

Georgia Geological Survey well no. 716

Stewart County, Georgia

Heinze-Spanel Drilling Co., W. C. Bradley no. 1

TD 2916

Geophysical datum: Kelley bushing, 548 feet above sea level

logged by Gilbert L. Treadwell, Emory University, August 1976

\* after a depth means a microfossil slide has been prepared and is in the sample envelope.

Stewart County

lithologic summary

- 0-160 no samples
- 160-430 Clear white, yellow and orange, micaceous, pyritic, hematitic, limonitic (pyrite, hematite and limonite more abundant in the upper, more leached portion), some slightly fossiliferous (forams, pelecypods, ostracodes), fine grained, some slightly limy, sand
- 430-520 very glauconitic, medium grained quartz sand
- 520-600 finer grained quartz sand; the first shale. Clear, glauconitic, micaceous, pyritic, slightly fossiliferous, well sorted, very fine to fine grained, limy (1-15%), shaly (10-20%) sand.
- 600-720 Shale percentage increases, glauconitic, slightly lignitic, phosphatic, medium grained sand. 700-710 no sample.
- 720-1450 Mostly shale with interlayered sand and limestone, usually as fossil fragments. Soft, fissile, olive gray 5Y<sub>4</sub>/1, micaceous, slightly glauconitic, slightly lignitic, slightly pyritic shale.
- 1450-2910 Clear, white, pale yellow to orange, some smoky gray, feldspathic, medium to well sorted, angular to subangular, coarse grained sand. Most of the section is rather pure sand. From 1820 to 2060, up to 40% shale is present.

- 0-160 no samples July 1976
- 160-170 Leached, hard, clear, cloudy white to orange and yellow, pyritic, hematitic, limonitic, micaceous, vitreous, medium sorted, angular, very fine to very coarse grained (1/16-2 mm, ave. .2 mm) slightly shaly (1%-medium light gray N5, iron stained, micaceous, fissile, non calcareous sand.  
 A bit of iron cemented sandstone. Two major sand size categories: 1 -dominant is fine grained (1/8-1/4 mm) and 2 -coarse grained (1/2-1 mm, ave 1 mm). Washed sample had much of the fine grained portion washed out.
- mica, limonite, hematite, pyrite
- 170-180 Little change. Leached, hard, clear, cloudy white, orange to yellow, pyritic, hematite, limonite, micaceous vitreous, medium sorted, angular, very fine to very coarse grained (1/16-2 mm, ave. .20 mm) shaley (3%) sand.  
 Very fine to fine specks of a black, glassy unknown mineral-obsidian?
- 180-190 Less coarse grained portion
- 190-200 Same shaly (3%) sand.
- 200-210\* Less leached (fine grained portion), less iron staining, slightly fossiliferous, slightly leached, hard, mostly clear, some orange to yellow in coarse grained portion, micaceous, hematitic, limonitic, pyritic, fossiliferous (forams, pelecypods, ostracodes?), vitreous, medium sorted, very fine to very coarse grained, average 1/16 mm, slightly shaley (2%), slightly limy (3% light gray N7 micaceous, slightly clayey fine-sandy limestone), sand.
- 210-220\* Even less coarse grained portion, less than 10%, so now well sorted, fine grained sand, still very fine to fine black specks (5%).
- 220-230 no change
- 230-240 Sand, fresh to leached, hard, clear to orange and yellow, micaceous, hematitic, limonitic, pyritic, slightly fossiliferous, vitreous, medium sorted, very fine to very coarse grained, ave. 1/16 mm, slightly shaly (3%), slightly limy (3%). Some (1%) is iron cemented, fine grained sandstone.

- 240-250 less coarse grained portion, now well sorted again.  
Little change otherwise
- 250-260\* no change
- 260-270 Fresh, slightly leached, hard, clear to pale orange, micaceous, pyrite, limonite, hematite, fossiliferous (forams and shell fragments), vitreous, angular, mostly fine grained (1/8-1/4 mm) shaly (2%), limy (4%) sand. Some (1%) is olive gray 5Y4/1 clayey limestone cemented, sandstone.
- 270-280 no change
- 280-290\* Fresh, clear, micaceous, fossiliferous, vitreous, well sorted, angular, fine grained limy (10%) sand.
- 290-300 no change.
- 300-310 Sand, fresh, clear, some still stained orange, hematitic, micaceous, glauconitic, phosphatic, angular, fossiliferous (forams, pelecypods, ostracodes), mostly fine grained, well sorted, average 1/6 mm, limy (12%)
- 310-320 Sand, coarser grained, more glauconitic, fresh, clear, cloudy white, glauconitic, micaceous, phosphatic, fossiliferous, fine to coarse grained, average 1/4 mm, medium sorted, limy (5%)
- 320-340 no change, glauconite 2%
- 340-350\* sand, less glauconite, less medium and coarse grains, fresh, though still some iron stain, clear, micaceous, glauconitic, phosphatic, fossiliferous, vitreous, well sorted, angular, fine grained-10% medium to very coarse grained, slightly shaly ( 5% soft, fissile, micaceous) limy, (3%)
- 350-360 Fresh, clear to white, micaceous, glauconitic, slightly phosphatic, vitreous, well sorted, angular, fine grained, slightly shaley, limy (3%) sand.
- 360-370 More coarse grains, little change
- 370-380 Fresh, clear, micaceous, glauconitic, fossiliferous (forams, ostracodes, pelecypod fragments), vitreous, well sorted, angular, fine grained, shaley limy (1%) sand.
- 380-390 no change
- 390-400 no change, 2% shale, 1% limestone

- 400-410 little change. Fresh, clear, micaceous, glauconitic, phosphatic, well sorted, angular, fine grained limy (1%) shaley (2%) sand.
- 410-420 no change
- 420-430\* pyrite, more mica and shale. Fresh, clear to white, some orange coatings, micaceous, glauconitic, slightly phosphatic, slightly pyritic, fossils, vitreous, well sorted, angular, fine grained, limy (3%) shaley (5%) sand.
- 430-440 Change.  
Pure medium grained sand with glauconite. Fresh, clear, glauconitic (3%) slightly micaceous, vitreous, well sorted subangular, medium grained average 1/3 mm, pure sand.
- 440-450 No change. Same very glauconitic, micaceous, subangular, medium grained, some fine and some coarse grained sand.
- 450-460 Little change. Now fossiliferous and 2% light gray, glauconitic sandy limestone.
- 460-470 very glauconitic 15%
- 470-480 little change. Fresh, clear, very glauconitic, micaceous, fossiliferous, vitreous, well sorted, sub angular, fine to coarse grained, mostly medium grained average 1/2 mm limy 5% sand.
- 480-490 no change.
- 490-500 Less glauconite, coarser grained, fresh, clear to cloudy white, glauconitic, micaceous, slightly pyritic, slightly fossiliferous (chalky to pearly fragments), vitreous, well sorted, subangular, fine to coarse grained, mostly coarse grained, average 3/4 mm limy (5%) sand.
- 500-510 no change
- 510-520 Fresh, clear, glauconitic, micaceous, slightly fossiliferous, vitreous, subangular to angular, medium sorted, fine to coarse grained, average .5 mm sand with 5% limestone.
- 520-530 Change.  
Finer grained, much shale. Fresh, clear, glauconitic, micaceous, pyritic, slightly hematitic, slightly fossiliferous, vitreous, well sorted, angular, very fine to fine grained, average 1/8 mm, limy (5%) shaley (20%) sand.
- 530-540 Little change. Less shale (8%), coarser grained, average 1/6 mm.

- 540-550 Fresh, clear, glauconitic, micaceous, pyritic, fossils (forams, pelecypods and ostracodes), vitreous, well sorted angular, very fine to coarse grained, mostly fine grained, average 1/6 mm, limy (1%) shaley (10%) sand.
- 550-560 no glauconite. Fresh, clear, slightly micaceous, slightly fossiliferous, vitreous, well sorted, angular, medium grained, average .5 mm, limy (1%) shaly (3%) sand.
- 560-570 Glauconite back, 1% shale 8% limestone and dark gray pelecypod fragments. Bit of a new white crystalline limestone.
- 570-580 Fresh, clear, glauconitic, micaceous, fossiliferous, vitreous, well sorted, angular, very fine to medium grained, average 1/4 mm, mostly fine grained, shaley (3%) limy (12%, of which 8% is the new white, sandy crystalline type), sand
- 580-590 no change
- 590-600 Fresh, clear, micaceous, phosphatic, slightly glauconitic, fossiliferous, medium sorted, angular, very fine to coarse grained, mostly fine grained, average 1/4 mm, slightly shaley, limy (15%) sand.
- 600-610 Fresh, clear, micaceous, glauconitic, slightly lignitic, slightly pyritic, slightly fossiliferous, vitreous, angular, well sorted, fine grained, average 1/6 mm, limy (2%) shaley (12%) sand.
- 610-620 Coarse grains more, average now 1/3 mm, more shale (20%)
- 620-630 no change
- 630-640 no change
- 640-650 Fresh, some leached (iron stained maybe cave), clear, to cloudy white, micaceous, glauconitic, slightly lignitic, slightly phosphatic, fossiliferous (pelecypod fragments, forams), medium sorted, angular, fine to coarse grained, average medium grained-.5 mm, limy (5%) shaley (25%) sand.
- 650-660 Same
- 660-670 Same
- 670-680 little change, 33% shale
- 680-690 Fresh, clear to cloudy white, micaceous, slightly phosphatic, slightly glauconitic, fossiliferous, medium sorted, angular, fine to coarse grained, mostly fine grained, average 1/3 mm, limy (10%) shaley (35%) sand.
- 690-700 no change
- 700-710 no change

- 710-720 Fresh, clear to cloudy white, micaceous, slightly hematitic, fossiliferous, medium sorted, angular, fine grained, limy (10%) shaley (40%) sand.
- 720-730 Fresh, soft, olive gray 5Y4/1, micaceous, phosphatic, earthy, waxy upon scratching, non porous, sandy (30%) limy (25% white shell fragments and medium gray N6 crystalline sandy clayey limestone) shale, slightly calcareous.
- 730-740 no change
- 740-750 Fresh, soft, olive gray 5Y4/1, micaceous, phosphatic, fossiliferous, earthy, waxy upon scratching, limy (25%-fossil fragments and N6 crystalline limestone) sandy (clear, fine grained 35%) shale.
- 750-760 same
- 760-770 two samples.  
 1. same as above  
 2. more sand- 25% limestone, mostly fossil fragments, and 35% shale as above and 40% sand, fine grained, well sorted
- 770-780 Fresh, clear, micaceous, slightly glauconitic, slightly phosphatic, fossiliferous, forams, pelecypods), vitreous, well sorted, angular, fine grained, average 1/6 mm, limy 20% shaley 35% sand
- 780-790 no sample, August 1976
- 790-800 no change, limy (fossil fragments) shaley sand
- 800-810 Fresh, soft, fissile, olive gray 5Y4/1 micaceous, slightly glauconitic, fossiliferous (forams, ostracodes, many pelecypod fragments), earthy, waxy, limy (25%) sandy (30%) shale.
- 810-820 no change, shale is slightly calcareous
- 820-830 15% limestone, mostly as fossil fragments  
 23% sand, clear, fine grained, angular, well sorted  
 62% shale, soft, fissile, micaceous, with included fossil fragments.
- 830-840 more sand 20% limestone, 35% sand, 45% shale
- 840-850 no change
- 850-860 no change
- 860-870\* same shale with limestone and sand
- 870-880 no change, very little glauconite, micaceous

- 880-890 Same, fresh, soft, fissile, olive gray 5Y4/1, micaceous, earthy-waxy, fossiliferous, limy (10%) sandy (20%) shale.
- 890-900 no sample, August 1976
- 900-910 Same, fresh, soft, fissile, olive green 5Y4/1, micaceous, slightly lignitic, fossiliferous, earthy-waxy, limy (10%) sandy (30%) shale.
- 910-920 no change
- 920-930 more sand. limestone 10%, sand 40%, shale 50%, mica, lignite
- 930-940 sand back down, limy (10%) sandy (20%) shale
- 940-950 Fresh, soft, fissile, olive gray 5Y4/1, very micaceous, lignitic, fossiliferous, forams, pelecypods, ostracodes, gastropods), earthy-waxy, limy (10%) sandy (30%) shale.
- 950-960 10% limestone, 15% sand, 85% shale
- 960-970 no change, mica, lignite
- 970-980 Fresh, soft, fissile, olive gray 5Y4/1, micaceous, lignitic, fossiliferous, earthy-waxy, limy (10%) sandy (20%) shale.
- 980-990 no change
- 990-1000 no change
- 1000-1010 no sample, August 1976
- 1010-1020 no change. same limy (10% fossil fragments) sandy (25% fine grained, clear, angular) shale
- 1020-1030 Same; fresh, soft, fissile, olive gray 5Y4/1, micaceous, slightly phosphatic, fossiliferous (mostly pelecypod fragments, some forams), earthy, waxy when scratched with probe, limy (10% fossil fragments), sandy (15%) shale.
- 1030-1040\*more sand-30%
- 1040-1050 35% sand, 10% limestone
- 1050-1060 no change
- 1060-1070 Fresh, soft, fissile, olive gray 5Y4/1, micaceous, fossiliferous (pelecypods, forams, ostracodes), earthy, limy (10%) sandy (40%) shale
- 1070-1080 no change

- 1080-1090 New limestone; light gray N7, dense, glauconitic, slightly clayey, sand, fresh, hard; also fresh, clear, micaceous, fossiliferous, vitreous, well sorted, angular, fine grained, average .25 mm, shaley (25%) limy (20% new limestone, 10% fossil fragments) sand
- 1090-1100 Fresh, clear, micaceous, fossiliferous, vitreous, well sorted, angular, fine grained, average .20 mm, limy (5% new limestone, 10% fossil fragments) shaley (40%) sand.
- 1100-1110 Fresh, clear, micaceous, lignitic, fossiliferous, vitreous, angular, well sorted, fine grained, average .20 mm, limy (10%) shaley (45%) sand
- 1110-1120 Fresh, brittle, fissile, olive gray 5Y4/1, micaceous, lignitic, fossiliferous, earthy, limy (10%) sandy (30%) shale, some slightly calcareous
- 1120-1130 no change
- 1130-1140 no change
- 1140-1150 Fresh, clear, micaceous, glauconitic, slightly pyritic, fossiliferous (forams, pelecypods, ostracodes, gastropods), vitreous, well sorted, angular, fine to medium grained, average .25 mm limy (10%) shaley (43%) sand.
- 1150-1160 no change
- 1160-1170 Fresh, brittle, medium gray N5, micaceous, lignitic, pyrite, fossiliferous, earthy, limy (8%) sandy (25%) shale.
- 1170-1180 no change
- 1180-1190 Fresh, brittle, fissile, medium gray N5, micaceous, lignitic, pyrite, fossils, earthy, limy (20%- as limestone 8%, as calcareous in shale 12%) sandy (25%) shale
- 1190-1200 New limestone: light gray N7, dense, hard, micaceous, very sandy (25-30%); fresh, brittle, fissile, medium gray, N5, micaceous, lignitic, slightly glauconitic, fossiliferous, earthy, limy (30%-new limestone and fossil fragments) sandy (30%) shale  
(5%) KLA
- 1200-1210 little change, limy (15%, fossil fragments 10%) sandy (40%) shale 10% very fine sand KLA
- 1210-1220 New sand, coarser. Fresh, clear, micaceous, fossiliferous, vitreous, medium sorted, angular, fine to coarse grained, average .5 mm, limy (15%) shaley (40%) sand.  
10% very fine sand KLA

- 1220-1230 Fresh, brittle, fissile, olive gray 5Y4/1 to medium gray N5, micaceous, lignitic, slightly glauconitic, fossiliferous, earthy, limy (15%) sandy (35%) shale (calcareous)  
*10% very fine sand KLA*
- 1230-1240 New shale: light olive gray 5Y6/1, brittle, fissile, non calcareous; Fresh, brittle, fissile, olive gray 5Y4/1 to light olive gray 5Y6/1 to medium gray N5, micaceous to non micaceous, fossiliferous, earthy, limy (15%) sandy (35%) shale (both calcareous and non calcareous)
- 1240-1250 no change
- 1250-1260 Fresh, clear to cloudy white, dull, medium sorted, micaceous angular, fine to coarse grained, average .74 mm, limy (2%) shaley (8%) sand 5% very fine sand and shale fragments KLA
- 1260-1270 Fresh, cloudy white to clear, dull to vitreous, well sorted, angular, medium to very coarse grained, average 1 mm, limy (2%) shaley (8%) sand. 5% very fine sand and shale fragments KLA
- 1270-1280 little change, medium sorted, fine to very coarse grained average .75 mm. 5% very fine sand and shale fragments KLA
- 1280-1290 same, with 20% shale. 5% very fine sand and shale fragments KLA
- 1290-1300 Fresh, pure, white to clear, dull to vitreous, well sorted, angular, coarse to very coarse grained, average 1 mm, sand
- 1300-1310 From pure sand right back to shale again. Fresh, brittle, fissile, olive gray to light olive gray, micaceous, pyrite, lignite, phosphate, slightly glauconitic, fossiliferous, earthy, limy (15%) sandy (20%) shale.  
*fine to very fine sand and shale fragments KLA*
- 1310-1320 no change, limestone as fossil fragments and sandy limestone.
- 1320-1330 Same
- 1330-1340 Same, fresh, brittle, fissile, olive gray 5Y4/1 to light olive gray 5Y6/1, micaceous, phosphatic, pyrite, fossils (pelecypod shell fragments), earthy, limy (8%) sandy (20%) shale.
- 1340-1350 no change
- 1350-1360 no change
- 1360-1370 Fresh, brittle, fissile, olive gray, micaceous, phosphatic, pyritic, fossils, (pelecypods, forams, ostracods) earthy, limy (5%) sandy (30%) shale.  
*fine to very fine sand and shale fragments KLA*
- 1370-1380 mica, phosphate, pyrite, more sand (35%)
- 1380-1390 no change

- 1390-1400 Fresh, clear, micaceous, phosphatic, pyritic, slightly fossiliferous, vitreous, medium sorted, subangular to angular, fine to coarse grained, average .5 mm limy (2%) shaly (45%) sand
- 1400-1410\* Shale as before, with 10% sandy limestone and 25% sand
- 1410-1420 Fresh, clear, micaceous, slightly pyritic, slightly fossiliferous, vitreous, medium sorted, angular, fine grained, some medium and coarse grained, average .25 mm limy (10%) shaly (40%) sand.
- 1420-1430 no change, limy shaly sand , pyrite
- 1430-1440 back to shale. Fresh, soft, fissile, olive gray 5Y4/1, micaceous, pyritic, earthy, limy (10%) sandy (35%) shale
- 1440-1450 no change
- 1450-1460 clean pure sand, fresh, cloudy white to clear, dull to vitreous, well sorted, feldspathic, angular, coarse grained, average 1 mm, pure sand.
- 1460-1470 Same feldspathic, angular, coarse grained sand, now 10% shale.
- 1470-1480 Fresh, cloudy white to clear, pale pink, pale orange, feldspathic (white, cleavage, pearly), dull to vitreous, medium sorted, medium to very coarse grained, average 1 mm, shaly (10%) sand
- 1480-1490 no change, 5% shale
- 1490-1500 same
- 1500-1510 no change
- 1510-1520 Same, feldspathic, coarse grained, slightly shaly sand
- 1520-1530 same
- 1530-1540 same
- 1540-1550 same
- 1550-1560 Same
- 1560-1570 no change
- 1570-1580 Same
- 1580-1590 Same
- 1590-1600 same

1600-1610	Same
1610-1620	same
1620-1630	same
1630-1640	same, coarse to very coarse grained, slightly feldspathic sand, with no shale, well sorted.
1640-1650	same
1650-1660	same
1660-1670	no change
1670-1680	Same , shale 5%
1680-1690	no change
1690-1700	no change
1700-1710	Fresh, cloudy white to clear, pink to pale orange and yellow, feldspathic, dull to vitreous, medium sorted, angular to subrounded, medium to very coarse grained, most is coarse grained, average 1 mm, shaly (10%) sand.
1710-1720	no change
1720-1730	less very coarse grained and more clear, angular, 1 mm sand
1730-1740	Fresh, cloudy white to clear, some pink, pale yellow and orange, slightly feldspathic, vitreous to dull, medium sorted, angular, medium to very coarse grained, mostly .75 mm, coarse grained, shaly (15%) sand
1740-1750	same
1750-1760	Fresh, brittle, fissile, olive gray 5Y4/1, micaceous, earthy, sandy (20%) shale, non calcareous
1760-1770	Fresh, cloudy white to clear, feldspathic, vitreous to dull, medium sorted, angular to subangular, coarse grained, average .75 mm, shaly (15%) sand.
1770-1780	Same with 10% shale
1780-1790	Same, with 5% shale, most sand grains are frosted
1790-1800	Same
1800-1810	Fresh, cloudy white to clear, feldspathic, dull, medium sorted, angular but frosted, medium to very coarse grained (1/4- 3 mm), most coarse grained, average 1 mm, shaly (8%) sand.

- 1810-1820 no change
- 1820-1830 lower average grain size, 3/4 mm, more shale 20%
- 1830-1840 25% shale
- 1840-1850 little change, fresh, cloudy white to clear, pale yellow orange, pink feldspar, vitreous to dull, medium sorted, angular to subangular, medium to very coarse grained, mostly coarse grained, average 1 mm, shaly (10%) sand mica,
- 1850-1860 20% shale
- 1860-1870 same
- 1870-1880 25% shale, bits of iron cement, poorly sorted sandstone
- 1880-1890 same sand, less shale (10%)
- 1890-1900 shale percentage varies between the washed and unwashed sample, more shale in the unwashed; variation to 20%; no change, fresh, clear to white, pale pink, yellow orange slightly feldspathic, vitreous, some frosted, dull, medium sorted, subrounded, coarse grained, average 1 mm, shaly (10-30%) sand
- 1900-1910 washed sample says no change -10% shale; unwashed sample is 30% shale
- 1910-1920 Fresh, clear to white, pink, yellowish orange, pyritic, lignitic, phosphatic, feldspathic, slightly fossiliferous (shell fragments), vitreous to dull, poorly sorted, subangular, fine to very coarse grained, mostly coarse grained, average 3/4 mm, shaly (40% unwashed) sand
- 1920-1930 Fresh, clear to white, etc., micaceous, feldspathic, pyritic, slightly fossiliferous (shell fragments), vitreous, medium sorted, subangular, medium to very coarse grained (1/4-2 mm) mostly coarse grained, average 3/4 mm, shaly (45% unwashed) sand
- 1930-1940 no sample
- 1940-1950 no change unwashed -30% shale *KLA*
- 1950-1960 Fresh, clear to white, much less additional coloration, micaceous, pyritic, feldspathic, slightly fossiliferous, vitreous, poorly sorted, subangular, fine to very coarse grained, mostly coarse grained, average 1/2 mm, shaly (20% sand. 10% fine and very fine sand and shale fragments *KLA*
- 1960-1970 little change though many shale pieces are iron stained yellow, red or orange 10% fine and very fine sand and shale fragments *KLA*

- 1970-1980 Same shaly (30%) sand
- 1980-1990 fine grained portion back, still iron stained shale; lignite
- 1990-2000 new fine grained orange sand. Clean, white, orange, feldspathic, micaceous, pyritic, slightly lignitic, slightly fossiliferous (pelecypod fragments), vitreous, medium sorted, fine to very coarse grained, mostly fine grained average .25 mm, shaly (15%) sand
- 2000-2010 clear, white, pink, yellow, orange, micaceous, feldspathic, pyritic, slightly fossiliferous (pelecypod fragments), vitreous to dull, poorly sorted, fine to very coarse grained (1/8-4 mm) medium grained is average size, shaly (40%) sand
- 2010-2020 less shale (15%)
- 2020-2030 White, to clear, pink, yellow, orange, micaceous, feldspathic, dull, medium sorted, angular to subangular, fine to very coarse grained, mostly coarse grained, average 1 mm, shaly (20%) sand. Still a bit of red, brown, and orange mottled shale
- 2030-2040 no change
- 2040-2050 little change, medium sorted, most medium grained
- 2050-2060 less shale, less sand coloration; white to clear, feldspathic, micaceous, medium sorted, fine to very coarse grained, average .5 mm, subangular, vitreous to dull, slightly shaly (2%) sand.
- 2060-2070 Fresh, pure, feldspathic, vitreous to dull, well sorted, subangular, coarse to very coarse grained, average 1.5 mm, sand.
- 2070-2080 no change
- 2080-2090 coarser grained, average 2 mm, subrounded, some smoky gray in color, pure feldspathic sand
- 2090-2100 fine grained portion back
- 2100-2110 back to poorly sorted, shaly sand. Clear to white, some pink, orange, feldspathic, micaceous, vitreous to dull, poorly sorted, subangular, fine to very coarse grained, mostly coarse grained, average .5 mm, shaly (40%) sand; some reddish brown mottled shale
- 2110-2120 less shale (5%), still poorly sorted, coarse grained sand

2120-2130 same

sand characteristics and shale percentages have varied very much over the past several hundred feet. Sand sizes vary from very fine to very coarse, lusters vary, as well as sorting and roundness

2130-2140 White to clear, orange, yellow, pink, gray, feldspathic, dull, medium sorted, subrounded, fine to very coarse grained (1/8- 4mm) mostly coarse grained, average 1 mm, slightly shaly (1%) sand

2140-2150 no change

2150-2160 Same

2160-2170 no change

2170-2180 little change, coarse grained, subangular

2180-2190 smaller average grain size (.75 mm) 5% shale 10% fine sand and shale fragments KLA

2190-2200 no change

2200-2210 Fresh, clear to white, pale yellow, feldspathic, vitreous, well sorted, subangular, medium to very coarse grained, mostly very coarse grained, average 1.5 mm, slightly shaly (3%) sand 10% fine and very fine sand and shale fragments KLA

2210-2220 Clear to white, yellow, orange, feldspathic, vitreous to dull, poorly sorted, subrounded, fine to very coarse grained, mostly coarse grained, average 1 mm, shaly (30% olive gray and red brown mottled clay) sand

2220-2230 like 2200-2210

2230-2240 White to clear, yellow, feldspathic, vitreous, well sorted, angular, coarse grained, average 1 mm, pure sand

2240-2250 now medium sorted, coarse grained, shaly (10%) sand

2250-2260 no change

2260-2270 same with 5% shale

2270-2280 Clear to white, pale yellow, pink, feldspathic, vitreous to dull, well sorted, angular, fine to very coarse grained, coarse grain average 1/2 mm, shaly (5%) sand

2280-2290 no change

2290-2300 same

2300-2310 same

- 2310-2320 White to clear, pale orange, yellow, feldspathic, vitreous, dull, well sorted, subrounded, coarse to very coarse, average 1.5 mm, shaly (2%) sand
- 2320-2330 little change, average grain size 1 mm
- 2330-2340 no change
- 2340-2350 White to clear, some pale orange to yellow, feldspathic, vitreous to dull, medium sorted, angular, fine to very coarse grained (1/8-3mm), mostly very coarse grained, average 1.5 mm, shaly (2%) sand
- 2350-2360 no change
- 2360-2370 same, but no shale
- 2370-2380 same, very coarse grained, feldspathic sand
- 2380-2390 no sample
- 2390-2400 same as above
- 2400-2410 Same, slightly shaly (1%) feldspathic sand
- 2410-2420 no change
- 2420-2430 lower average, 1 mm
- 2430-2440 no sample
- 2440-2450 little change  
Fresh, clear to white, some pale yellow orange, feldspathic, well sorted, angular, fine to very coarse grained mostly coarse grained, average 1 mm sand
- 2450-2460 no change
- 2460-2470 same, well sorted, angular to subangular, feldspathic, coarse grained sand
- 2470-2480 no change
- 2480-2490 more medium to fine grained, average now .5 mm. Fresh, clear to white, pale yellow orange, feldspathic, medium sorted, angular to subangular, vitreous, dull, fine to very coarse grained, mostly coarse grained, average 1.5 mm, slightly shaly (1%) sand
- 2490-2500 no change
- 2500-2510 Same

2510-2520 Same

2520-2530 Same

2530-2540 Same except for now medium sorted and 3% shale

2540-2550 like 2500-2510

2550-2560 little change; fresh, clear to cloudy white, some pale yellow orange, feldspathic, well sorted, angular, vitreous, fine to very coarse grained, coarse grains average 1 mm, sand

2560-2570 no change

2570-2580 no change

2580-2590 more feldspar (2%); fresh, clear to white, some pale yellow, orange, pink, feldspathic, vitreous, angular, well sorted, fine to very coarse grained, most common size is very coarse grained, average 1mm, sand

2590-2600 no change

2600-2610 Same, shaly (3%) sand

2610-2620 same

2620-2630 Fresh, clear to cloudy white, pale yellow orange, gray, feldspathic, micaceous, vitreous, medium sorted, angular, fine to very coarse grained (1/8-3mm), coarse grained, average 1 mm, shaly (5%) sand

2630-2640 no change

2640-2650 most is very coarse grained, average 1.5 mm

2650-2660 sand now coarse grained, shale (.5%)

2660-2670 no change

2670-2680 Same

2680-2690 same

2690-2700 Same, shale 2%, olive gray, brittle, fissile, micaceous, non calcareous, some red brown mottled.

- 2700-2710 little change, more shale 5%. Fresh, clear to white, pale yellow-orange, gray, feldspathic, slightly fossiliferous (weathered pelecypod chips), vitreous, well sorted, angular, fine to very coarse grained, coarse grains average 1 mm, shaly (5%) sand
- 2710-2720 same, except shale 2%
- 2720-2730 same
- 2730-2740 same
- 2740-2750 no change
- 2750-2760 same, with 2% shale
- 2760-2770 Fresh, clear to white, pale yellow-orange, gray, feldspathic, vitreous, medium sorted, angular, fine to very coarse grained, more fine to medium grained, mostly coarse grained, average of all grain sizes .5 mm, shaly (5%) sand
- 2770-2780 same, with 1% shale
- 2780-2790 less medium to fine grained, average now 1 mm, feldspar, well sorted, angular to subangular, coarse grained sand
- 2790-2800 no change
- 2800-2810 less feldspar, less quartz sand coloration, less very coarse grains; Fresh, clear to white to light tan, slightly feldspar, vitreous to dull, well sorted, angular to subangular, fine to very coarse grained, mostly coarse grained, average 1 mm, pure sand
- 2810-2820 like 2790-2800
- 2820-2830 no change
- 2830-2840 Same, three small pieces of poorly sorted, iron cemented (limonite) sandstone; may be pieces of weathered hematite to limonite with attached sand and feldspar grains
- 2840-2850 Clear, white, pale yellow orange, gray, feldspar, dull to vitreous, medium sorted, angular to subangular, fine to very coarse grained (1/8-5mm), mostly very coarse grained, average 1.5 mm, shaly (2%) sand
- 2860-2870 same as 2840-2850 with 5% shale and a few pelecypod chips.
- 2890-2860 Increase in amount of orange quartz; mostly coarse grained, average of total grain size 1 mm; well sorted

- 2870-2880 no change
- 2880-2890 little change, clear to white, pale yellow-orange, sandy gray, feldspathic, very slightly fossiliferous (pelecypod chips), dull to vitreous, medium sorted, fine to very coarse grained (1/8-3mm) mostly coarse grained average 1 mm, shaly (4% mostly olive gray as usual but many are brown-purple mottled) sand. 2 pieces of poorly sorted iron cemented sandstone
- 2890-2900 no change
- 2900-2910 same--last sample
- TD 2916