetrated predominately marine strata representing the upper Ulatisian or lower Narizian Stage of Mallory (1959), of Middle Eocene age. Paleoenvironments in the shallowest parts of this interval are generally open marine, nearshore, and outer neritic to bathyal in depth. The second quarter of the well section (1260 to 2730 ft) is also marine, but indeterminate in age due to dilution of fossils by sand. Rare Foraminifera present in this interval indicate an intermittently open marine, nearshore environment.

The bottom half of the well (2760 to 5560 ft) is partially and possibly almost entirely non-marine. Lignite/coal (gilsonite?) fragments were found intermittently throughout the interval. The only marine fossil occurrence (one specimen) in the entire interval was found at 5460 ft. Based on negative evidence, the bottom half of this well is probably correlative to part of the top 4400 ft of the General Petroleum Long Bell No. 1, also drilled in Douglas County.

BIOSTRATIGRAPHIC RESULTS

The following data were derived from previously unprocessed wet ditch samples. Single depths noted below represent bottoms of 30 ft intervals.

0-35'	Bathysiphon eocenica, Ammodiscus sp. var. (large), Vaginulinopsis cf. nudicostata, Quinqueloculina cf. imperialis, Nodosaria sp. (of Mallory, 1959, pl. 13, fig. 17), Lenticulina spp., Gyroidina cf. soldanii, G. obliquata, Alabamina scitula, arenaceous spp. indeterminate (crushed), Anomalina sp.
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60-690'	Barren of indigenous marine fossils (based on rapid examination). Lignite at 120 ft and 390 ft.
720'	Diatom (pyritized, centrate), Dentalina? sp. (fragment).
750-840'	Barren of indigenous marine fossils.*
870'	Pseudoglandulina conica, Bulimina macilenta, Subbotina sp.
900'	Trochammina cf. globigeriniformis, echinoid spines, ostracod, Bulimina corrugata, Globobulimina sp. (pyritized), gastropod.
930-1200'	Barren of indigenous marine fossils.*
1230'	Parrella tenuicarinata (of Mallory, 1959), Amphimorphina californica, Siphonina cowlitzensis.
1260, 1290'	Barren of marine fossils.*
1320-1410'	Labels on sample bags illegible.
1440-1500'	Barren of marine fossils.*
1530'	Quadrimorphina sp., Spumellaria.
1560'	Bulimina sp. var. (large, smooth wall), B. sp. var. (small test, pointed proloculus, smooth wall).
1590-1680'	Barren of indigenous marine fossils.*
1710, 1740'	No new species.
1770-2580'	Barren of indigenous marine fossils.*
2610, 2640'	No new species.
2670, 2700'	Barren of indigenous marine fossils.*
2730'	No new species.
2760-4800'	Barren of indigenous marine fossils.* Lignite at 2850 and 4130 ft. Gilsonite at 4130 and 4260 ft.
4830-5010'	Barren of marine fossils. Coal/lignite rare to common. Pyrite common at 4830 ft. Serpentine rare at 4980 ft.
5040-5360'	Barren of marine fossils.
5390-5430'	Barren of marine fossils. Lignite rare to common.
5460'	No new species. Arenaceous sp. indeterminate (crushed) - one specimen.
5490-5560'	Barren of fossils.

* Based on rapid examination.

CONCLUSIONS

DEPTH (FEET)	STAGE/AGE	PALEOENVIRONMENT
35	Upper Ulatisian to Lower Narizian (Middle Eocene)	Outer Neritic to Upper Bathyal
60-840	Indeterminate	Intermittently Non-marine
870-900	Upper Ulatisian to Lower Narizian (Middle Eocene)	Middle Bathyal, undifferentiated
930-1200	Indeterminate	Indeterminate
1230	Upper Ulatisian to Lower Narizian (Middle Eocene)	Outer Neritic to Bathyal, undifferentiated

1260-1500	Indeterminate	Indeterminate
1530-1560	Indeterminate	Outer Neritic to Bathyal, undifferentiated
1590-2730	Indeterminate	Intermittently marine, undifferentiated
2760-5560	Indeterminate	Probably Non-marine to Marginal Marine

FLORIDA EXPLORATION COMPANY
HARRIS NO. 1-4
NE 1/4 SEC. 4, T21S, R6W
DOUGLAS COUNTY

Summary

The well penetrated marine strata representing all or parts of the Ulatisian, Penutian, and Bulitian Stages of Mallory (1959). In this case the age ranges from early Middle Eocene back to Late Paleocene. Rare Cretaceous species at 3360 ft probably are reworked into a sandstone. Faunas present below 3330 ft are very intermittent, and are likely caved from above.

The richly fossiliferous interval from 1590 to 3240 ft indicates offshore, open marine conditions and middle or lower bathyal depths. One exception is a neritic, tropical marine environment at 2310 and 2340 ft, indicated by abundant *Amphistegina*. This shoaling event provides a useful correlation to the Long Bell No. 1 and Coos County No. 1 (see Plate I, back cover).

BIOSTRATIGRAPHIC RESULTS

The following data were derived from previously unprocessed wet ditch samples. Single depths noted below represent bottoms of 30 ft intervals.

- 90-810' Essentially barren of marine fossils. Intermittent coal/lignite throughout interval.
- 840' *Chilostomella* sp., *Spumellaria* (spheres), *Virgulina* sp.
- 870-1560' *Subbotina* spp. (indeterminate) very rare and intermittent.
- 1590' *Truncorotaloides nicoli*, *Cassidulina globosa* var. (small). Brownish-gray mudstone.
- 1620' *Truncorotaloides* cf. *quetrus*.
- 1650' *Lenticulina* sp.
- 1680' *Truncorotaloides collacteus*, *T. bullbrooki*?
- 1710' *Oridorsalis umbonatus*, arenaceous spp. indeterminate (crushed, one "greenish"), *Cibicides felix* (of Mallory, 1959, pl. 25), *Planorotalites* cf. *planoconica*; *Silicosigmoilina californica*?, *Cibicides spiropunctatus*?, *Subbotina eocaena*? - all poorly preserved; *Catapsydrax* sp., *Lenticulina* cf. *terryi*.
- 1740' *Asterigerina crassaformis*, *Subbotina* cf. *linaperta*, *S. frontosa*? (crushed), *Silicosigmoilina californica*, *Planorotalites indiscriminata* (diminutive), *Gyroidina* sp., *Pseudohastigerina* cf. *micra*, *Marssonella*
- 1740' *oxycona*, *Nodosaria deliciae*, *Cibicides* spp., (cont.) *Karrerriella* cf. n. sp. of Cook (in: Mallory, 1959). Highest greenish-gray mudstone.
- 1770' *Nodosaria latejugata*, *Cibicides spiropunctatus*, *Osangularia midwayana*, *Subbotina linaperta*, *Truncorotaloides bullbrooki*, "*Valvulineria*" *childsii*?, *Pleurostomella* sp. var. (thin, small test), *Amphimorphina*? sp. (juvenile).
- 1800' *Cibicides laimingi*, *Gyroidina planata*, *G. octocamerata*, *Bulimina* cf. *macilenta*, *B. sp.* var. (test "greenish" and costate on lower half), *Spirillina*? cf. *vivipara* (of Mallory, 1959), *Karrerriella* cf. *monumentensis*? (very small).
- 1830' "*Valvulineria*" *childsii*, *Silicosigmoilina californica* (on 80 mesh screen), *Planorotalites planoconica* (possibly = "*Globorotalia*" *canariensis* of Mallory, 1959), *Bifarina nuttalli*, *Cibicoides venezuelanus*.
- 1860' *Cibicides fortunatus*, s.l. (broken), *Bulimina garzaensis*, *Anomalina garzaensis*, s.s., *Pullenia* sp.
- 1890' *Cibicides pseudowuellerstorffi*, *Allomorphina* sp., *Subbotina eocaena*, *Truncorotaloides nitidus*?, *Lenticulina* sp. (of Mallory, 1959, pl. 8, fig. 5), *Karrerriella monumentensis* (juvenile), *Cibicides* cf. *pachyderma*?
- 1920' *Quinqueloculina imperialis*.
- 1950' *Truncorotaloides pseudotopilensis*, *Bulimina macilenta*.
- 1980' *Vaginulinopsis asperuliformis*, *Bulimina curtissima*, *B. callahani*, *Allomorphina conica*. Gray mudstone.
- 2010' *Spiroplectammina* cf. *adamsi*, *Amphimorphina californica* (small), *Morozovella* cf. *aragonensis* var. (four chambers in last whorl), *Uvigerina miriamae*? (juvenile).
- 2040' *Pleurostomella* sp. var. (short, obese test).
- 2070' *Anomalina* sp. var. (raised plug on one side, clear umbo on other side), *Lenticulina vortex*, *Gyroidina simiensis*?, *Spiroplectammina richardi*, *Uvigerina miriamae*, *U. garzaensis*, *Morozovella* cf. *convexa*, *Amphimorphina ignota*, *Truncorotaloides primitivus*?
- 2100' *Subbotina* sp. var. (large test, "pinkish-red"), *Anomalinoidea aragonensis*, *Valvulineria wilcoxensis* (of Mallory, 1959), *Loxostomum applini*, *Spumellaria* (spheres, "pinkish-red", very abundant).
- 2130' *Pseudoglandulina inflata*, *Subbotina* sp. ("green"), *Anomalina crassisepta*.
- 2160' *Truncorotaloides primitivus*, *Nonionellina applini*, *Elphidium*? sp., *Subbotina* cf. *velascoensis*, *Planorotalites* cf. *pseudomenardii* (no keel), *P. pseudoscutula*, *P. imitata*?, *Morozovella* aff. *aequa* (diminutive), *Bulimina* spp. (costate), *Bolivina lodoensis*. Dark gray mudstone.
- 2160-2180' *Cibicides* cf. *sandiegensis*, *Morozovella twisselmanni*, *M. cf. crosswicksensis*, *Plectofrondicularia kerni*, *Bulimina* cf. *impensans*, *Amphimorphina* sp. var. (obese), *Truncorotaloides broedermanni*, *Amphistegina*? sp.

- 2180-2220' *Planorotalites pseudomenardii* ("green"), *Anomalinoidea dorri*, *Pseudohastigerina* cf. *sharkriverensis*, *Truncorotaloides nitidus*, *Morozovella aragonensis*, *M. lensiformis*, *M. aequa* (diminutive), *Glomospira corona*, *Cyclamina* sp., *Cibicides* cf. sp. (of Mallory, 1959, pl. 25), large indeterminate calcareous species, poorly preserved. Volcanics? common.
- 2250' *Plectina garzaensis*, *Truncorotaloides* cf. *wilcoxensis*, *T. mckannai?* (*spiralis?*), *Bulimina bradburyi?* (small, broken).
- 2280' No new species. Light colored siliceous mudstone. Possibly barren of indigenous Foraminifera.
- 2310' *Amphistegina* sp. (common), *Morozovella marksii* (dextral).
- 2340' *Morozovella subbotinae?* Also, *Spumellaria* (very, very abundant) and *Amphistegina californica* var.
- 2370' No new species. Very light colored siliceous mudstone.
- 2400' *Morozovella californica*. Also, *Spumellaria* flood.
- 2420' Rocks from bit run. *Bulimina bradburyi*, *Dorothyia principiensis*, *Pseudohastigerina wilcoxensis*, *Cibicides* sp. var. (attached form), *Discorbis* sp. Also, *Amphistegina californica* var.
- 2430' *Spongodiscid?* sp. B (of Miles, 1977, pl. 8, fig. 3), *Vulvulina curta*, *Subbotina* cf. *triloculinoides*. Tar rare.
- 2460' *Truncorotaloides wartsteinensis*.
- 2490' *Morozovella subbotinae*, *Trifarina californica*.
- 2520' *Morozovella subbotinae*, s.s. (some large), *Planorotalites pseudomenardii* (diminutive). Also, *Bulimina bradburyi* (large, on 80 mesh screen).
- 2550' *Siphonina* cf. *wilcoxensis*, *Bulimina* sp. var. (striate, triangular cross section). Also, *Spongodiscid?* sp. B (of Miles, 1977) common, and *Pseudohastigerina wilcoxensis*, s.s.
- 2580' *Truncorotaloides spiralis* (= *T. mckannai* of Miles, 1977).
- 2610' *Trochamminoides contortus* ("green"), *Podycyrtis papalis* (of Miles, 1977). Also, *Spumellaria* var. (large, on 40 mesh screen), and *Spumellaria* flood (many "pink").
- 2640' *Morozovella convexa*, s.s., actinomids, gen. et. spp. (of Miles, 1977, pl. 7).
- 2670' *Subbotina velascoensis*. Also, *Bulimina* sp. var. (large, finely costate on lower 3/5 of test - probably not highest occurrence).
- 2700' *Pullenia eocenica*, s.l., *Pleurostomella gredalensis?* (large), *Haplophragmoides glabra?* (of Mallory, 1959, "green").
- 2730' No sample received.
- 2760' *Nodosaria velascoensis* (of Mallory, 1959), *Bulimina* cf. *impedens*, *Planorotalites elongata* (diminutive), *Uvigerina wilcoxensis?*
- 2790' *Morozovella occlusa*, *Spiroplectamina adamsii*
- 2820' *Haplophragmoides* sp. var. (small, smooth, compressed test, "green").
- 2850' *Ammodiscus* cf. *incertus*.
- 2880' *Spiroplectamina eocenica?*, *Spongurus bilobatus* var. (narrow, elongate test), *Bulimina* sp. var. (entire test finely costate).
- 2910' *Gonatosphaera eocenica*, *Pullenia quinqueloba* var. (large), "*Angulogerina*" *wilcoxensis* (diminutive).
- 2910' Rocks from bit run. No new species. *Spongurus bilobatus* var. (narrow, elongate) common.
- 2940' *Spiroplectamina richardi* var. (wide peripheral flange), *Uvigerina?* sp. var. (no neck, small hispid test, through 100 mesh screen).
- 2970' *Haplophragmoides excavata* (of Mallory, 1959, pl. 2).
- 3000' *Spumellaria* var. (large, "flying saucer" shaped). Lost circulation material common.
- 3030' No new species. *Spumellaria* var. (as in sample above). Metal shavings abundant. Well-consolidated reddish-brown silty mudstone? abundant. Faunal decrease.
- 3060' No new species. Further faunal decrease. Probably barren of indigenous marine fossils.
- 3090' No new species. Lignite (additive?) flood. *Spumellaria* var. (as in 3000 and 3030' samples).
- 3120' *Truncorotaloides esnaensis*, *Spumellaria* var. (thick peripheral flange, thickened through center of test, "green"). Also, *Spumellaria* flood. Radiolarian-rich siltstone.
- 3150' *Bulimina* cf. *impedens* (of Mallory, 1959, pl. 16). Also, *Silicosigmoilina californica* ("green"), *Spumellaria* flood.
- 3180' *Gyroidina florealis?* (poorly preserved). Also, *Spumellaria* flood.
- 3210' *Bulimina excavata* (of Mallory, 1959, pl. 16). Also, *Silicosigmoilina californica* ("green"), *Spumellaria* flood.
- 3240' *Anomalina?* (*Cibicides?*) sp. var. (planoconvex, umbilical plug on flat side). Also, *Spumellaria* flood, *Bulimina excavata*.
- 3270' No new species. Faunal decrease. Large inorganic spheres common, translucent grains very abundant. Possibly barren of indigenous marine fossils.
- 3300' No new species. Further faunal decrease. Tar rare.
- 3330' Barren of indigenous marine fossils. Volcanic? very fine-grained sandstone. Lignite/coal very, very abundant (additive?).
- 3360' Probably barren of indigenous marine fossils. Sparse Cretaceous fauna, probably reworked, including *Nodosaria septemcostata*, *Pullenia jarvisi*, *Chilostomella trinitatensis*, *Inoceramus* sp. (prisms). Also, *Morozovella* sp. and *Subbotina* sp., both red-colored. Greenish fine-grained sandstone and multicolored fine-grained sand.
- 3390' Probably barren of indigenous marine fossils. *Osangularia cordieriana?* (poorly preserved, replaced), *Silicosigmoilina californica*

3390', (pinkish-colored), Subbotina sp. (red-colored). Also, inorganic spheres abundant and red grains common.	1590-1710	Ulatisian, undifferentiated	Bathyal, undifferentiated
3420-3540' Barren of indigenous marine fossils. Metavolcanics? Reddish grains common to very abundant.	1740-1830	Lower Ulatisian (Early Eocene)	Bathyal, undifferentiated
3570' NO sample received.	1860-1950	Penutian to Lower Ulatisian (Early Eocene)	Lower Middle Bathyal to Lower Bathyal
3600-4020' Intermittent non-age diagnostic marine faunas, possibly indigenous, including Spumellaria ("greenish") rare to abundant, Subbotina spp. ("greenish") rare.	1980-2160	As above	Middle to Lower Bathyal, undifferentiated
4050-4580' Barren of indigenous marine fossils. Rock fragments abundant. Spumellaria very abundant at 4490 ft are probably contamination from above.	2180-2250	Upper Bulitian to Penutian (Early Eocene)	Upper Middle Bathyal
4610' Barren of indigenous marine fossils. Rock fragments very abundant and basalt abundant.	2280	Indeterminate	Indeterminate
4640-4880' No samples received.	2310, 2340	Upper Bulitian to Penutian (Early Eocene)	Probably Neritic
4910' Possibly barren of indigenous marine fossils. Alabamina wilcoxensis (of Mallory, 1959, pl. 19). Also, Planorotalites pseudomenardii (on 100 mesh screen), plus several others mentioned above, including Spumellaria very abundant.	2370	Indeterminate	Indeterminate
4940' Barren of indigenous marine fossils. Volcanics very abundant. Major increase in sample size.	2400-2580	Upper Bulitian to Penutian (Early Eocene)	Upper Middle Bathyal
4970, 5000' Probably barren of indigenous marine fossils. Spumellaria common to abundant.	2610, 2640	As above	Middle to Lower Bathyal, undifferentiated
5030' Possibly barren of indigenous marine fossils. Spiroplectammina gryzbowskii? (fragment), plus others mentioned above, including Spumellaria abundant.	2670-2910	Late Paleocene (Lower Bulitian or older)	As above
5060' Probably barren of indigenous marine fossils. Faunal decrease. No new species.	2940-3000	As above	Bathyal, undifferentiated
5090' Barren of indigenous marine fossils.	3030-3120	As above	Marine, undifferentiated
5120' Probably barren of indigenous marine fossils. Truncorotaloides spiralis. Sparse fauna.	3150-3240	As above	Middle to Lower Bathyal, undifferentiated
5150' Probably barren of indigenous marine fossils. No new species. Sparse fauna.	3270, 3300	Indeterminate	Marine, undifferentiated
5180' Possibly barren of indigenous marine fossils. No new species. Faunal increase, including Silicosigmolina californica (dark green), Spumellaria very abundant and Cibicides spp.	3330-5960	Indeterminate	Indeterminate
5210, 5240' Barren of indigenous marine fossils. Angular to well-rounded sand flood.	COMMUNITY OIL AND GAS COMPANY SCOTT NO. 1 SW¼ SEC. 5, T27S, R6W DOUGLAS COUNTY, OREGON		
5270' Barren of fossils. Angular sand flood.	<u>Summary</u>		
5300-5900' Barren of indigenous marine fossils. Volcanics and rock fragments.	Parts of the Penutian and/or Bulitian foraminiferal Stages of Mallory (1959) are represented in the uppermost 590 ft of this well. Based on fossil distribution alone, certainly indigenous marine faunas occur only in the upper 590 ft. Sparse and very intermittent faunas below 590 ft possibly are cavings into a section essentially barren of marine fossils.		
5930' Barren of fossils. Vesicular basalt and orange fine-grained sand.	Radiolaria and planktic Foraminifera occur throughout the uppermost 590 ft, indicating an open marine environment.		
5960' Barren of fossils. Light gray volcanics and rock fragments.	Benthic foraminiferal species of <u>Pleurostomella</u> and ornamented <u>Bulimina</u> from 30 to 590 ft indicate water depths of <u>middle bathyal</u> or deeper.		

CONCLUSIONS

<u>DEPTH (FEET)</u>	<u>STAGE/AGE</u>	<u>PALEOENVIRONMENT</u>
90-810	Indeterminate	Possibly intermittent Non-marine
840-1560	Indeterminate	Intermittent Marine

BIOSTRATIGRAPHIC RESULTS

The following data were derived from selected previously unprocessed dry ditch samples. The samples were selected from the finest grained sediments according to the well log. It is assumed

that depths listed below which were on the sample bags represent bottoms of the intervals sampled.

- 30' *Bathysiphon eocenica*, *Spiroplectamina richardi*, *Cibicides stephensoni* (of Mallory, 1959, pl. 32), *C. kernensis*, *C. spp.*, *Eponides lodoensis*, *E. dorfi*, *Anomalina keenae*, *Pseudohastigerina wilcoxensis*, *P. cf. sharkriverensis*, *Nodosaria deliciae*, *Pseudoglandulina conica*, *Pleurostomella cf. paleocenica*, *Gyroidina aequilateralis*, *G. octocamerata*, *Cassidulina globosa*, *Martinottiella eocenica*, *Trifarina californica*, *Bolivina lodoensis*, *Lenticulina spp.*, *Truncorotaloides cf. wilcoxensis*, *T. collacteus*, *Parrella tenuicarinata*, *Bulimina cf. macilenta*, *Uvigerina miriamae?* (juvenile), *Quadriformina sp.*, *Siphonina sp.*, *Subbotina spp.*
- 50' *Nodosaria latejugata*, *Cibicoides venezuelanus*, *Pseudohastigerina cf. micra*, *Truncorotaloides wilcoxensis*, s.l., *T. nicoli*, *T. cf. angulosus*, *Discorbis baintoni*, *Loxostomum applini*, *Anomalina sp. A* (of Mallory, 1959), *Vaginulinopsis kerni?* (juvenile).
- 90' *Truncorotaloides quetrus*, *T. cf. esnaensis*, *T. wilcoxensis* (juvenile), *Cibicides spiropunctatus*, *Lenticulina vortex*, *Planorotalites luxorensis?*
- 120' *Oridorsalis umbonatus*, *Anomalina crassisepta*, *Spiroplectamina aff. gryzbowskii*, *Zeauvigerina lodoensis*, *Bulimina whitei*, *Bifarina elegantata*.
- 150' *Vaginulinopsis nudicostata*, *Tritaxilina colei*, *Anomalinoides dorri*, *Verneuilina triangulata*, *Cibicides felix* (of Mallory, 1959, pl. 25).
- 180' *Nonionellina applini*, *Uvigerina wilcoxensis*, *Elphidium californicum* (of Mallory, 1959, pl. 15), *Bulimina lirata*, *B. minsseni*.
- 210' *Truncorotaloides pseudotopilensis*, *Bulimina curtissima*, *Silicosigmoilina californica* (small, thin test), *Uvigerina miriamae*, *arenaceous spp.* (crushed) very abundant.
- 240' *Gonatosphaera eocenica*, *Plectofrondicularia kerni*, *Bulimina cf. carlsoni*, *Truncorotaloides cf. primitivus*, *Allomorphina conica*, *Palmula lodoensis*.
- 270' *Operculina cushmani* (of Mallory, 1959) (= "large" Foraminifera), *Gaudryina coalingensis*, *Bulimina callahani*, *Silicosigmoilina californica*, s.s.
- 300' *Anomalina cf. regina* (of Mallory, 1959 - not of Martin, 1943).
- 330' *Pseudoglandulina bistegia?* (of Mallory, 1959).
- 360' *Dorothia principiensis*, *Truncorotaloides primitivus*, s.s., *Asterigerina crassaformis*.
- 390' *Bulimina bradburyi*, *Subbotina cf. triloculinoides* (some specimens "green"), *S. cf. velascoensis* ("green"), "*Angulogerina*" *wilcoxensis*, *Bolivina aragonensis*, *Truncorotaloides deceptus*, *Morozovella cf. convexa* (five chambers in final whorl). Also *Truncorotaloides quetrus* ("green"), *Pseudohastigerina sp.* (juvenile, "green").
- 420' *Karreriella cf. arenasensis* (of Mallory, 1959), *K. media-aguaensis*, *Morozovella aequa*, s.l.
- 420', (juvenile), *M. cf. aequa*, *Bulimina impendens* (of Mallory, 1959), *Planorotalites aff. imitata*. Limestone? lithology very abundant; pyrite abundant.
- 450' *Truncorotaloides angulosus*, *Spongodiscidae* (disc).
- 480' No new species. Possibly barren of indigenous Foraminifera. Rock fragments.
- 510' *Silicosigmoilina californica* var. (large), *Spiroplectamina gryzbowskii*, s.s.
- 540' No new species.
- 570' *Bulimina excavata* (of Mallory, 1959).
- 590' *Bulimina sp. var.* (striate, triangular in cross section).
- 875, 885' No new species. Probably barren of indigenous Foraminifera.
- 895-905', 905-915' Barren of indigenous Foraminifera. Rock fragments.
- 1090' No new species. Probably barren of indigenous Foraminifera. Fine-grained sandstone.
- 1250' *Cibicides?* sp. (encrusted with sandstone lithology).
- 1310' Barren of indigenous Foraminifera. Very fine-grained sandstone.
- 1420' *Cibicides pachecoensis?*
- 1525' Barren of indigenous Foraminifera.
- 1860' Barren of indigenous Foraminifera.
- 1880' Barren of indigenous marine fossils.
- 1900' No new species. *Bulimina excavata* (of Mallory, 1959), possibly indigenous. Gray micaceous mudstone very abundant.
- 1920' No new species.
- 1990, 2010' No new species. Probably barren of indigenous Foraminifera.
- 2020-2030' Barren of indigenous Foraminifera. Gilsonite rare.
- 2090' Barren of Foraminifera.
- 2100-2110' Barren of indigenous Foraminifera. Fine to medium-grained sandstone.
- 2140' Probably barren of indigenous Foraminifera. Medium-grained sandstone.
- 2160, 2180' Barren of Foraminifera. Gilsonite rare at 2180 ft.
- 3480-3490' Barren of Foraminifera.
- 3490-3500' Probably barren of indigenous Foraminifera.
- 3510, 3530, 3540' Barren of Foraminifera.
- 3540-3550' Barren of Foraminifera.
- 3550-3560' No new species. Probably barren of indigenous Foraminifera.
- 3580' Barren of indigenous Foraminifera. Volcanic? (arkose) rock fragments.
- 3660' Barren of Foraminifera. Lithology as above.
- 3670' Barren of indigenous Foraminifera. Lithology as above.
- 3680, 3690' Probably barren of indigenous marine

3680, 3690', fossils. Rock fragments and arkosic
(cont.) fine-grained sandstone.

3750' Barren of fossils. Rock fragments and tar on
20 mesh screen.

CONCLUSIONS

<u>DEPTH (FEET)</u>	<u>STAGE/AGE</u>	<u>PALEOENVIRONMENT</u>
30-120	Upper Bulitian to Penutian (Early Eocene)	Lower Middle Bathyal
150-390	As above	Middle Bathyal, undif- ferentiated
420-590	Late Paleocene (Lower Bulitian or older)	As above
875-1310	Indeterminate	Indeterminate
1420	Late Paleocene?*	Bathyal, undifferen- tiated?*
1525-1880	Indeterminate	Indeterminate
1900	Late Paleocene?*	Bathyal, undifferen- tiated?*
1920-3750	Indeterminate	Indeterminate

* Possibly not indigenous.

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