

DEPARTMENT OF MINES, MINING AND GEOLOGY  
STATE DIVISION OF CONSERVATION



AGRICULTURE LABORATORY BUILDING  
19 HUNTER STREET, S.W.  
ATLANTA 3, GEORGIA

SCHLUMBERGER RECORD

Sealy well  
Dougherty County, Ga.

FRESH WATER 510' - 1110'

280 - 410      Fresh water sand

550 - 580

600 - 755

780 - 785

1010 - 1055

1225 - 1260

1756 - 1788

Brackish water at about 2850' - gets saltier with depth

(A. S. Furcron)

DOUGHERTY COUNTY

Name of Well: J. R. Sealy, et al., No. 1, Reynolds Brothers Lumber Company

Recorded by: A. S. Furcron

Title: Geologist

Well Located: Reynolds Bros. Lumber Company Property about 7 miles from Albany and about 3/4 of a mile north of Central of Georgia Railway.

Type of Rig: Rotary

Depth: 5013 feet

Driller: D. H. Furse

Elevation: 197' A. T. (Transit)

Date Spudded in: December 24, 1941

Completed: 10 P. M. March 25, 1942

Use: Oil Test Well

Terraine: Sink hole topography on Ocala limestone

(All samples are cuttings unless otherwise specified. <sup>2</sup> Lithologic log prepared by using binocular only. heavy mineral log prepared with petrographic microscope)

- 580 - Light gray limestone and shell fragments; gray glauconitic limestone which contains small, rounded or angular quartz grains; blue gray shale fragments; much brown quartz, etc. from up the hole.
- 580 - 585 As above. Some dark gray quartz<sup>to</sup> beds which drilled hard.
- 585 - 592 Blue gray shale and light gray limestone beds; gray glauconitic sandy limestone; the sample mostly limestone; iron stained limestone and quartz fragments probably from a cavernous area in the formation, making some mud.
- 592 - 623 Light gray limestone and shell fragments in gray sandy, glauconitic marl with clear angular quartz grains.
- 623 - 653 Practically all light gray, porous and fossiliferous limestone; some blue gray shale beds; (~~angular brown~~) fossil fragments resembling internal casts of gastropods.
- 653 - 684 Practically all light gray porous limestone; gastropods and clams; pyrite.
- 684 - 714 Light gray limestone; some pyrite.
- 714 - 744 Practically all light gray limestone; some splintery fragments of gray shale.
- 744 - 774 Limestone and blue shale.

Note: Casing set at 774 feet. Samples described above were ~~separated~~ <sup>collected</sup> in trench which leads from mouth of <sup>Casing.</sup> ~~cutting~~. At this point the box was set for collecting cuttings. All later samples were taken from box.

- 780 Brown sand, many clear grains of rock crystal; abundant nodules, ~~deep~~ <sup>light</sup> green to greenish black glauconite.
- 774 - 804 Cuttings mostly limestone fragments; some blue shale and considerable glauconite.
- 804 - 810 Sixty per cent light gray limestone; 30 per cent fine, clear, sub-rounded, angular quartz sand; abundant small glauconitic nodules.
- 810 - 835 About 40 per cent sand; clear rock crystal, sub-angular grains; about 30 per cent gray limestone; some shell fragments; this zone is extremely glauconitic and probably 20 per cent or more of the sample is glauconite.
- 827 About 60 per cent limestone; 30 per cent clear sub-angular quartz sand; much glauconite; one pink garnet noted.
- 827 - 835 Sample very glauconitic, about 60 per cent of the sample fine-grained angular clear quartz sand; considerable gray limestone.

Number 5146 Borden

- 835 - 865 Fifty per cent light gray limestone; 40 per cent or more sand as above; much glauconite; Bryozoa.
- 865 - 895 Mostly medium-coarse, clear, sub-angular quartz; some gray limestone; considerable glauconite; some blue shale fragments.
- 895 - 925 At least 50 per cent sand; light gray limestone abundant. The sand is gray and rather fine-grained; glauconite still persists; nodules very small; some brown stained sand grains from up the hole.
- 925 - 955 About 40 percent gray sand the remainder of sample mostly light gray limestone; ~~multicolored shale fragments~~
- 955 - 985 Much light gray limestone; soft blue shale or mud but no shale fragments.
- 985 - 1015 Blue gray shale that breaks down in <sup>to</sup> mud. It is difficult to wash samples and not much sample accumulates; considerable light gray limestone.
- 1015 - 1045 Nearly all blue shale with two small limestone breaks. Not much sample accumulation in box because most of it ran away with mud; drilled fast; fragments of marl; effervesces in acid to give residue of some very fine sand and minute ~~flakes~~ <sup>grains</sup> of glauconite.
- 10<sup>7</sup>45 - 1105 Fine-grained gray sand and marl; some muscovite mica and glauconite.

1045 - 1075 Blue grey shale with some limestone beds.

- 1105 - 1135 Similar to above but sand is a little coarser; effervesces
- 1135 - 1165 Similar to above; contains a few limestone beds.
- 1165 - 1195 Blue shale but acid digestion shows large amount of fine sand which caused cuttings to stick to bottom of box; small black nodules of glauconite abundant.
- 1195 (Bit Sample) Sticky blue shale or mud stone containing some large pyrite concretion of irregular shape. Washed sample contained pyrite and glauconite.
- 1195 - 1225 Much fine, gray sand with blue mud; micaceous (muscovite); effervesces freely. Sand is clear and rather angular and salt and pepper colored; little gray limestone; pyrite.
- 1211 - 1229 (Core) 6' recovery; tough, blue sandy clay i.e. a sandy mud stone; washed sample is 1/3 ~~gray~~ sand and about 2/3 blue clay; a few shell fragments. Put on fish tail which would not cut material under the core; changed to rock bit.
- 1225 - 1255 Similar to above 30' but somewhat more micaceous. slightly less blue mud; quartz angular and salt and pepper colored.
- 1225 - 1285 Resembles in all respects sample above; acid treated gives clear angular quartz sand and glauconite.
- 1285 - 1315 Fine sandy mud stone; glauconitic; similar to above but contains noticeable fragments of white gray limestone and some small finger nail pieces of brown sticky mud; some small fragments of muscovite; cuttings still stick to bottom of box; shell fragments much broken; ~~clear shell fragments not noted, features similar to above.~~ *light sized*
- 1315 - 1345 About as above but more muscovite noted.
- 1345 - 1375 Mostly sharp fine sand as in above specimen; some glauconite; not much effervescence.
- 1375 - 1405 <sup>✓</sup>  
A About as above.
- 1405 - 1435 About as above.
- 1435 - 1465 Sample consisted mostly of some sand and glauconite; contains some gray limestone and a few fossils.
- 1476 (Bit Sample) Bit fouled at this place; sticky blue shale containing pyrite nodules resembling 1195; slightly gritty.

- little clay*
- 1465 - 1495 Sand and blue gray sand is coarser than above; angular; some ~~clear~~ shale; sample effervesces freely; some limestone particles; not much glauconite.
- 1495 - 1525 Sandy blue mud or shale; effervesces freely; quartz is clear, fine-grained and angular; glauconite quite noticeable.
- 1525 - 1555 Sandy blue mud stone or shale; some effervescence; contains some clear blue gray shale fragments; sandier than above sample but otherwise similar to it; micaceous.
- little*
- 1555 - 1585 Much ~~clear~~ blue gray shale; some light gray limestone beds; sand abundant and very fine and angular; glauconitic; effervesces rather freely.
- 1585 - 1615 As above; little glauconite.
- 1615 - 1645 As above; little glauconite.
- 1645 - 1675 As above; little glauconite
- 1675 - 1705 About as above; some gray limestone fragments.
- 1705 - 1735 About as above; mostly blue gray shale fragments; some very fine angular sand and equally fine glauconite.
- 1735 - 1765 About as above; practically no sand; glauconitic.
- 1765 (Bit Sample) Deep green almost blue green shale that is slightly sandy; effervesces freely giving off  $H_2S$ , and giving fine-grained very angular sand residue and glauconitic; aragonite prisms.
- 1759 - 1765 (Core) 6 foot recovery; porous green micaceous sand; sand rather sharp and clear; considerable glauconite; effervesces in acid.
- 1765 - 1786 Mostly blue marly shale fragments which effervesce; about 30 per cent sharp, angular, clear sand; ~~many~~ *small* shell fragments.
- 1786 - 1816 Mostly blue gray shale; considerable clear sharp angular quartz; some shell fragments; after acid treatment considerable glauconite is seen in sand. About 35 feet of sand resembles above. Core appears to occur at this level.
- 1816 - 1846 Blue marly mud stone or shale; ~~sharp, clear sand~~ effervesces freely; after acid treatment gives sharp clear sand grains and glauconite.
- 1846 - 1876 As above

- 1876 - 1906 Blue gray shale fragments and some gray limestone; sample effervesces freely to give residue of ~~dark~~, fine, clear sand and glauconite. *Sharp*
- 1906 - 1936 Blue mud stone with some clear blue gray shale fragments; effervesces freely to give residue of fine-grained, ~~dark~~, clear sand and glauconite. *Sharp*
- 1936 - 1966 Sample resembles 1876 - 1906.
- 1966 - 1996 Blue gray shale fragments; some shell fragments; sample effervesces freely with residue to sharp, clear fine sand and glauconite.
- 1992 - 1996 (Core) Two foot recovery. Sticky, dark blue gray <sup>marly</sup> unstratified mud stone; distinctly micaceous; effervesces freely to give residue of sharp angular sand with glauconite.
- 1996 - 2020 Shaly sandstone; <sup>S</sup> containing much mica and also some glauconite; effervesces in acid giving residue of clear, fine sand grains and some glauconite.
- 2020 - 2050 Very much as above but distinctly <sup>a</sup> blue shale. *^*
- 2050 - 2080 Mostly blue gray shale fragments; effervesces freely; gives residue of sharp clear sand and glauconite; shell fragments rather abundant.
- 2080 - 2110 Sand and shale beds; cutting <sup>S</sup> effervesce giving sharp clear, fine sand residue and some <sup>a</sup> glauconite. *^*
- 2110 - 2140 About as above.
- 2140 - 2170 Soft blue gray shale; effervesces freely; some clear sub-angular quartz and a little glauconite in residue of blue gray soft shale and shaly marl.
- 2260 (Bit Sample) Tough, **sticky**, compact blue shale rubber like without stratification; almost no reaction to acid; micaceous.
- 2260 - 2290 Blue gray shale fragments.
- 2290 - 2320 Blue mud with a few shale fragments; effervesces freely to give residue shale fragments and clear, sub-angular partly rounded quartz grains.
- 2320 - ~~23~~50 Blue gray sandy shale; effervesces - residue of shale fragments and considerable angular sub-rounded clear, <sup>medium</sup> coarse, irregular size quartz grains.
- 2350 - 2380 Sandy, micaceous shale; a few brown quartz grains; mica abundant; no fossils noted; acid residue sand and shale fragments with sand grains clear, angular irregular size; considerable pyrite.

- 2382 (BIT SAMPLE) Sample cub from fish tail; bed is stiff blue sandy clay; no acid reaction observed; washed sample gives residue of clear angular, sub-angular quartz and little mica.
- 2382 - 2388 (CORE) Lithologically resembles Tuscaloosa formation; coarse angular, uneven-grained sand; some pyrite and mica; sample contains some deeply iron stained quartz grains.
- 2380 - 2410 Rather coarse gray micaceous quartz sand; some blue gray shale fragments, orange and lemon colored sand; considerable pyrite concretion.
- 2410 - 2440 Medium-coarse, angular quartz sand and blue gray shale; some mica; some orange and lemon colored coarse quartz grains.
- 2440 - ~~2440~~2470 Medium-coarse gray quartz sand; containing<sup>s</sup> angular or orange colored quartz grains; pyrite.
- 2452 - 2458 (6' CORE), Four foot recovery. Unstratified coarse, irregular size quartz sand (green); containing brown clay areas; numerous brown quartz grains; mica; some small clam shells.
- 2493 - 2500 (CORE) No recovery. Two pea size<sup>d</sup> pieces were recovered from core barrel of purple clay which contained areas of greenish sandy clay.
- 2470 - 2500 Cuttings represented in part by the above core contained coarse irregular size quartz with some blue gray shale; orange sand grains common; muscovite; pyrite; shells abundant; small Ostrea and plicated Pelecypods.
- 2521 - 2524 (CORE) Three foot core 1½ foot recovery, material on bit before core was taken is brown milk chocolate colored clay which contains some patches of greenish sand and green clay. The core is green sand rather coarse, mixed with purplish chocolate colored clay. The sand when clay is washed out is clear, angular, sub-rounded; medium coarse; a few brown stained grains; mica rare; very slight reaction to acid.
- 2500 - 2530 Sample mostly stained but considerable original mud washed out of cuttings box; some mica; sand rather coarse and angular and of uneven size; some brown grains; shell fragments common.
- 2530 - 2560 Medium-coarse sand and clay, some blue shale fragments; brown sand grains occur; micaceous.
- 2552 - 2559 (CORE) Coarse grained sand in green clay;
- 2560 - 2590 Mostly medium-coarse sand; micaceous; some of the original clay lost in cuttings box; shell fragments which may be from up the hole.

- 2590 - 2620 Medium-coarse, micaceous sand; quartz grains clear and sharp; shale fragments; most of mud specimen washed out in cuttings box.
- 2620 - 2650 Medium-grained angular quartz sand and green mud much as above.
- 2649 - 2655 (CORE) Six inch recovery; purple, brown and green clay and greenish clay with coarse sand.
- 2660 - 2690 About as above.
- 2690 (BIT SAMPLE) Coarse quartz fragments mixed with fine quartz grains and gray kaolin; much variation in size of quartz grains; quartz grains much oxidized; micaceous; chocolate colored clay with sand and included white kaolin balls. Very typical of Tuscaloosa.
- 2690 - 2720 Coarse angular quartz grains; many brown stained grains; some grains of gray potash ~~feldspar~~ mica <sup>pegmatite</sup> sized
- 2720 - 2740 (BIT SAMPLE) Coarse, irregular quartz grains in clay; many stained grains; micaceous; some fragments of light gray aplitic granite; pyrite; dark brown lignite in bit sample at 2740; numerous small, black, shiny particles of bone; shells probably from up the hole because the mud was recirculated.
- 2720 - 2750 As above. Glauconite noted which may be from up the hole.
- 2750 - 2780 Medium-coarse irregular <sup>shaped</sup> quartz sand; micaceous; some small oysters; glauconite; some sand grain aggregates cemented by brown iron oxide.
- 2780 - 2804 Rough unequal-size quartz sand with mica, iron stained grains; sample well washed.
- 2804 (6' CORE) Full recovery. Upper part of hole drilled very hard and consists of a rock containing considerable biotite mica especially of bedding planes; considerable fine sand in the matrix; lime, and clay. This material contained paper-thin layers of black shale, and layers of black shale with small oyster shells.
- 2804 - 2838 Much quartz sand; grains angular some rounded; Mica; some Pelecypod shells; some brown sand grains;
- 2849 - (BIT SAMPLE) Blue gray shale with fine sand and mica.

- 2845 - 2851 (6' CORE) Full recovery; green micaceous sandy shale; shows distinct inclined stratification; very micaceous with fine, silver-gray color probably due to minute and abundant flakes of mica; some hard, brown sand pebbles. Contains some thin layers of black shale. Core contains 8" bed of hard gray limestone at very top. Most of the core is an exceedingly micaceous, greenish marl with considerable angular quartz; effervesces. The upper part of this core (2845-2846) contains numerous small oyster shells and some striated clam shells, some of which are an inch or more long; definite test for salt with silver nitrate was obtained.
- 2834 - 2867 *grains* Coarse, rough sand and brittle blue shale; red quartz grains; many shell fragments; washed sample contains small aggregates of quartz, cemented with asphaltic material which ~~gave~~ gave a definite test in either.
- 2867 - 2897 For sequence note 2834-2867, preceding discussion of above core. Washed sample contained rough quartz grains of irregular sizes, coarse to fine; iron stained grains; glauconite; pyrite nodules exhibiting a combination of cube and octahedron; pipe scale; positive reaction for ~~from~~ salt.
- 2897 - 2927 Angular coarse to fine sand; some gray sandy shale fragments; glauconite; well washed sample contains some small, yellow brown mud balls; some mica
- 2927 - 2957 *Subrounded to angular quartz grains and blue grey brittle shale fragments; many stained quartz grains; glauconite; pyrite.*
- 2971 - 2973 (2' CORE) Core taken in sandy shale break. No recovery.
- 2957 - 2987 Blue gray shale and sandy shale - rather slow drilling; some brittle blue gray shale; red and yellow quartz grains.
- 2991 - 3021 Well washed sample contained rough quartz grains, <sup>and</sup> coarse to fine brown sandy mud balls; much clay washed out of cutting box; pyrite.
- 3021 - 3051 Sandy shale and blue gray, brittle shale; a little mica; glauconite; some shells present.
- 3051 - 3081 *Shale* Coarse rough quartz sand with some blue gray, brittle ~~shell~~ fragments; numerous pink, yellow and orange quartz grains; sample was well washed and originally was about 30 per cent sand and about 70 per cent mud.

Some pyrite; some mica. One rather large crystal of brown tourmaline; fragments of fine-grained, micaceous sandstone; small pieces of coal.

- 3121 - 3127 (6' CORE) One inch recovery. The small sample recovered from the core barrel consisted of purple clay with large and small quartz grains and some muscovite; some lignite. *shale*
- 3081 - 3111 Well washed sample consisted of rough, ~~medium~~ coarse quartz grains and blue gray shell fragments; a little glauconite. In addition to the above small pieces of dark gray limestone with pyrite, a fragment of pink garnet, fragments of gray sandstone some with mica, and fine quartz fragments containing black tourmaline were noted.
- 3111 - 3141 Much coarse quartz sand, angular and large range in size of grains, most of the original rock is sandy mud or shale; blue gray shale fragments; some glauconite; a few lignite fragments; pyrite; some golden yellow mud balls; aragonite; one piece of coal noted.
- 3141 - 3171 Sandy mud; rough, angular quartz fragments, coarse to fine-grained, some pieces of gray sandstone; pyrite and glauconite.
- 3171 - 3201 Well washed sample shows coarse ~~to~~ *varied* sized sand and some blue shale fragments; fragments of gray micaceous sandstone; ~~various~~ colored quartz grains; pyrite; coal; original rock probably more shale than sand.
- 3201 - 3231 Red beds; dark blue shale; washed specimen contains sharp, angular quartz ~~grains~~, many of which are orange colored and other colors; some fine sandy blue gray shale fragments; gypsum.
- 3209 - 3217 (8' CORE) Six foot recovery. Red beds. About 1/3 coarse, irregular-sized, sharp, rough quartz sand and 2/3 brick red clay; one piece of rough vein quartz 2/3 of an inch in diameter; no indication of stratification in core; gives ~~an~~ considerable silver chloride precipitate with silver nitrate; washed sample contains massive gypsum fragments; waxy clay (Halloysite?).
- 3232 - 3263 Coarse angular quartz often colored and blue gray shale.
- 3263 - 3297 Coarse angular quartz with many red and lemon colored grains; some blue gray fragments; lignite; mica; pyrite.
- 3297 - 3327 As above but decidedly micaceous and containing more blue shale and more mud than sand; grains of red gypsum;

- some glauconite; bromoform separation of heavy mineral containing forams coated with pyrite; ~~and~~ considerable stellite.
- 3327 - 3357 Essentially as above and below but more mud.
- 3357 - 3387 Several ostrea sp? Much vari-colored quartz sand; lignite and thin lignite beds in blue gray fine sandy shale; quartz grains coarse to fine and angular; pyrite abundant; green glauconite; mica; some fragments of red gypsum; stellite. At this point fish tail bit was completely worn out to pear-shaped nub.
- 3387 - 3417 Coarse quartz sand; angular; micaceous; most of original clay washed out of cutting box; some blue gray shale or sandstone with glauconite; some quartz grains partly covered with kaolin and fine mica; glauconite common in finer meshes and of deep green color; sawdust, pipe scale and stellite.
- 3417 - 3447 Coarse quartz grains about as above but more quartz; changed core bit to roller rock bit; quartz grains did not wash clean and was partly kaolin and mica; ostrea.
- 3447 - (BIT SAMPLE) Blue clay with quartz sand interlayered with sandy iron-stained kaolin. Put on roller rock bit; sample lithologically typical of Tuscaloosa formation; some waxy looking ~~formation~~ *kaolin* (halloysite ?).
- 3447 - 3477 Coarse vari-colored quartz sand, angular, coming from poorly stratified mud or shale most of latter lost in cutting box, *Some* ~~most~~ glauconite, etc. probably from above; most of the quartz grains lack inclusions and ~~probably~~ resemble ~~massive~~ broken down vein quartz. Lithologically resembles Tuscaloosa formation.
- 3477 - 3508 Very similar to above.
- 3508 - 3538 No new or different lithological features observed; Ostrea sp?
- 3538 - 3566 S. O. S.
- 3566 - 3568 Coarse to fine, angular, vari-colored quartz grains; alabaster gypsum; coarse, ~~rough~~ etched quartz grains; fine grains gray slaty micaceous sandstone; some glauconite probably from above.
- 3574 (BIT SAMPLE) Sticky brown and greenish clay with coarse, rough quartz grains; roller rock bit fouled, rollers worn flat; resembles Tuscaloosa, changed to new fish-tail bit.
- 3568 - 3598 Coarse and fine grains of vari-colored quartz sand.
- 3598 - 3628 As above but considerable blue shale fragments finely micaceous; Ostrea sp?.

- 2628 - 3636 Coarse, angular, vari-colored sand with some blue shale and some calcareous gray glauconitic sandstone; pyrite; smoky quartz grains; shell fragments with aragonite structure; Ostrea sp?.
- 3636 (BIT SAMPLE) Tough chocolate brown clay containing sand and thin coal seams.
- NOTE: In many respects this sample resembles a tough, purple glacial till. Glacial deposits are certainly not expected at this horizon. Nevertheless when the material is slaked and washed free of sticky clay there is a residue of pebbles many of which are highly polished and faceted. These pebbles are almost entirely quartz; when facets are dipped in water and examined under binoculars they are definitely but delicately striated. The finer sand residue consists of sharp, broken angular grains. This type of sticky material at this horizon appears to lie between 3221-3661. It reoccurs at lower levels and is very difficult to drill because it fouls roller bit and sharp pebbles and sand grains ~~drilled~~ <sup>mean</sup> out ~~fish-tail~~ bits. <sup>no cores of this type of material.</sup> Unfortunately there are
- 3628 - 3658 Medium coarse fine-grained sand some shale fragments. Pebbles which are known to occur in this zone do not come out in cutting box except as broken fragments.
- 3658 - 3688 About as above.
- 3688 - 3718 About as above but sand is finer.
- 3718 - 3748 About as above.
- 3748 - 3778 Medium coarse to fine sand; some blue gray shale fragments.
- 3778 - 3808 Coarse, vari-colored quartz grains and <sup>blue</sup> gray shale fragments.
- 3821 (BIT SAMPLE) Sticky green mud with rounded areas of light gray kaolin resembling rocks in Tuscaloosa formation.
- 3808 - 3838 Coarse vari-colored sand; some <sup>gray</sup> sand limestone and gray micaceous sandstone; waxy kaolin; most of mud and shale washed out of cuttings.
- 3838 - 3868 Coarse, vari-colored sand and some blue arenaceous shale and balls of purple sandy shale; mud washed out.
- 3868 - 3898 Coarse, angular, vari-colored sand and some blue gray shale; mud washed out; some pieces of bone and spine; glauconitic sandstone fragments.
- ~~3898 - 3928 Note: Driller gained 8 feet in last three lengths of pipe: sandy blue gray shale~~

- 3898 - 3928 Coarse, vari-colored sand much as above.
- 3928 - 3968 Note: Driller gained 8 feet in last three lengths of pipe. Sandy blue gray shale; sand grains sharp and colored grains scarce; pyrite; wore out rock bit.
- 3966 (BIT SAMPLE) Sandy blue gray micaceous shale with some brown clay and shale and some gray kaolin patches; forams and aragonite columns in washed sample. This sample from teeth of bit and thus from bottom of hole.
- 3958 - 3968 About as above but sand is finer and not as angular; considerable glauconite and pyrite.
- 3968 - 3998 Coarse sand with considerable range in mesh size; some colored ~~grains~~<sup>grains</sup>; blue gray shale fragments; angular shell fragments; sand grains angular ~~and~~<sup>to</sup> rounded but many rounded grains; pyrite. Some fragments of light gray limestone. Numerous small, hard, black, shiny objects some resembling shark's teeth; some quartz grains have a waxy white kaolin in their hollows.
- 3998 - 4028 Much as above but some small grains of fresh, cleavable feldspar noted. Feldspars here and below are yellow, light gray to brownish gray and both plagioclase and potash types are represented. No granite fragments observed.
- 4028 - 4058 Rather fine grained angular quartz sand with some small feldspar grains. Original rock mostly shale.
- 4058 - 4088 Resembles 3968-3998; some feldspar fragments.
- 4088 - 4121 Much as above some blue gray shale fragments; feldspar.
- 4121 - 4151 Coarse vari-colored sand; feldspar fragments; shark's teeth; some fragments of dark ~~basaltic~~ shale.
- 4158 - (BIT SAMPLE) This sample taken from roller rock bit. After clay is washed out there is much coarse sand; ; some polished and striated, dark olive gray shale pebbles; some light gray limestone; pyrite concretions; one shell fragment distinctly polished. The tough clay from the bottom is about the color 3636, but much sandier. Sand contains glauconite; fossil fragments abundant. After shut down at this point the well began to flow and the water contained salt and H<sub>2</sub>S. Put on fish tail.
- 4158 - 4181 Sharp change in lithology; very glauconitic sand limestone or lime with abundant fossils; cuttings pepper and salt color.

- 4181 - 4211 About as above and very fossiliferous; shark's teeth similar to those found in 4121-4151. *shale*
- 4211 - 4241 Sticky; washed residue of glauconitic sand; sandy marl with considerable dark olive *similar to fragments* found in 4158; very fossiliferous; coarse, vari-colored quartz ~~veins~~ *grains*
- 4241 - 4271 Fine-grained sandy, glauconitic marl; contains much mud.
- 4271 - 4301 Sandy glauconitic marl; some sand grains probably from above; shale or mud stone beds which are sticky; some coarse glauconite; pyrite; quartz grains angular and generally clear.
- 4301 - 4331 About as above.
- 4331 - 4361 Glauconitic, sandy marl; less mud than above.
- 4361 - 4392 Coarse to fine angular sand; some fragments of dark to dark gray shale; glauconite and fragments of glauconitic marl; shark's teeth; very fossiliferous; some sand grains from above.  
Trip made to change bit at 2 P. M., March 17.

Note: At 4375½ feet which is the recorded depth of bottom of hole of Pan American No. 1, well (Pierce County), this well became the deepest well in the State.

- 4392 - (BIT SAMPLE) Small sample mostly pick up. Core from eye bit is light gray kaolin; lower end of fish tail worn out and put on rock bit.
- 4392 - 4395 AS above (4361-4392).
- 4395 - 4425 This sample resembles the one immediately ~~below~~ *beneath* it but garnet was somewhat less abundant. Numerous fragments of bit was in the sample.
- 4425 - 4455 Glauconitic sandy marl and dark blue gray shale. Washed sample mostly sub-rounded quartz grains; some shale and marl fragments; much glauconite in finer meshes; sample is very fossiliferous containing bone fragments, ~~vertebra~~ *vertebra* segments and teeth of sharks. Small red garnets and green quartz grains; stained quartz persists as in all of the above samples but in this one they may come ~~from~~ from above; some muscovite. Stopped to change bit. Rock bit wore out and then fouled. Put on fish tail.
- ~~4455~~ - 4485 (BIT SAMPLE) Glauconitic green marl with considerable green mud; gray kaolin; sample not very calcareous and very sandy; some muscovite; shell fragments; a washed sample contained much sticky, light gray kaolin resembling the material in the Tuscaloosa; also much glauconite and quartz. Specimen washed ~~show~~ *show* quartz grains, glauconite, kaolin and balls of mud and some fragments of dark olive shale. Put on fish tail.

- 4485 - 4515 Sand; glauconite; some shell fragments from up the hole; shark's teeth and ~~some~~ <sup>brown</sup> pieces of bone; some iron stained quartz; and some round clay-sand balls. Kaolin washed out of the sample much as above; feldspar.
- 4525 (BIT SAMPLE) Sticky, green or bluish green clay with white areas of sandy kaolin and rather large pebbles and rock fragments; quite glauconitic; drilled with great difficulty. Sample difficult to wash giving residue of sand and glauconite and large pebbles of light gray limestone and with blue gray sandy limestone which contained considerable very fine, angular quartz grains and numerous minute fragments of brown lignite. Also pebbles of olive colored shale which are generally polished and striated. One pyrite pebble; a few small quartz pebbles. Limestone and sandstone pebbles range up to one inch to 1 1/8 inch in largest diameter; a few broken shell fragments. This zone as represented by bit sample seems to lie between 4490 and 4525. Because the bit made no progress the driller thought he was in "hard sand".
- 4515 - 4545 Cuttings mostly quartz sand; glauconite; broken shell fragments; small balls of incompletely washed clay; some feldspar grains and mica; garnet; pyrite; quartz grains some times stained. Panned sample contains numerous small red garnet and bit fragments.
- 4545 - 4575 Rather similar to above but contains more sand in the mud which is somewhat purple in cuttings box; also small, coarse quartz grains; breaks of blue gray shale occur in this zone. A panned sample contained considerable garnet, pyrite, magnetite and zircon. The shale breaks in this zone appear to alternate frequently with sandy mud suggesting the possibility of some sort of ~~intermittent~~ <sup>seasonal</sup> varving.
- 4575 - 4605 About as above. Shale breaks alternate frequently with sandy mud.
- 4605 - 4636 Thin shale breaks alternate with sandy mud; not much glauconite.
- 4636 - 4661 Sticky. Trip made to change bit. Sample is hard to wash but contained considerable sand which is medium coarse to fine grained with frequent coarse quartz; fragments of dark blue gray shale abundant. Driller's log - indicate that thin shale breaks alternate with sandy mud to the depth of 4661. Rock bit worn out put on fish tail.
- 4661 (BIT SAMPLE) Sticky green clay with large pebbles of dark olive gray shale up to 2 3/8 X 1 1/2 inches. Also a pebble of glauconitic limestone 1 1/2 inches long with shell in it; small pebbles of quartz, etc. Large pebbles all broken by bit. The finer material in washed sample is very angular sand, glauconitic; pea to wheat size pebbles and quartz; some large fine mica.
- Naika*

- ↘ 4661 - 4671 Medium coarse to fine sand with angular fragments of blue, <sup>gray</sup> ~~greenish~~ shale; coarse quartz grains; sample difficult to wash; small fragments of purple, ~~gray, mica~~ <sup>Some mica.</sup>
- 4671 - 4702 About as above.
- 4702 - 4732 About as above.
- 4732 - 4762 About as above.
- ↘ 4762 - 4780 Very similar to above; micaceous; <sup>numerous</sup> angular fragments of purple clay and after drilling mud is washed out ~~of~~ purple <sup>(the)</sup> clay ~~is~~ break<sup>s</sup> down to give water <sup>a</sup> ~~of~~ ~~brn~~-chocolate-brown color.
- 4772 (BIT SAMPLE) Small sample of green and purple clay with a few quartz pebbles. Bit worn out; put on rock bit. Larger pebbles much broken by bit; one fragment of glauconitic sandstone noted. Sample difficult to wash.
- 4762 - 4792 Washed cuttings consist of medium coarse sand. Original ~~rock~~ <sup>rock</sup> ~~is~~ probably sandy mud stone.
- 4792 - 4822 As above.
- ↘ 4822 - 4852 About as above. Some blue gray shale fragments. Some samples of glauconitic sandy limestone; pyrite; garnet.
- 4852 - 4876 Bit worn out; Changed to fish tail bit; <sup>tough</sup> blue and purple shale.
- 4876 - 4882 About as above.
- ↘ 4882 - 4916 Coarse angular sand with blue gray shale fragments; considerable garnets and feldspar fragments. Drilled very slowly; ~~pyrite; blue gray shale;~~ beds of light gray limestone and small purple clay fragments.
- 4916 - 4948 Coarse sand; fragments of blue gray shale; a few broken shell and limestone fragments; feldspar common; small pieces of purple clay.
- 4932 (BIT SAMPLE) Sticky green clay with some pebbles. Considerable pick up. Put on new fish tail.
- 4935 <sup>(BIT SAMPLE)</sup> Bit worn out in 3 <sup>feet</sup> drilling; <sup>of</sup> drilled very hard; bit sample mostly pick up.
- 4948 - 4978 Cuttings washed consist of medium sized sand grains.
- ↘ 4978 - 5000 Fine-grained, moderately angular sand; some blue gray shale fragments.
- 5000 - 5008 As above
- ↘ 5008 - 5013 As above.

(BOTTOM OF HOLE)