

GEORGIA

ECHOLS COUNTY

Operator: Humble Oil & Refining Co.
Landowner: Bennett and Langdale Well 1
Location: Land District 12, Land Lot 146
660 ft. south and 666 ft east
of northwest corner of Land
Lot 146

GGs. No. 189
Elevation: 181 ft.
(derrick floor)
Total depth: 4185 ft.
Completed: May 6, 1949

Summary of Stratigraphy

	Depth to top (feet)	Thickness (feet)
Tertiary		
Paleocene		
In beds containing Tamesí fauna; 1st sample 2700 ft.	?	?
Cretaceous		
Gulf		
Beds of Taylor age	2810	240
Beds of Austin age	3050	290
Atkinson Formation, upper member	3340	210
do lower member	3550	210
Comanche undifferentiated	3760	360
Ordovician		
Lower Ordovician <u>1/</u> quartzitic sandstone	4120 to	65
	total depth	
diabase intrusion <u>2/</u>	4125-4150	

1/ Bridge, Josiah, and Berdan, J.M. 1951, U.S. Geological Survey
open-file p. 7 and map.

2/ Applin, P.L., 1951, U.S. Geological Survey Circular 91,
p. 15-16, and 27.
_____ 1957, Geological Society of America Bulletin, V. 68,
p. 1486-1489

B & L. Well 1 Lithologic and paleontologic descriptions of cuttings and cores. Samples are cuttings unless otherwise stated.

Depth (feet)	Description
0-2700	Samples not studied.
	Tertiary
	Paleocene
	In Beds containing Tamesí microfauna
2700-2705	Marl, light-gray, chalky, highly silty, glauconitic, about 50 percent of sample Fragments of grayish-green shale.
2705-2710	Mainly silty, like sample at 2700-2705 ft., and fragments of hard gray limestone that is probably lenticular in the silty marl. The fauna includes specimens of Ostracodes and specimens of the small foraminifer <u>Globigerina triloculinoides</u> ; also specimens of <u>Cibicides</u> sp., <u>Globorotalia velascoensis</u> , and a small <u>Robulus</u> sp.
2710-2740	Like the sample at 2705-2710 ft., but showing an increase of limestone fragments. No marked change in fauna.
2745-2790	No change in material.
2790--2795	Shale, gray, soft, silty, glauconitic, is probably drilled at this level. The microfauna in the samples at 2745-2790 ft. and 2790-2795 ft. includes specimens of <u>Spiroplectamina mexiaensis</u> <u>Marssonella oxycona</u> , <u>Robulus midwayensis</u> , <u>Nodosaria affinis</u> , <u>Cibicides alleni</u> <u>Anomalina acuta</u> , and <u>Globigerina pseudobulloides</u> .

Depth (feet)	Description
2795-2810	No change. Cretaceous Gulf Series Beds of Taylor Age
2810-2815	Limestone, white, hard, chalky, glauconitic, somewhat sandy (very fine-grained sand); sample contains fragments of <u>Inoceramus</u> , and cavings from higher levels. The fauna contains specimens of <u>Globotruncana marginata</u> , <u>Marssonella oxycona</u> , <u>Planulina dumblei</u> , <u>Stensiöina americana</u> , and others.
2815-2820	Chalk, white, hard, somewhat glauconitic; many fragments of <u>Inoceramus</u> , other fossil bivalves, and Echinoids, Microfauna as in sample at 2810-2815 ft., many specimens of <u>Planulina dumblei</u> .
2820-2825	Chalk, white, moderately soft; many <u>Inoceramus</u> fragments, and microfauna as in the samples beginning at 2810 ft.
2825-2855	No change.
2855-2860	Washed residue, small, probably from a soft white chalk, containing fragments of green shale (caving?), abundant <u>Inoceramus</u> fragments and prisms. Microfauna similar to preceding Cretaceous samples; <u>Planulina dumblei</u> (common), and many specimens of <u>Lituola taylorensis</u> (highest occurrence).

Depth (feet)	Description
2860-2865	Material and fauna is similar to the sample at 2855-2860, but sample contains few fragments of <u>Lituola</u> .
2865-2900	No change.
2900-2905	Chalk, white, also fragments of hard gray limestone and soft gray marl that are probably caving. The fauna contains fragments of <u>Inoceramus</u> , specimens of <u>Lituola taylorensis</u> and other species as in the preceding Cretaceous samples, and specimens of several species of Ostracodes.
2905-2910	Material and fauna like sample at 2900-2905 ft.; about 25 percent of the washed sample is composed of fine to coarse-grained quartz sand (from drilling mud?).
2910-2915	Like sample at 2905-2910 ft., but with about 50 percent sand.
2915-2920	Marl, gray, soft, cavings from higher levels, abundant frag- ments of <u>Inoceramus</u> , and specimens of Foraminifera that are mainly, <u>Planulina dumblei</u> , <u>Globotruncana cretacea</u> , and a few fragments of <u>Lituola taylorensis</u> .
2920-2925	Like sample at 2915-2920 ft. and a few fragments of <u>Kyphopyxa</u> <u>christneri</u> .
2925-2945	Material and fauna like samples at 2920-2925 ft.

Depth (feet)	Description
2945-2950	Washed residue, small. Probably from a soft gray marl, containing <u>Inoceramus</u> fragments, specimens of Foraminifera (<u>Globotruncana</u> sp. fairly common), and many small nodules of pyrite.
2950-2955	Like sample at 2945-2950 ft. Specimens of <u>Robulus</u> sp. and <u>Globotruncana</u> sp. are dominant in the fauna, which contains, also, specimens of <u>Marginulina austiniana</u> .
2955-2965	No change.
2965-2970	Material and fauna as in immediately preceding samples; also a few specimens of <u>Pseudogaudryinella capitosa</u> .
2970-2975	Like sample at 2965-2970 ft.
2975-2980	Marl, gray, containing small nodules of pyrite, abundant <u>Inoceramus</u> fragments, and specimens of Foraminifera, among which <u>Globotruncana</u> sp. and <u>Robulus</u> sp. are common.
2980-2990	No change.
2990-2995	Material and fauna like sample at 2975-2980 ft., with the addition of specimens of <u>Citharina wadei</u> .

Depth (feet)	Description
2995-3000	Like sample at 2990-2995 ft. but specimens of <u>Citharina wadei</u> absent. Specimens of <u>Marginulina austiniana</u> and <u>Globigerina</u> sp. fairly common.
3000-3050	Like sample at 2995-3000 ft. and abundant cavings.
Beds of Austin age	
3050-3060	Chalk, white, moderately hard; many fragments contain much very fine calcitic material, and abundant specimens of <u>Oligostegina</u> , characteristic of the beds of Austin age. Nodules of pyrite and fragments of <u>Inoceramus</u> are common.
3060-3070	No change.
3070-3075	Marl, brownish-gray, soft, is probably drilled at this level. Sample contains many <u>Inoceramus</u> fragments, nodules of crystalline pyrite, and cavings. Among the indigenous specimens of Foraminifera, <u>Globotruncana marginata</u> and <u>Globigerina</u> sp. are dominant; <u>Planulina austiniana</u> and <u>Guembelina reussi</u> are fairly common; specimens of <u>Valvulineria infrequens</u> (Austin var.) are present.
3075-3080	Like the sample at 3070-3075 ft., also fragments of <u>Citharina texana</u> .

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Depth (feet)	Description
3080-3085	Not described.
3085-3090	Clay, gray, marly; contains many <u>Inoceramus</u> fragments and prisms, nodules of crystalline pyrite, and specimens of species of Foraminifera characteristic of the beds of Austin age.
3090-3100	Clay, gray, marly; contains a few <u>Inoceramus</u> fragments, nodules of pyrite, specimens of Foraminifera, and many Ostracodes.
3100-3125	No change.
3125-3130	Clay, gray, marly; contains <u>Inoceramus</u> fragments and nodules of pyrite. Specimens of <u>Guembelina</u> sp. and <u>Globigerina</u> sp. are dominant in the microfauna, which also contains many specimens of <u>Globotruncana</u> sp. and a small <u>Anomalina</u> sp.
3130-3230	No change.
3230-3235	Washed residue, small. Contains fragments of gray marly clay, <u>Inoceramus</u> fragments, nodules of pyrite, and a few small fragments of dark brownish-gray slightly speckled, marly shale. The microfauna is like that in the sample at 3125-3130 ft.

Depth (feet)	Description
3235-3240	Two separate samples at this depth. a. Like sample at 3230-3235 ft. b. Like sample at 3230-3235 ft., with the addition of many fragments of gray, hard, sandy (fine-grained sand) limestone, and fragments of Ostrea-like bivalves.
3240-3250	Materials and fauna like sample at 3230-3235 ft.
3250-3255	Core 4. Recovery 4 ft. Top. Clay, light-gray, marly slightly micaceous. Washed residue is small and consists of specimens of <u>Guembelina</u> sp. and <u>Globigerina</u> sp.; many specimens of <u>Globotruncana marginata</u> , <u>Planulina austiniana</u> (small), and <u>Virgulina tegulata</u> ; a few specimens of Ostracodes, including <u>Cythereis dallasensis</u> .
3255-3265	Core 5. Recovery 3 ft. Clay, brownish-gray, marly, light-speckled. The fauna consists of a few fish scales, and specimens of Foraminifera and Ostracoda like sample at 3250-3255 ft.
3265-3270	Core 6. Recovery 4 ft. Top. Chalk, light-gray, moderately hard. The fauna consists of specimens of Foraminifera and Ostracoda like sample at 3250-3255 ft., with the addition of specimens of <u>Citharina texana</u> . Bottom. Like top part of core, but no <u>C. texana</u> .

Depth (feet)	Description
3270-3280	Core 7. Recovery 5 ft. Top. Marl, gray (darker gray than preceding cores), light speckled. No change in fauna. Bottom. No change.
3280-3285	Core 8. Recovery 5 ft. Top. Marl, gray and brownish-gray, light speckled. No change in fauna. Bottom. Marl, gray, soft. No change in fauna.
3285-3295	Core 9. Recovery 4 ft. Top. Chalk, white, moderately hard; few specimens of Foraminifera wash free. Bottom. Marl, dark-gray, highly light-speckled. Microfauna like the preceding core samples.
3295-3300	Core 10. Recovery 9 ft. Top. Chalk, white, moderately hard. No change in fauna. Middle. Like top of core. Bottom. Marl, gray and brownish-gray, speckled; contains thin hard lenses composed of masses of calcitized microfossils and microfossil fragments; no change in fauna.

Depth (feet)	Description
3300-3310	<p>Core 11. Recovery 10 ft.</p> <p>Top 3 ft. Marl, dark brownish-gray, speckled, highly pyritic. No change in fauna.</p> <p>2nd 3 ft. Chalk, light-gray, moderately hard; contains much calcitized micro fossiliferous material (<u>Inoceramus</u> prisms and specimens of Foraminifera). <u>Globigerina</u> sp. and <u>Guembelina</u> sp. very abundant; also many specimens of <u>Globotruncana</u> sp. typical of the lower part of the Austin chalk.</p> <p>3d 3 ft. Chalk, white, moderately hard, similar in general character and fauna to the 2nd 3 ft.</p> <p>Bottom 1 ft. No change.</p>
3310-3320	<p>Clay, gray, calcareous, and speckled marl. Sample contains many <u>Inoceramus</u> fragments, nodules of pyrite, and specimens of Foraminifera like the preceding cores; also a few specimens caving from higher levels.</p>
3320-3325	<p>Material and fauna like sample at 3310-3320 ft.; also a few fragments of very fine-grained, somewhat glauconitic, calcareous sandstone that contains specimens of many small foraminiferal species like those mentioned in preceding cores.</p>

Depth
(feet)

Description

3320-3330 Core 13. Recovery 10 ft.

Top 1 ft. Clay, shaly, gray, soft, silty. Sample contains small nodules of glauconite, a few nodules of pyrite, and many specimens of Foraminifera. Specimens of a small Globigerina sp. and a small Planulina sp. are common; specimens of Guembelina sp. are in the fauna, though not abundant.

2nd 2 ft. Marl, gray, containing a very large amount of Inoceramus prisms and calcitized molds of specimens of Foraminifera. Common forms are: Globiferina sp., Globotruncana sp. (lower Austin form), Guembelina sp., and a few Planulina sp., like the top part of the core.

3d 4 ft. Marl, light-gray, chalky, like the preceding part of the core in character and fauna.

Bottom 3 ft. Marl, gray, highly microfossiliferous, somewhat white speckled. No change in fauna.

3330-3340 Core 14. Recovery 10 ft.

Top 5 ft. Marl, gray, soft. Fauna composed of Inoceramus prisms and specimens of Globigerina sp. and Guembelina sp.

2nd 4 ft. Marl, gray, sandy (medium-grained to moderately coarse-grained sand). Phosphatized fragments of fish bones common. Washed residue large; composed of 50 percent sand and 50 percent Inoceramus prisms and specimens of Foraminifera. Fauna like core 13 at 3320-3330 ft., and a

(continued)

Depth
(feet)

Description

(Core 14 continued from page 11)

few specimens of Planulina eaglefordensis and Cythereis

Atkinson Formation

Upper Member

Bottom 1 ft. Marl, gray, soft, sandy, like top part of core, and gray, hard, sparsely sandy limestone containing fragments of fossil bivalves. The limestone marks the top of the upper member of the Atkinson Formation.

3340-3345 Core 15. Recovery 4 ft.

Top 2 ft. Sandstone, white, hard, fine to medium-grained, calcareous, highly pyritic; contains phosphatic fragments and fragments of fossil bivalves.

2nd 1 ft. Sandstone, white, hard, medium to coarse-grained, calcareous, pyritic; contains fragments of phosphatized fish bones, and fragments of fossil bivalves.

Bottom 1 ft. Sandstone, light-gray, hard, calcareous, very fine-grained, and sandy limestone, containing many shell fragments, a little phosphatic material, a trace of fine-grained, bright-green glauconite, a trace of mica, and a few specimens of Ostracodes.

3345-3350 Core 16. Recovery 3 ft.

Top 1/2 ft. Siltstone, light-gray, moderately soft, micaceous, slightly glauconitic; contains fragments of *Ostrea* sp. (common), and fragments of phosphatized fish bones. Washed residue contains much fine to medium-grained quartz sand.

continued on page 13

Depth
(feet)

Description

(Core 16 - continued from p. 12)

2nd 1/2 ft. Sandstone, light-gray, hard, calcareous, and sandy limestone; contains abundant shell fragments, and is irregularly micaceous and somewhat phosphatic.

Bottom 2 ft. Sandstone, light-gray, fine-grained; calcareous, micaceous; contains many shell fragments and phosphatized fragments of fish bones.

3350-3355 Core 17. Recovery 2 ft.

Top 1/2 ft. Shale, gray-green, flaky, slightly silty; contains phosphatic fragments, shell fragments, and a few specimens of Ostracodes.

Bottom 1½ ft. Siltstone, light-gray, soft, micaceous, calcareous; contains fairly common specimens of several species of Ostracodes, and specimens of Valvulineria infrequens (Eagle Ford variety), and of a very small Guembelina sp.

3358-3362 Core 19. Recovery?

Washed sample is very fine grained sandstone and a few shell fragments.

Depth (feet)	Description
3362-3367	<p>Core 20. Recovery 5½ ft.</p> <p>Top. Sand, fine to medium-grained quartz; containing many worn and broken shell fragments, a few phosphatic nodules, and a few specimens of Ostracodes.</p> <p>Bottom. Sandstone, fine to medium-grained, soft, quartz, containing many worn and broken shell fragments (<u>Ostrea?</u> sp.), pyrite, a trace of glauconite, mica and phosphatic material.</p>
3367-3372	<p>Core 21. Recovery 5 ft.</p> <p>Top. Clay, light-greenish gray, soft, sandy, micaceous; contains a few shell fragments and phosphatic nodules.</p> <p>Bottom. Shale, greenish-gray, soft, sandy (fine-grained sand), slightly glauconitic.</p>
3372-3377	<p>Core 22. Recovery 5 ft.</p> <p>Top. Like bottom part of Core 21 at 3367-3372 ft.</p> <p>Bottom. Clay, light greenish-gray, sandy (fine to medium-grained sand), micaceous, slightly glauconitic, somewhat phosphatic.</p>
3375-3380	<p>Sandstone, light-gray, fine-grained, and shale; contains many shell fragments, many bryozoan fragments, specimens of Foraminifera from younger beds, a few fragments of light-green shale, and a little glauconite.</p>

Depth (feet)	Description
3380-3390	No change.
3390-3395	Like sample at 3375-3380 ft. The microfauna contains specimens of Foraminifera that have caved from various levels but also contains specimens of species that are typical of the upper member of the Atkinson Formation. Common species are: <u>Guembelina</u> sp. (small), <u>Valvulineria infrequens</u> (Eagle Ford variety), and small specimens of <u>Planulina eaglefordensis</u> .
3395-3400	Like sample at 3390-3395 ft. Sample composed, mainly, of fragments of <u>Ostrea</u> sp., bryozoan fragments, a few fragments of fine-grained, micaceous sandstone, and a few specimens of Foraminifera caving from the beds of Austin age.
3400-3420	No change.
3420-3425	Sample composed of shell fragments, bryozoan fragments, loose sand, and micaceous sandstone; also many fragments of white, sandy limestone, containing many imbedded shell fragments.
3425-3430	Like the sample at 3420-3425 ft.

Depth (feet)	Description
3430-3435	Dominant materials in the sample are about 50 percent fine to moderately coarse-grained sand, and fragments of white, irregularly sandy, macrofossiliferous limestone reported in the same at 3420-3425 ft. Sample also contains bryozoan fragments, shell fragments, phosphatic nodules, and a few fragments of sandstone.
3435-3475	No change.
3475-3480	Like sample at 3430-3435 ft., but fragments of white, fine to medium-grained, glauconitic, micaceous sandstone are slightly more common. Sample also contains a few fragments of flaky green shale.
3480-3500	No change.
3500-3505	Sandstone, white, medium-grained, calcareous, somewhat glauconitic and phosphatic; contains many fragments of <u>Ostrea</u> sp. and a small <u>Gryphea</u> . Loose sand and shell fragments compose about 75 percent of the sample.
3505-3555	No change.

Atkinson Formation Lower Member

The top of the lower member of the Atkinson Formation is placed at 3550 ft. on the basis of electric log correlation supported by the samples.

Depth (feet)	Description
3555-3560	Sample is composed mainly of loose sand and abundant shell fragments, but also contains many fragments of light-tan, hard, sandy limestone in which shell fragments are embedded.
3560-3570	No change.
3570-3575	Washed sample, composed mainly of sand and shell fragments.
3575-3580	Washed sample, small; composed of fragments of gray, micaceous siltstone; fragments of the sandy, fossiliferous limestone mentioned in sample at 3555-3560 ft.; a little loose sand; and phosphatic nodules. The material drilled at this level is probably siltstone and soft, greenish-gray shale, a few fragments of which are in the sample. The sample contains specimens of arenaceous species of Foraminifera, among which are specimens of <u>Ammobaculites stephensoni</u> .
3580-3585	No change.
3585-3590	No change in material, but no specimens of arenaceous Foraminifera observed.
3590-3595	No change in material but contains specimens of <u>Ammobaculites stephensoni</u> ; specimens of <u>Planulina eaglefordensis</u> and other species are probably caving from higher levels.

Depth (feet)	Description
3595-3605	No change.
3605-3610	Washed sample, small; composed of fragments of grayish-green shale, a little loose sand, and a few shell fragments. The microfauna contains specimens of <u>Ammobaculoides plummerae</u> and <u>Ammobaculites advenus</u> .
3610-3620	No change.
3620-3625	Washed sample, small; composed of greenish-gray and light-brown, somewhat micaceous shale. Shell fragments and sparse specimens of Foraminifera are probably caving.
3625-3630	Material like sample at 3620-3625 ft; specimens of Foraminifera like sample at 3605-3610 ft.
3630-3660	No change.
3660-3665	Core 23. Recovery 1 ft. Shale, olive-gray, flaky, slightly micaceous; contains a few small reddish-brown, irregular-shaped nodules of siderite, and a few specimens of Ostracodes.

Depth
(feet)

Description

3665-3670 Core 24. Recover 5 ft.

Top 1 ft. Shale, gray, flaky, containing irregular streaks of light-gray, micaceous silt.

2nd 1 ft. Material like top 1 ft.

Washed residue, small; composed of fragments of shale and siltstone, and abundant small, irregular-shaped nodules of siderite. The microfauna contains specimens of Ammobaculites comprimatus, Trochammina rainwateri, specimens of small Globigerina sp., small Planulina sp. (related to P. eaglefordensis), and small Guembelina sp.

3d 1 ft. Shale, olive-gray, micaceous, and a little siltstone, containing a few small irregular-shaped nodules of siderite, a few comatulid fragments, and specimens of Foraminifera like preceding part of core.

4th 1 ft. Shale, gray, slightly micaceous, containing a few silty areas. No change in microfauna.

Bottom 1 ft. No change.

Core 25. Recovery 10 ft.

Top 3½ ft. Shale, gray, micaceous; almost no washed residue.

Middle 3½ ft. shale, like top part of core, and a little siltstone. Fauna like core 24 at 3665-3670., and in addition, many specimens of Ammobaculoides plummerae.

Bottom 3 ft. Unaccounted for.

Depth (feet)	Description
3680-3690	<p>Core 26. Recovery 10 ft.</p> <p>Top 1 ft. Shale, gray, flaky.</p> <p>2nd 1 ft. Shale, gray, micaceous, somewhat carbonaceous containing lenses of siltstone and very fine grained micaceous sandstone.</p> <p>3d 2 ft(?). No sample?</p> <p>4th 4 ft. Shale, gray.</p> <p>Bottom 2 ft. Shale, gray, flaky, containing lenses of light-gray, micaceous siltstone. The shale contains scattered specimens of very minute species of Foraminifera.</p>
	<p>Core 27. Recovery 10 ft.</p> <p>Top 1 ft. Shale, gray, and gray, hard, silty clay. Washed sample. Sand, fine to coarse-grained, quartz, worn and broken shell fragments, and phosphatized bone fragments.</p> <p>2nd 2 ft. Sandstone, gray, very fine grained, calcareous, micaceous, slightly glauconitic, containing abundant specimens of small <u>Guembelina</u> sp. and small <u>Planulina</u> sp., a few specimens of Ostracodes, and small fragments of shells. Thin lenses of gray shale contain specimens of <u>Ammobaculites agrestis</u>, and two species of <u>Guembelina</u>.</p> <p>3d 2 ft. Sandstone, very fine-grained, calcareous, micaceous, slightly glauconitic, containing shell fragments and phosphatic material.</p>

Depth
(feet)

Description

(Core 27, continued.)

4th 3 ft. Clay, gray, sandy (fine-grained sand).

Washed sample. Sand, fine-grained, containing many shell fragments, schinoid spines, nodules of pyrite, and many specimens of species of Foraminifera characteristic of the so-called "Barlow" fauna 1/. Common species are:

1/ Applin, E.R., 1955, U.S. Geological Survey, Prof. Paper 264-I, p. 187-197, pls 48 and 49.

Ammobaculites agrestis A. advenus, Haplophragmoides langsdalensis, Trochammina Rainwateri, Citharina kochi, Placopsilina langsdalensis, Quinqueloculina lirellangula, Marsonella cf. M. Ellisorae, Ammobaculites junceus, Globigerina sp., Nodosaria sp., Discorbis cf. D. Minima; several species of ostracodes also common.

Bottom 2 ft. Siltstone, gray, micaceous; gray, micaceous shale; soft, argillaceous, medium to coarse-grained sandstone; a little glauconite; a few fragments of worn shells; a few phosphatic nodules. The lenses of shale contain many small, irregular-shaped nodules of siderite, glauconite, fine-grained sand, and a few small specimens of Ammobaculites.

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Depth
(feet)

Description

3700-3710 Core 28. Recovery 10 ft.

Top 3 ft. Shale, gray, slightly micaceous, containing lenses of gray, very fine grained, calcareous sandstone. The sandy lenses contains the "Barlow" fauna described in the 4th 3 ft. of Core 27 at 3690-3700 ft., with slight difference in the species. Globigerina sp. is common in this sample, and Ammobaculoides plummerae is Fairly abundant.

Middle 3 ft. Shale, gray; lenses of gray, highly sandy (fine-grained sand), micaceous shale, and of hard, very fine grained, calcareous sandstone. The sample contains shell fragments; fish teeth; specimens of several species of Ostracods; many specimens of Globigerina sp.; and a few specimens of other species of Foraminifera common in the "Barlow" fauna.

3d 2 ft. Shale, gray, containing scattered silty and sandy (very fine grained sand) areas; many small shell fragments; phosphatized fish bones; a trace of glauconite and mica; many specimens of Ostracods; and a few specimens of Globigerina sp. and other Foraminifera common in the "Barlow" fauna.

Bottom 2 ft. Sandstone, gray, very fine grained, micaceous, argillaceous, or highly sandy shale containing thin lenses of light-gray, hard, fine-grained, calcareous, slightly glauconitic sandstone, in which pyritic areas and small fragments of carbonaceous material are fairly common.

Depth
(feet)

Description

(Core 28 continued).

Some lenses of shale contain a few specimens of Ostracodes, small fragments of shells, and a few specimens of Foraminifera.

3710-3720 Core 29. Recovery 3 ft.

Top 2 ft. Limestone, gray, hard, sandy, argillaceous. The sand is medium-grained, and seems to be evenly distributed in the fragments of limestone. Softer parts of the core contain very fine grained argillaceous sand, mica and a little glauconite.
Bottom 1 ft. Shale, dark-gray, thinly laminated.

3720-3730 Core 30. Recovery 10 ft.

Top 2 ft. Clay, gray, soft, sandy (fine to medium-grained sand), micaceous; contains some coarse grains of sand and a few phosphatic nodules.
2nd 4 ft. Shale, gray, somewhat micaceous and glauconitic; a few small worn shell fragments.
3d 2 ft. Shale, gray, containing a little fine-grained sand and glauconite.
Bottom 2 ft. Clay, gray, soft, highly arenaceous. The sand is fine to very coarse grained quartz, in general, but some grains are about the size of small pebbles. A few shell fragments and phosphatic nodules are in the sample.

Depth (feet)	Description
3730-3740	<p>Core 31. Recovery 5 ft.</p> <p>Top 2 ft. Sand, gray, soft, highly argillaceous, containing lenses of buff-gray, sandy, slightly glauconitic limestone. The sand is poorly sorted, fine to coarse-grained, and composes about 50 percent of the sample. A few shell fragments are in the sample.</p> <p>Bottom 3 ft. Sandstone, gray, highly argillaceous. The sand is fine to very coarse grained; coarse to very coarse grains are common. The sample contains a few shell fragments and a few phosphatic nodules.</p>
3740-3750	<p>Core 32. Recovery 5 ft.</p> <p>Sandstone, light-gray, soft, argillaceous. The sand is poorly sorted, fine to coarse-grained, roughly angular, slightly etched; contains a few pink-tinted grains.</p>
3750-3755	<p>Core 33. Recovery 1 ft.</p> <p>Top 10 in. sandstone, light-gray, highly argillaceous, micaceous, glauconitic, like core 32 at 3740-3750 ft.; contains a few shell fragments.</p> <p>Bottom 2 ft. Clay, gray, soft, silty, micaceous.</p>

Depth
(feet)

Description

3755-3765 Core 34. Recovery 11 ft.

Top 2 ft. Clay, greenish-gray, irregularly red-streaked, micaceous, sandy (fine to medium-grained sand), and a few fragments of brownish-red waxy shale.

Comanche Series undifferentiated

The top of the Comanche is placed at 3760 ft. on the basis of samples and electric log correlation.

2nd 5½ ft. Clay, dull-red and greenish-gray mottled, waxy, micaceous, highly sandy.

Washed sample contains fragments of gray and dull purplish-red sandy clay, and fine to coarse grains of sand washed from the clay; also flakes of biotite and muscovite.

Bottom 3½ ft. Clay, light greenish-gray, waxy, irregularly sandy, micaceous. The clay shows irregularly stained red and mustard-yellow areas probably caused by oxidation of iron minerals.

3765-3775 Core 35. Recovery 8 ft.

Top 4 ft. Sandstone, dull red, argillaceous, micaceous, moderately coarse grained. The sand grains are roughly angular, etched quartz and a little feldspar; the mica is biotite and muscovite.

Bottom 4 ft. Clay, dull-red and greenish-yellow mottled, silty to sandy (fine-grained sand), micaceous.

Depth (feet)	Description
3775-3780	Sand, coarse to very coarse grained, quartz, and a little feldspar; many grains red-tinted.
3780-3880	No change.
3880-3890	Sand, like sample at 3775-3780 ft., and a few fragments of dark-red clay shale.
3890-3900	Sand, very coarse grained, quartz, (many amber-tinted grains), and a little feldspar; a few fragments of red shale.
3900-3930	No change.
3930-3940	Sand, very coarse grained, quartz, and feldspar; many of the grains are amber-tinted and pink-tinted; a little mica.
3940-3990	No change.
3990-4000	Sand, fine to very coarse grained, and a little feldspar; many grains are amber-tinted.
4000-4010	No change.
4010-2040	Sand, coarse to very coarse grained quartz, and a little feldspar; many grains are amber-tinted and pink-tinted; also a few fragments of "basement" rocks.

Depth (feet)	Description
	Paleozoic
	Lower Ordovician(?) or Silurian(?)
4020-4027	Sand, like sample at 4010-4020 ft., and fragments of red and gray mottled, thinly laminated shale that are probably from the weathered surface of the Paleozoic sedimentary rocks.
4130-3135	Cuttings of diabase, and cavings from higher levels.
4135-4140	Diabase fragments, mainly, and a few fragments of the weathered(?) Paleozoic rocks.
4140-4145	Like sample at 4135-4140 ft., with the addition of fragments of dark brownish-gray, hard, material (resembles dolomitic limestone) attached to fragments of diabase; a few fragments of dark-gray shale (Paleozoic).
4145-4150	Not described or no sample.
4150-4155	Diabase, like preceding samples, many fragments of reddish (weathered(?) Paleozoic) shale, and a few fragments of black shale (Paleozoic).
4155-4160	Sandstone, gray, quartzitic, extremely fine-grained, a little black shale, and cavings.
4160-4165	Diabase, quartzitic sandstone, and a little black shale.
4169-4170	Core 36. Recovery 1 ft.
	Bottom $\frac{1}{2}$ ft. Quartzite, gray, and thin lenses of black shale.
4170-4185	T.D. Paleozoic sedimentary rocks.