

UNITED FUEL GAS COMPANY

Well No. 5810

Location: On Knox River, north of Whiteoak Fork, Buchanan County, Va.
(National Shawmut Well, Long Branch, of Tug Fork)

<u>Interval</u>	<u>Description</u>
1032-1038	Sandstone, very light gray (N8)*, very fine-grained, well sorted, clustered, noncalcareous cementing material, micaceous, black minerals, 85%; shale, medium light gray (N6), 15%.
1038-1046	Sandstone, as above, 80%; shale, 20%.
1046-1052	Shale, medium light gray, silty, 80%; sandstone, 20%.
1052-1060	Shale, medium light gray, very slightly silty.
1060-1070	Ditto; slightly micaceous; piece of coal with high luster.
1070-1076	Sandstone, very light gray (N8), very fine-grained, sub-angular, poorly sorted, clustered, some green and black minerals with some iron staining, 60%; shale, as above, 35%; quartz fragments, angular, 2-3 mm., 5%.
1076-1082	Sandstone, very light gray, medium-grained, subangular, rather poorly sorted, 70%; angular white quartz, 2-4 mm., 20%; shale, as above, 10%.
1082-1085	Sandstone, as above.
1085-1090	Sandstone, fine- to medium-grained, iron-stained, 90%; shale, 10%.
1090-1095	Sandstone, fine- to medium-grained, clustered to friable, some green (glauconite?) and black mineral inclusions, one-half iron-stained, 90%; shale, 10%.
1095-1098	Sandstone, as above, with few clusters, 95%; quartz fragments, smaller than in 1076-1082, 5%.

* Color descriptions and numbers taken from National Research Council Rock-Color Chart.

<u>Interval</u>	<u>Description</u>
1165-1170	Sandstone, as above, clustered to some friable, 80%, with 5% quartz; sandstone, light gray to medium gray (N7-N5), as in 1150-1157, 10%; coal, some shaly, 5%.
1170-1174	Sandstone, as above, medium- to coarse-grained, friable, 80%; quartz fragments, 10%; sandstone as in 1150-1157, 10%.
1174-1176	Sandstone, as above, 90%; quartz fragments, 10%.
1176-1179	Sandstone, white (N9), coarse-grained, angular, poorly sorted, 50%; quartz, white, angular, 48%; chert, dark bluish gray (5B 4/1); trace of green mineral.
1179-1184	Ditto.
1184-1189	Ditto: some dark bluish gray shale.
1189-1195	Sandstone, yellowish gray (5Y 8/1), very fine-grained, subrounded, rather well sorted, friable, 50%; sandstone, white, as above, 50%.
1195-1198	Sandstone, yellowish gray, very fine- to medium-grained, friable, 75%; small angular quartz pieces, 25%.
1198-1200	Sandstone, white, medium- to coarse-grained, subangular, poorly sorted, friable, some iron staining, 70%; angular quartz fragments, 1-2 mm., 30%.
1200-1205	Sandstone, as above, 75%; quartz, as above, 25%.
1205-1212	Sandstone, as above, 25%; quartz, as above, 1-3 mm., 75%.
1212-1217	Shale, medium gray (N5) to medium light gray (N6), very silty to slightly silty, some micaceous, 90%; sandstone, light gray (N7), very fine-grained, very slightly calcareous, micaceous, 10%.
1217-1220	Sandstone, light gray (N7), as above, some very micaceous (muscovite?), 75%; shale, as above, 25%.
1220-1227	Sandstone, as above, 90%; shale, as above, 10%.
1227-1230	Sandstone, as above, 75%; shale, as above, some very carbonaceous, 10%; numerous quartz grains, 1 mm.; few, 2 mm.
1230-1236	Shale, medium gray (N5), silty, finely micaceous.

<u>Interval</u>	<u>Description</u>
1236-1240	Sandstone, white (N9), medium-grained, subrounded to sub-angular, poorly sorted, friable to small clusters, some green (glauconite?) and black minerals included, 80%; shale, as above, 20%.
1240-1250	Shale, medium light gray (N6), silty, micaceous.
1250-1258	Ditto.
1258-1260	Sandstone, light gray (N7), very fine-grained, subrounded, poorly sorted, clustered, considerable fine-grained black mineral and \pm half quartzose, 70%; considerable yellowish gray (5M 8/1) chert and white quartz fragments to 2.5 mm., 75%; shale, as above, to medium dark gray, carbonaceous, 25%.
1260-1268	Sandstone, as above, 85%; shale, as above, 15%.
1268-1273	Sandstone, as above, 95%; shale, as above, light carbonaceous, 5%.
1273-1280	Sandstone, as above, 85%; shale, as in 1260-1268, 15%.
1280-1285	Sandstone, as above, 95%; shale, as above, 5%.
1285-1290	Sandstone, as above, 80%; shale, medium light brownish gray (5YR 5/1), fissile, 20%; some brownish gray (5YR 4/1), very fine-grained siltstone.
1290-1295	Sandstone, as above, 95%; shale, medium gray (N5), fissile, 5%.
1295-1300	Ditto.
1300-1307	Sandstone, as above, 80%; shale, medium light gray (N6), very silty, micaceous, 20%.
1307-1314	Sandstone, as above, 95%; shale, as above, 5%.
1314-1324	Ditto.
1324-1327	Sandstone, as above, 85%; shale, as above, extremely silty, 15%.
1327-1331	Sandstone, very light gray (N8), fine- to medium-grained, sub-angular to subrounded, few fine-grained dark mineral inclusion, micaceous (muscovite?), one-half quartzose, 90%; shale, as above, and some brownish gray resinous, 10%.
1331-1339	Sandstone, as above, 98%; shale, as above, 2%.
1339-1344	Sandstone, as above, 96%; shale, as above, 4%.

<u>Interval</u>	<u>Description</u>
1344-1346	Sandstone, very light gray (N8), very fine-grained, as above, less quartzose than above, 95%; shale, medium gray (N5), silty, micaceous, 5%.
1346-1350	Sandstone, as above, slightly conglomeratic, 90%; shale, as above, and some very carbonaceous, 10%.
1350-1354	Sandstone, as above, 95%; shale, as above, 5%.
1354-1360	Sandstone, medium gray (N5), as above, friable, 95%; shale, as above, 5%.
1360-1365	Ditto.
1365-1371	Sandstone, as above, 95%; quartz, to 1 mm., 5%.
1371-1376	Sandstone, as above, medium- to coarse-grained.
1376-1381	Sandstone, as above; few quartz fragments, 1 mm.
1381-1386	Ditto: considerably iron stained.
1386-1390	Ditto: little iron staining.
1390-1396	Sandstone, as above, much iron staining, 90%; sandstone, yellowish gray (5Y 8/1), very fine-grained, subrounded, rather well sorted, very calcareous cement, some green mineral (glauconite?) inclusions, 10%.
1396-1399	Sandstone, medium gray, as above.
1399-1404	Sandstone, white (N9), medium-grained, subangular, moderately well sorted, few dark mineral inclusions, friable to few clusters, slightly micaceous (muscovite?).
1404-1407	Ditto.
1407-1410	Ditto: small clusters, some friable.
1410-1412	Ditto: considerable iron staining.
1412-1417	Ditto.
1417-1418	Ditto: few quartz fragments, 3/4 mm.
1418-1425	Sandstone, as above, 70%; coal, shaly, and shale, carbonaceous 30%.
1425-1431	Shale, medium gray (N5), very micaceous, 80%; sandstone, as above, 20%.

<u>Interval</u>	<u>Description</u>
1431-1438	Sandstone, very light gray (N8), medium-grained, subangular, poorly sorted, friable to some clusters, with about one-half quartzose, some with numerous black mineral inclusions, 80%; shale, as above, 20%.
1438-1448	Shale, brownish gray (5YR 4/1), micaceous.
1448-1456	Shale, medium light gray (N6), slightly silty to silty, 90%; shale, light olive gray (5Y 6/1) and brownish gray (5YR 4/1), 10%.
1456-1461	Shale, medium light gray, as above, 50%; shale, medium light gray, very sandy (very fine-grained), 30%; shale, dark reddish brown (10R 3/4), medium fissile, 20%.
1461-1467	Shale, medium light gray, as above, 50%; shale, dark reddish brown, as above, 30%; shale, brownish gray and light olive gray, as in 1448-1456, 20%.
1467-1474	Shale, dark reddish brown, as above, 50%; siltstone, medium light gray (N6), coarse-grained, poorly sorted, peppered with dark grains, very calcareous cement, 30%; shale, medium light gray, as above, slightly micaceous, 20%.
1474-1482	Shale, grayish red (5R 4/2) and some blackish red (5R 2/2), 60%; shale, medium gray (N5), very slightly micaceous, silty to very silty, 20% siltstone, as above, to sandstone, very fine-grained, 20%.
1482-1490	Shale, red, 80%; shale, medium gray, as above, non-silty to silty, 20%.
1490-1497	Shale, red, 80%; shale, medium dark gray (N4), calcareous to noncalcareous, 20%.
1497-1506	Shale, medium dark gray (N4 to N5), 80%; shale, red, 20%.
1506-1513	Shale, medium gray (N5), slightly calcareous, 85%; shale, red, 15%.
1513-1520	Shale, medium dark gray (N4 to N5).
1520-1529	Shale, as above, very slightly calcareous.
1529-1535	Shale, as above, 90%; shale, red, as in 1474-1482, 10%, Sample dirty.
1535-1545	Shale, as above, calcareous, 75%; shale, medium grayish red (5R 3/1), calcareous, 25%.

<u>Interval</u>	<u>Description</u>
1545-1550	Shale, medium dark gray, as above, 50%; shale, medium grayish red (5R 3/1), as above, 50%.
1550-1555	Shale, medium dark gray, as above, 40%; shale, medium grayish red, as above, 40%; sandstone, light gray (N7), very fine-grained, subrounded, rather poorly sorted, with few green, red and dark minerals, very calcareous cement, 20%.
1555-1560	Shale, medium dark gray, as above, 40%; shale, red, as above, 30%; sandstone, as above, 30%.
1560-1567	Shale, medium dark gray, as above, 50%; shale, red, as above, 20%; sandstone, as above, 30%.
1567-1573	Shale, medium dark gray, as above, 80%; sandstone, as above, 20%.
1573-1579	Ditto: noncalcareous cement in sandstone.
1579-1580	Shales, medium dark gray, medium grayish red, as above, and greenish gray, 50%; sandstone, light gray (N7), very fine-grained, subrounded, poorly sorted, about one-half quartzose, friable to clustered, 50%.
1580-1587	Shales, as above, 50%; sandstone, as above, clustered, very slightly calcareous cement, few large flakes of mica (muscovite?).

Samples run by Eloise Jacobsen, May 1949.

- 158701594 Sandstone, very light gray (N8), very fine-grained, subrounded, moderately well sorted, silty, very slightly micaceous, 95%; shale, grayish red (10R 4/2), slightly calcareous, 5%.
- 1594-1600 Ditto: sandstone, 97%; shale, 3%.
- 1600-1608 Siltstone, as sandstone above, coarse-grained, 98%; shale, 2%.
- 1608-1616 Shale, medium light gray (N6), silty, very slightly micaceous, 30%; siltstone, as above, 70%.
- 1616-1621 Sandstone, very light gray (N8), very fine-grained, as siltstone above, silty and shaly 65%; shale, grayish purple (5RP 4/2), 20%; shale, medium gray (N5), 5%; shale, medium light gray, very silty, 5%; shale, brown (5YR 4/2), 5%; trace variegated shale, light gray and red.
- 1621-1628 Sandstone, as above, 70%; shale, grayish purple, as above, 20%; shale, medium gray (N5), silty, 10%.
- 1628-1635 Sandstone, as above, 60%; shale, grayish purple, 20%; shale, medium gray, 20%.
- 1635-1642 Siltstone, light gray (N7), coarse-grained, subrounded, moderately well sorted, shaly, considerable dark and black minerals, very slightly micaceous, 70%; shale, medium gray (N5), some very slightly micaceous, 30%.
- 1642-1650 Siltstone, as above, very coarse-grained, 60%; shale, as above, very silty, 40%.
- 1650-1658 Ditto: siltstone, 70%; shale, most very silty, 30%.
- 1658-1665 Shale, medium dark gray (N4), 65%; siltstone, as above, 35%.
- 1665-1672 Shale, medium gray (N5), moderately calcareous, trace finely micaceous material.
- 1672-1679 Shale, medium dark gray (N4), calcareous, very finely micaceous; trace red shale and very fine-grained white sandstone.
- 1679-1688 Shale, as above; trace red shale.
- 1688-1694 Ditto (very dirty sample).
- 1694-1700 Ditto, some silty, sample dirty.

- 1700-1707 Shale, as above, 60%; sandstone, very light gray (N8), very fine-grained, subrounded, moderately well sorted, slightly calcareous cement, 40%; trace red shale; (sample dirty).
- 1707-1714 Shale, medium light gray (N6), silty, 75%; sandstone, as above, 25%; trace red shale.
- 1714-1721 Shale, as above, silty to non-silty, 85%; sandstone, as above, 15%.
- 1721-1730 Ditto.
- 1730-1738 Shale, medium dark gray (N4), non-micaceous to very finely micaceous; trace sandstone, as above.
- 1738-1747 Shale, as above, part slightly calcareous, half micaceous and silty, 60%; siltstone, light gray (N7), medium-grained, subrounded, considerable dark mineral inclusions, micaceous, 20%; siltstone, very light gray (N8), fine-grained, subrounded, calcareous cement, 20%.
- 1747-1753 Siltstone, very light gray (N8), medium-grained, subrounded, poorly sorted, shaly, very slightly calcareous cement, 40%; siltstone, light gray, as above, 30%; shale, medium gray (N5), 20%; shale, medium gray (N5), silty, finely micaceous, 10%; trace red shale.
- 1753-1760 Siltstone, very light gray, coarse-grained, as above, 60%; shale, medium gray (N5), 30%; shale, medium gray, silty, 10%.
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- 1760-1766 Sandstone, very light gray (N8), very fine-grained, subrounded to subangular, rather poorly sorted, shaly, very slightly calcareous cement, very slightly peppered with dark minerals, 40%; siltstone, as above, 30%; shale, as above, 30%.
- 1766-1770 Sandstone, as above, 65%; siltstone, as above, 10%; shale, medium dark gray (N4), part silty and micaceous 20%; shale, grayish red (10R 4/2), calcareous, 5%.
- 1770-1774 Sandstone, as above, 50%; siltstone, 25%; shale, grayish red, 25%; trace red shale, non-calcareous to calcareous; trace pyrite.
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- 1774-1782 Shale, medium gray (N5), silty, 80%; sandstone, as above, to white, 15%; shale, red, as above, calcareous 5%; trace pyrite.
- 1782-1792 Shale, medium gray, as above, 90%; shale, red, 10%; (sample dirty).
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- 1792-1797 Sandstone, light gray to very light gray (N7-8), very fine-grained, subrounded, moderately well sorted, slightly silty, slight to calcareous cement, clustered, 75%; shale, as above, 25%; trace red shale.

- 1797-1804 Ditto; part of shale non-silty.
- 1804-1808 Sandstone, as above, coarser-grained and friable, 80%; shale, 20%.
- 1808-1815 Sandstone, white (N9), as 1804-08, 40%; sandstone, light gray (N7), very fine-grained, subrounded, moderately poorly sorted, numerous pieces dark mineral inclusions, well cemented clusters, 30%; shale, medium dark gray (N4), 25%; shale, red, 5%.
- 1815-1820 Sandstone, white, as above, very calcareous cement, some dark mineral inclusions, few clusters fine-grained, 70%; sandstone, light gray, as above, 20%; shale, as above, 10%; trace pyrite.
- 1820-1825 Sandstone, white, and very light gray (N8-9), as above, 85%; sandstone, light gray, as above, 10%; shale, as above, 5%.
- 1825-1828 Siltstone, light gray (N7), coarse-grained, subrounded, moderately poorly sorted, slightly calcareous cement, very slightly micaceous, slightly peppered with dark minerals, 85%; shale, medium dark gray, non-silty to silty, slightly micaceous, 15%.
- 1828-1837 Siltstone, as above, 90%; shale, medium dark gray, as above, 7%; shale, grayish red purple (5RP 4/2) with one piece showing contact, 3%.
- 1837-1843 Sandstone, as above siltstone, very fine-grained, light gray to medium light gray (N7-6), 90%; shale, medium dark gray (N4), 7%; shale, purple, 3%.
- 1834-1850 Sandstone, as above, part with very calcareous cement, 50%; siltstone, as 1828-37, 35%; shale, medium dark gray (N4), finely micaceous, 25%.
- 1850-1855 Sandstone, as above, 50%; siltstone, as above, 10%; shale, medium dark gray, as above, 25%; shale, grayish red (10R 4/2), nonealcareous to some very calcareous, 15%.
- 1855-1860 Ditto: smaller pieces, sandstone, 50%; shale, medium dark gray, 25%; shale red, 25%.
- 1860-1864 Ditto: sandstone, approaching siltstone, 50%; shale, medium dark gray, 40%; shale, red, 10%; trace pyrite.
- 1864-1867 Sandstone, white (N9), very fine-grained, subrounded, moderately well sorted, slightly peppered with very small black mineral grains, moderately friable, 40%; sandstone, white, very fine-grained approaching fine-grained, subangular to subrounded, poorly sorted, moderately friable, 40%; shale, dark gray (N3), 15%; shale, grayish red (5R 4/2), calcareous, 5%.
- 1867-1870 Sandstone, white, very fine-grained to fine-grained, as above, few medium-grained, friable, 70%; shale, red, as above, 15%; shale, gray, 15%; trace pyrite.

- 1870-1874 Ditto: sandstone, fine-grained, 80%; shale, gray, 15%; shale, red, 5%.
- 1874-1879 Sandstone, white (N9), fine-grained, subangular to subrounded, moderately poorly sorted with some medium-grained subrounded quartz, few dark mineral inclusions, friable, 50%; shale, medium dark gray (N4), finely micaceous, 25%; shale, grayish red (10R 4/2), finely micaceous, 25%.
- 1879-1881 Sandstone, as above, with some subangular to angular coarse-grained quartz pieces, possibly conglomeratic, 50%; shale, gray, 25%; shale, red, 30%.
- 1881-1885 Sandstone, as above, conglomeratic, 93%; shale, gray, 3%; shale, red, 4%.
- 1885-1887 Ditto.
- 1887-1889 Ditto: sandstone, 90%; shale, gray, 6%; shale, red, 4%.
- 1889-1891 Ditto: sandstone, 80%; shale, gray, 15%; shale, red, 5%.
- 1891-1893 Ditto: sandstone, 95%; shale, gray, 3%; shale, red, 2%.
- 1893-1895 Ditto, slightly conglomeratic.
- 1895-1900 Ditto, conglomeratic, also with yellow gray and very light bluish gray chert.
- 1900-1902 Shale, medium dark gray (N4), some laminated, 25%; shale, grayish red, as above, slightly calcareous, 15%; sandstone, as above, 60%, some very coarse-grained angular quartz pieces.
- 1902-1905 Shale, gray, as above, 30%; shale, grayish red, as above, 20%; sandstone, as above, 50%.
- 1905-1913 Shale, medium light gray (N6), very calcareous, 90%; limestone, light gray (N7), finely clastic, shaly, slightly fossiliferous (crinoidal), 10%; trace red shale and coarse-grained quartz.
- 1913-1918 Limestone, medium gray (N5), shaly. (Sample slightly dirty).
- 1918-1924 Ditto; trace light gray limestone.
- 1924-1930 Ditto (sample dirty); trace red non-calcareous shale.
- 1930-1937 Ditto, some medium clastic parts, 90%; limestone, light gray, as above, 3%; shale, light grayish red (5R 5/2) with one piece showing transition from light gray limestone, 7%.
- 1937-1948 Ditto, very shaly, fossiliferous; trace red shale.
- 1948-1954 Shale, dark grayish red (5R 2/2), very slightly micaceous, part slightly silty, 70%; shale, medium dark gray (N4), calcareous, 10%; siltstone, grayish yellow green (5GY 7/2), very calcareous, sandy, considerable green mineral (glauconite?), 20%; trace pyrite.

United Fuel, No. 5810, National Shawmut

- 1954-1960 Sample very dirty, appears to be medium gray to medium light gray (N5-6) shale, 90%; shale, red, as above, 10%, in very calcareous mud.
- 1960-1967 Shale, red, as above, 90%; shale, medium dark gray, as above, very calcareous, 7%; siltstone, as above, and some shale, 3%.
- 1967-1972 Shale, red, as above, silty, 95%; shale, medium dark gray, as above, very calcareous to slightly calcareous, 5%.
- 1972-1980 Shale, medium light gray (N6), silty, micaceous, 80%; shale, red, as above, 20%.
- 1980-1986 Shale, medium light gray (N6), very slightly silty.
- 1986-1992 Shale, medium gray (N5), very silty with some approaching siltstone, some slightly micaceous, 95%; shale, grayish red (5R 4/2), silty, finely micaceous, 5%.
- 1992-1999 Shale, as above, 50%; siltstone, light gray (N7), medium-grained, subrounded, slightly peppered with dark mineral, shaly, very slightly calcareous cement, 50%.
- 1999-2004 Shale, as above, 60%; siltstone, 40%.
- 2004-2009 Shale, medium dark gray (N4), slightly silty to very silty, finely micaceous, 70%; siltstone, as above, 30%.
- 2009-2015 Shale, medium dark gray, as above, 85%; siltstone, as above, 15%.
- 2015-2021 Sandstone, medium light gray to light gray (N6-7), very fine-grained, subangular to subrounded, moderately sorted, very calcareous cement, considerable greenish minerals present, 30%; shale, medium gray (N5), some medium dark gray (N4), slightly silty, finely micaceous, 50%; shale, grayish red (5R 4/2), part silty, some laminated, 20%.
- 2021-2026 Sandstone, very light gray (N7), slightly calcareous cement, slightly micaceous, as above, 70%; shale, medium gray, as above, 25%; shale, red, 5%.
- 2026-2032 Sandstone, as above, friable with few clusters, considerable iron staining, 95%; shale, medium gray, as above, with trace red, 5%.
- 2032-2037 Sandstone, as above, silty, 85%; shale, gray, as above, 8%; shale, red, as above, 7%.
- 2037-2040 Ditto.
- 2040-2047 Sandstone, very light gray, as above 50%; sandstone, white (N9), fine-grained, subangular to subrounded, moderately well sorted, some very fine-grained black mineral inclusions, slightly calcareous cement, friable, 45%; shale, as above, 5%.

- 2047-2052 Ditto: sandstone, very light gray, 35%; sandstone, white, 60%; shales, 5.
- 2052-2056 Ditto.
- 2056-2061 Shale, grayish red (5R 4/2), slightly calcareous, finely micaceous, 85%; sandstone, very light gray, as above, 15%.
- 2061-2070 Shale, as above.
- 2070-2075 Shale, red, as above, 75%; shale, medium gray (N5), 25%.
- 2075-2080 Ditto.
- 2080-2085 Shale, red, as above, 65%; shale, medium gray (N5), finely micaceous to some micaceous, 35%; trace sandstone.
- 2085-2087 Shale, medium gray (N5), very silty, micaceous, 60%; shale, light grayish red (10R 5/2), very silty, very slightly calcareous, 30%; shale, red, as above, 10%.
- 2087-2091 Siltstone, light gray (N7), subrounded to subangular, calcareous cement, peppered with green mineral, shaly, slightly micaceous, 60%; shale, medium gray, as above, 20%; shale, grayish red, as above, micaceous, 20%.
- 2091-2096 Siltstone, as above, 80%; shale, medium gray, as above, 18%; shale, red, 2%.
- 2096-2100 Ditto.
- 2100-2134 Shale, medium gray (N5), some very silty, slightly micaceous, 70%; siltstone, as above, 30%; note on sack: "grained 29' in hole."
- 2134-2139 Shale, medium gray (N5), calcareous, silty, part very finely micaceous.
- 2139-2140 Sandstone, very light gray (N8), very fine-grained, subrounded, moderately well sorted, calcareous cement, 50%; shale, medium gray as above, 45%; shale, grayish red, 5%.
- 2140-2143 Sandstone, as above, peppered with dark mineral, 70%; shale, medium gray, as above, 20%; siltstone, medium gray (N5), subrounded, poorly sorted, very calcareous, 10%; trace red shale.
- 2134-2148 Sandstone, as above, 75%; siltstone, as above, approaching silty limestone, 20%; shale, medium gray, as above, 5%.
- 2148-2152 Ditto, trace red shale.
- 2152-2156 Ditto: sandstone, 95%; siltstone, 5%.
- 2156-2162 Ditto, very calcareous.
- 2162-2164 Siltstone, as 2140-56, 50%; sandstone, as above, 48%; trace red and gray shale.

- 2164-2168 Shale, medium dark gray (N4), micaceous, 70%; siltstone, as above, 15%; sandstone, light brownish gray (5YR 6/1), very fine-grained, calcareous, considerable brown mineral grains, 15%.
- 2168-2174 Shale, medium light gray (N6), finely micaceous, 70%; sandstone, very light gray (N8), very fine-grained, subrounded, rather poorly sorted, calcareous, 30%.
- 2174-2181 Limestone, medium gray (N5), finely clastic, shaly to slightly shaly, 35%; shale, medium gray (N5), 30%; sandstone, very light gray, as above, 30%; shale, medium light gray, as above, 5%.
- 2181-2186 Shale, medium gray (N5), part silty, part micaceous, 40%; sandstone, as above, 20%; limestone, as above, 10%.
- 2186-2188 Sandstone, as above, 70%; shale, medium gray, as above, 20%; siltstone, medium gray, 10%.
- 2188-2190 Ditto.
- 2190-2196 Sandstone, fine-grained, as above, friable, 95%; shale, as above, 5%.
- 2196-2200 Ditto, very slightly calcareous, considerable iron staining.
- 2200-2204 Ditto.
- 2204-2208 Ditto.
- 2208-2212 Shale, medium dark gray (N4), part laminated, some very finely micaceous, 95%; sandstone, as above, 5%.
- 2212-2217 Shale, as above, 50%; sandstone, very light gray (N8.5), very fine- to fine-grained, subangular, moderately well sorted, slightly calcareous cement, 50%.
- 2217-2223 Sandstone, as above, 60%; shale, dark gray, as above, part carbonaceous, 40%.
- 2223-2226 Sandstone, very light gray (N8.5), very fine-grained, subrounded, moderately well sorted, few dark mineral grains, friable with few clusters, 70%; shale, as above, 30%; considerable iron staining.
- 2226-2230 Ditto: sandstone, 95%; shale, 5%.
- 2230-2233 Ditto: sandstone, 90%; shale, 10%.
- 2233-2234 Ditto: sandstone, 87%; shale, 13%.
- 2234-2236 Ditto: sandstone, 60%; shale, 40%, part carbonaceous.
- 2236-2242 Ditto: sandstone, 65%; shale, 35%, part carbonaceous.

2242-2245	Sandstone, white, as above, chert fragments, 80%; shale, as above, 20%; trace pyrite.
2245-2247	Ditto: sandstone, 90%; shale, 10%; trace pyrite.
2247-2249	Ditto: " 98%; " 2%.
2249-2250	Ditto: sandstone, very fine-grained to fine-grained, chert fragments, few medium-grained quartz pieces.
2250-2253	Ditto: sandstone, 98%; shale, 2%.
2253-2255	Ditto: " 99%; trace mica.
2255-2258	Ditto: sandstone, fine-grained with some very fine-grained, sub-rounded to subangular, 98%; shale, 2%.
2258-2263	Ditto.
2263-2266	Ditto.
2266-2270	Ditto.
2270-2272	Ditto, fine-grained.
2272-2274	Ditto.
2274-2279	Shale, medium dark gray (N4), 50%; limestone, medium dark gray (N4), finely clastic to finely crystalline, moderately fossiliferous, part very shaly, 40%; limestone, light gray (N7), finely clastic to medium clastic, 10%.
2279-2287	Shale, as above, finely micaceous, 60%; limestone, as above, 40%; one piece coarsely crystalline.
2287-2290	Shale, as above, 80%; limestone, as above, 20%; trace pyrite.
2290-2296	Shale, as above, 50%; shale, medium dark gray (N4), very finely, trace mica; 25%; siltstone, medium light gray (N6) to medium gray (N5), subrounded, shaly, considerable angular very fine-grained black mineral, very slightly calcareous cement, 25%.
2296-2302	Shale, medium dark gray (N4); trace coal and siltstone, as above.
2302-2307	Shale, medium dark gray (N4), finely micaceous, 70%; siltstone, medium light gray (N6) to little light gray (N7), medium-grained, subrounded, moderately well sorted, slightly peppered with black mineral, 30%; trace coal.
2307-2312	Shale, dark gray (N3), 80%; sandstone, white (N9), very fine-grained, moderately well sorted, calcareous cement, friable, 20%; trace pyrite.
2312-2318	Sandstone, very light gray (N8), very fine-grained, shaly, considerable green and black minerals, 35%; sandstone, white, as above, 35%; shale, medium gray to some dark gray (N5-3), 30%.

- 2318-2323 Ditto.
- 2323-2327 Ditto: sandstone, very light gray, 30%; sandstone, white, 30%; shale, 40%.
- 2327-2330 Ditto.
- 2330-2336 Shale, medium dark gray (N4) to medium light gray (N6), very silty, micaceous, 50%; sandstone, very light gray, as above, slightly calcareous cement, 30%; shale, medium dark gray (N4), micaceous, 20%.
- 2336-2339 Sandstone, as above, 70%; shale, medium light gray (N6), silty, as above, 15%; shale, medium gray (N5), as above, 5%; siltstone, medium light gray (N6), shaly, 10%.
- 2339-2345 Ditto, trace red shale.
- 2345-2350 Shale, medium dark gray (N4), trace very finely micaceous material, 75%; shale, dark grayish purple (5P 3/2), 20%; limestone, grayish brown (5YR 3/2), very finely clastic, very shaly, 3%; sandstone and shale, as above, 2%.
- 2350-2360 Shale, dark grayish red (10R 3/2), very finely micaceous, one piece with finely crystalline limestone lense, 70%; shale, medium dark gray, as above, 20%; shale, purple, as above, 5%; limestone, as above 5%.
- 2360-2367 Shale, grayish red, as above, part calcareous, 70%; shale, medium gray (N5), finely micaceous to very finely micaceous, 30%.
- 2367-2369 Ditto, trace of shale, silty, and trace pale red limestone.
- 2369-2380 Shale, dark grayish red, silty to non-silty, 60%; shale, medium gray to medium dark gray (N5-4), as above, 35%; limestone, brown as 2345-60, 5%.
- 2380-2385 Shale, dark grayish red, as above, 70%; shale, medium gray to medium dark gray, as above, 15%; shale, medium light gray (N6), silty, 5%; sandstone, very light gray (N8), very fine-grained, subangular to subrounded, poorly sorted, calcareous, shaly, some dark mineral inclusions, 10%.
- 2385-2387 Siltstone, very light gray (N8), medium-grained, subrounded, moderately well sorted, shaly, 50%; shale, medium gray (N5), some medium dark gray (N4), 40%; shale, red, as above, 10%.
- 2387-2393 Shale, medium dark gray (N4), slightly laminated, 50%; shale, medium dark gray, silty, 30%; siltstone, medium light gray, peppered with dark minerals, 15%; sandstone, very light gray (N8), very fine-grained, 5%.
- 2393-2400 Siltstone, very light gray to light gray (N8-7), medium-grained to coarse-grained, subrounded, moderately well sorted, very calcareous to calcareous cement, 15%; shale, medium dark gray (N4), finely micaceous, 25%; shale, grayish red (10R 4/2), finely micaceous, 30%; trace brown calcareous shale.

- 2393-2400 Shale, medium dark gray (N4), calcareous, 60%; shale, grayish red, as above, calcareous, 30%; shale, dark grayish purple (5RP 3/2), 5%; sandstone as siltstone, as above, 5%.
- 2400-2406 Shale, medium dark gray, as above, 50%; shale, grayish red, as above, 15%; shale, dark grayish purple, as above, 25%; sandstone and siltstone, as above, calcareous cement, 10%.
- 2406-2411 Shale, grayish red, as above, calcareous, 50%; shale, purple, as above, very slightly calcareous, 10%; shale, medium dark gray (N4), 30%; siltstone, as above, calcareous, 5%; sandstone, as above, calcareous, 5%; trace gray (yellowish gray) chert (very small pieces).
- 2411-2416 Ditto: shale, medium dark gray, 60%; shale, grayish red, 20%; siltstone, light gray, 15%; sandstone, 5%; trace chert (small pieces).
- 2416-2426 Shale, medium dark gray, silty, part very finely micaceous, 50%; shale, grayish red (5R 4.5/2), calcareous with part non-calcareous, silty, 45%; sandstone, as above 5%, (small pieces).
- 2426-2431 Shale, medium dark gray (N4), little calcareous, finely micaceous, 60%; shale, grayish red, as above, part non-silty, 40%. (Small pieces).
- 2431-2436 Shale, medium gray (N5), trace very finely micaceous material, 85%; shale, grayish red, as above, 15%.
- 2436-2440 Siltstone, grayish red (5R 4/2), subangular, very shaly, very well cemented, micaceous to slightly micaceous, 25%; shale, medium gray, as above, part calcareous, 25%; shale, medium dark gray (N4), slightly silty and micaceous, 25%; shale, grayish red, as above, some silty to very silty and micaceous, 25%.
- 2440-2445 Ditto.
- 2445-2450 Shale, medium dark gray (N4), chunky, 70%; shale, grayish red, as above, 20%; shale, medium gray, as above, 3%; limestone, yellowish gray, (5Y 7/2), finely clastic, 2%.
- 2450-2456 Shale, medium dark gray (N4), as above, 50%; shale, grayish red, as above, 30%; shale, medium gray, finely micaceous, 15%; sandstone, very light gray (N8), very fine-grained, subangular, moderately poorly sorted, micaceous, some dark minerals, 5%.
- 2456-2461 Shale, medium dark gray, as above, 75%; shale, grayish red, as above, 15%; shale, medium gray, as above, 5%; sandstone, as above, 5%.
- 2461-2471 Shale, medium gray (N5), calcareous to more or less 1/3 non-calcareous.
- 2461-2476 Shale, dark grayish red (5R 3/2), part calcareous, 45%; shale, medium dark gray (N4), finely micaceous, 35%; shale, medium gray (N5), part calcareous, finely micaceous, 20%.

- 2476-2482 Shale, grayish red, as above, 45%; shale, medium dark gray, as above, 45%; shale, medium gray, as above, 10%.
- 2482-2489 Shale, medium dark gray (N4), trace finely micaceous material, 85%; shale, medium gray, 10%; shale, red, as above, 5%.
- 2489-2496 Shale, medium dark gray, as above, 70%; sandstone, very light gray (N8), very fine-grained (approaching siltstone), subrounded, moderately well sorted, slightly peppered with dark minerals, slightly shaly, 30%.
- 2496-2501 Sandstone, as above, 70%; shale, as above, 30%.
- 2501-2506 Ditto. (Sample rather dirty).
- 2506-2510 Shale, medium dark gray (N4), 50%; sandstone, very light gray (N8), very fine-grained, subrounded, moderately well sorted, shaly, few dark mineral grains, small clusters, 50%; trace grayish yellow and bluish chert.
- 2510-2512 Sandstone, as above, 75%; shale, 25%; trace pyrite and red shale.
- 2512-2515 Sandstone, as above, very slightly calcareous cement, 80%; shale, dark gray (N3), 20%; trace pyrite and red shale.
- 2515-2517 Ditto.
- 2517-2519 Ditto.
- 2519-2522 Sandstone, as above, friable.
- 2522-2525 Ditto; trace mica.
- 2525-2526 Ditto: sandstone with few clusters, 90%; shale, medium dark gray (N4), 10%; trace medium dark gray (N4), finely clastic limestone.
- 2526-2527 Sandstone, white, as above, half clustered, 90%; shale, as above, 10%.
- 2527-2530 Ditto: sandstone, few clusters, 95%; shale, 5%.
- 2530-2534 Ditto, considerable iron staining.
- 2534-2536 Ditto.
- 2536-2540 Sandstone, as above, 50%; limestone, medium gray (N5), finely clastic, slightly silty, 40%; shale, medium gray (N5), 10%.
- 2540-2545 Limestone, as above, 40%; shale, 60%.
- 2545-2555 Shale, medium dark gray (N4), part very slightly calcareous, trace finely micaceous material, 90%; limestone, as above, 10%.

- 2555-2558 Shale, dusky red (10R 2.5/2) and grayish red (5R 4/2), part slightly silty, finely micaceous, 50%; shale, gray, as above 50%.
- 2558-2561 Shale, grayish red (5R 4/2), finely micaceous, 85%; shale, medium gray (N5), finely micaceous, 15%.
- 2561-2568 Shale, medium gray (N5), calcareous to very calcareous, finely micaceous, 85%; shale, red, as above, 15%.
- 2568-2572 Sandstone, greenish gray (5GY 6/1), very fine-grained, sub-rounded to subangular, poorly sorted, well cemented, with some calcareous cement, numerous green and few dark mineral inclusions, micaceous, 40%; shale, medium dark gray (N4), slightly calcareous, somewhat fissile, 50%; shale, red, as above, 10%.
- 2572-2580 Sandstone, as above, 40%; shale, medium dark gray, as above, 35%; shale, medium gray (N5), 20%; shale, red, as above, 5%.
- 2580-2585 Shale, medium dark gray, as above, 75%; sandstone, as above, 20%; shale, medium gray (N5), as above, 5%; trace red shale.
- 2585-2590 Shale, medium gray, 1/10 calcareous, trace finely micaceous material, 85%; shale, medium dark gray, as above, 5%; shale, red, as above, 5%; sandstone, as above, 5%.
- 2590-2596 Shale, medium gray, as above, calcareous to very calcareous, 90%; limestone, medium gray, finely clastic, 10%; trace red shale.
- 2596-2601 Shale, medium dark gray, as above, calcareous.
- 2601-2610 Ditto, 1/10 calcareous; trace sandstone.
- 2610-2615 Sandstone, white (N9), very fine-grained, subrounded to subangular, moderately well sorted, slightly silty, slightly calcareous cement, 30%; shale, medium dark gray, non-calcareous, 70%; trace pyrite.
- 2615-2623 Shale, medium gray (N5), non-silty to some silty, part micaceous, 70%; siltstone, light gray (N7), well-cemented, 20%; sandstone, as above, 10%.
- 2623-2627 Shale, medium dark gray to dark gray (N4-3), 60%; sandstone, white (N9), very fine-grained, few dark mineral grains, as above, 35%; siltstone, as above, 5%.
- 2627-2628 Shale, medium dark gray to dark gray, as above, part carbonaceous, 85%; sandstone, as above, 15%; trace pyrite and siltstone.
- 2628-2630 Ditto; shale non-carbonaceous, 75%; sandstone, 25%; trace pyrite.
- 2630-2632 Ditto: shale, 70%; sandstone, 30%; trace pyrite.
- 2632-2634 Ditto: shale, 60%; sandstone, slightly calcareous cement to non-calcareous, 40%; trace pyrite.

- 2634-2639 Ditto: shale, little silty to some siltstone, 50%; sandstone, as above, 50%; trace red shale and pyrite.
- 2639-2647 Shale, medium dark gray to dark gray (N4-3), slightly fissile, 80%; sandstone, as above, 20%.
- 2647-2652 Shale, as above, dark gray (N3).
- 2652-2665 Ditto.
- 2665-2672 Shale, medium dark gray (N4), as above.
- 2672-2682 Ditto.
- 2682-2692 Ditto, (N4.5).
- 2692-2705 Shale, as above, fossiliferous, 85%; limestone, medium gray (N5) and brownish gray (5YR 4/1), very finely clastic, 15%.
- 2705-2715 Shale, as above, some slightly calcareous, 80%; limestone, as above, part medium clastic, crinoidal, part light gray, shaly, 20%.
- 2715-2726 Shale, as above, part very calcareous, 85%; limestone, as above, 15%.
- 2726-2732 Limestone, as above, part, mottled with light gray, fossiliferous, 50%; shale, as above, 50%.
- 2732-2740 Limestone, as above, medium gray (N5), 75%; shale, as above, medium gray (N5), 25%.
- 2740-2744 Limestone, as 2726-32, no fossil fragment noted, 70%; shale, dark gray (N3), 30%.
- 2744-2748 Ditto.
- 2748-2759 Shale, medium gray to medium dark gray (N5-4), finely micaceous, non-calcareous to calcareous, 70%; limestone, as above, and light brownish gray (5YR 6/1), oolitic trace white limestone, 30%.
- 2759-2766 Limestone, brownish black (5YR 2/1) to brownish gray (5YR 4/1), finely clastic, 40%; limestone, medium brownish gray (5YR 5/1), medium clastic, slightly oolitic, (1/3 mm.), considerable mottling with light gray, some light gray and white limestone, 25%; shale, as above, dark gray to grayish black, 35%.
- 2766-2771 Limestone, medium brownish gray, as above, and some oolitic light gray to white limestone, 60%; limestone, brownish black to brownish gray, as above, 20%; shale, as above, 20%.

United Fuel, No. 5810, National Shawmut

- 2771-2777 Limestone, medium light gray to light brownish gray (N6-5YR 6/1), as above, 80%; shale, medium dark gray (N4), 20%.
- 2777-2782 Limestone, light brownish gray (5YR 6/1) to light gray (N7), scattered oolites, fossiliferous (ostracod fragments), 60%; shale, medium dark gray (N4), 30%; shale, greenish gray (5GY 6/1), 10%.
- 2782-2784 Limestone, light brownish gray to very light gray (N8), as above, trace crinoid fragment, 70%; shales, as above, 30%.
- 2784-2791 Ditto: limestone, part medium to coarsely crystalline, crinoidal, one foraminifers noted, 75%; shales, 25%.
- 2791-2798 Ditto: also coral fragment, 80%; shales, 20%.

Samples run by Eloise T. Jacobsen, June 1949.

UNITED FUEL GAS COMPANY

Number 5810

Geographic Location: Long Branch of Tug Fork on Knox R., north of
Whiteoak Fork.

Buchanan County, Virginia

Total Depth: 5305'

Interval

- 2798-2804 Shale, very calcareous, medium dark gray (N4), very slightly micaceous, fossiliferous (crinoids and other macrofossil fragments).
- 2804-2810 Ditto.
- 2810-2818 Ditto, (approaching very shaly limestone).
- 2818-2823 Shale, very calcareous, as above, non-fossiliferous, with contact showing very thin lense of light brownish gray (5YR 6/1), clear chert with dark inclusions.
- 2823-2829 Ditto.
- 2929-2940 Limestone, medium dark gray (N4), medium clastic, oolitic (light and dark ooliths 1/4 to few 1/2 mm. in diameter), with light gray or dark (N6), very finely clastic matrix.
- 2840-2845 Limestone, shaly, medium gray (N5), very finely clastic.
- 2845-2855 Limestone, medium dark gray (N4), medium clastic, oolitic (ooliths light gray and medium dark gray, 1/8 to few 1 mm. in diameter, most with light gray very finely clastic matrix, some with dark very finely clastic matrix), non-oolitic fragments slightly shaly.
- 2855-2865 Limestone, medium light gray (N6), coarsely clastic, oolitic (ooliths medium light gray with medium light gray very finely clastic soft matrix); limestone, medium brownish gray (5YR 5/1), medium clastic, slightly oolitic (ooliths with very finely clastic brownish gray matrix); slightly crinoidal few pieces very coarsely crystalline limestone.

Interval

- 2865-2873 Shale, very calcareous, medium gray (N5).
- 2873-2883 Shale, calcareous to very calcareous, medium dark gray (N4), trace very finely micaceous material.
- 2883-2893 Shale, very calcareous, dark medium gray (N4.5), very slightly micaceous.
- 2893-2900 Limestone, medium light gray (N6), finely clastic to medium clastic, slightly nodular, slightly crinoidal.
- 2900-2913 Limestone, medium gray (N5), finely clastic to medium clastic, about 1/2 oolitic (1/4 mm. in diameter) dark ooliths in light and dark very finely clastic matrix.
- 2913-2918 Limestone, medium dark gray (N4), medium clastic, oolitic (1/3-1/2 mm. in diameter, predominantly dark very finely clastic matrix).
- 2918-2928 Limestone, light gray (N7), medium clastic, oolitic (1/4 to 1/2 mm. in diameter, light and some dark ooliths, predominantly in moderately soft very finely clastic matrix).
- 2928-2933 Ditto, very oolitic (ooliths to 3/4 mm. in diameter).
- 2933-2941 Limestone, light brownish gray (5YR 6/1), medium clastic, oolitic (1/4 mm. in diameter, brownish gray ooliths in very finely clastic brownish gray matrix); some limestone, medium gray (N5), very finely clastic.
- 2941-2948 Limestone, medium gray (N5), very finely clastic.
- 2948-2953 Limestone, medium brownish gray (5YR 5/1), little very light gray (N8), medium clastic, oolitic (diameter 1/2 to few 1 mm., brownish gray ooliths in very finely clastic matrix), trace crinoids.
- 2953-2961 Shale, very calcareous, light gray (N7), moderately hard.
- 2961-2968 Limestone, light gray (N7), medium clastic, oolitic (1/8 to 1/4 mm. in diameter), moderately soft.
- 2968-2976 Limestone, medium gray (N5), very finely clastic, slightly shaly.
- 2976-2983 Limestone, medium dark gray (N4), very finely clastic to some medium clastic, slightly nodular, part oolitic (?), trace shaly material, few fossil fragments.
- 2983-2991 Ditto.
- 2991-2999 Ditto, with some limestone (thin lense?), light gray (N7), medium clastic, nodular, part oolitic (?), moderately soft.

Interval

- 2999-3008 Limestone, shaly, medium dark gray (N4), clastic.
- 3008-3017 Limestone, as above, slightly shaly.
- 3017-3028 Ditto.
- 3028-3036 Limestone, light gray (N7), and light brownish gray (5YR 6/1), medium clastic, nodular oolitic (ooliths 1/4 to 2/3 mm. in diameter, light gray, medium gray, and light brownish gray in very finely clastic matrix); considerable limestone, very light gray (N8), medium clastic, oolitic, moderately soft (thin interbedded ?), slightly crinoidal, trace very coarsely crystalline limestone.
- 3036-3046 Limestone, light gray, finely clastic, fossiliferous (crinoidal, brachiopods (?) fragments); some limestone, light brownish gray (5YR 6/1), very finely clastic.
- 3046-3054 Limestone, light gray, finely clastic to medium clastic, slightly oolitic (1 to 1/2 mm. in diameter), crinoidal; and limestone, light brownish gray, very finely clastic, very slightly crinoidal.
- 3054-3065 Limestone, light brownish gray (5YR 6/1), medium clastic, oolitic (ooliths 1/8 to 2/3 mm. in diameter), slightly crinoidal.
- 3065-3073 Limestone, medium light gray (N6), medium clastic, nodular, moderately soft.
- 3073-3077 Limestone, medium light gray (N6), medium clastic to nodular, oolitic, (light brownish gray ooliths and nodules with 1/2 mm. in diameter in very light gray finely clastic matrix); and limestone, medium gray (N5.5), very finely clastic to medium clastic, part oolitic (medium-gray ooliths in medium-grained very finely clastic matrix), little coarsely crystalline.
- 3077-3083 Limestone, light brownish gray (5YR 6/1), very finely clastic, flaggy, slightly trace shaly material.
- 3083-3087 Limestone, as above, small part nodular.
- 3087-3097 Ditto, with few pieces showing contact with soft, very finely clastic, very light gray (N8), limestone, (thin lense?).
- 3097-3106 Ditto, medium brownish gray (5YR 5/1); no contact pieces noted.
- 3106-3112 Ditto, trace shaly material.
- 3112-3123 Ditto, very finely clastic to some finely clastic, non-shaly.

Interval

- 3123-3131 Ditto, light brownish gray (5YR 6/1), very few pieces mottled with light gray limestone.
- 3131-3143 Limestone, very shaly, medium gray (N5.3), finely clastic.
- 3145-3151 Limestone, light brownish gray (5YR 6/1), very finely clastic to medium clastic, oolitic to slightly oolitic (ooliths 3/4 mm. in diameter, light brownish gray in very finely clastic matrix), with few very light gray (N8), in white finely clastic matrix.
- 3151-3156 Limestone, as above, coarsely clastic, very oolitic, sample predominantly ooliths, 1/2 to 1 mm. in diameter, loose from very finely clastic light brownish gray matrix.
- 3156-3164 Ditto.
- 3164-3169 Ditto, very few medium light gray (N6), ooliths, slightly crinoidal, slight trace coarsely crystalline white limestone.
- 3169-3176 Limestone, medium light gray (N6.8), very finely clastic to some medium clastic, some very small oolites (1/8 mm. in diameter).
- 3176-3182 Limestone, medium gray (N5), finely clastic, angular medium gray (N5), medium clastic fragments well cemented in very finely clastic matrix.
- 3182-3198 Limestone, light brownish gray (5YR 6/1), medium clastic, oolitic (1/2 to 3/4 mm. in diameter, ooliths light brownish gray and very light gray (N8) in hard brownish gray very finely clastic matrix and soft very light gray finely clastic matrix); trace pyrite crystals.
- 3190-3195 Limestone, very light gray (N8), coarsely clastic, very oolitic (1/3 to 1 mm. in diameter), very light gray (N8), soft finely clastic matrix, few light brownish gray ooliths.
- 3195-3200 Limestone, as above, part well cemented matrix.
- 3200-3204 Ditto, very small fragments, ooliths about 1/6 to 1/2 mm. in diameter.
- 3204-3210 Limestone, medium light gray (N6), very finely clastic to finely clastic.
- 3210-3215 Limestone, light brownish gray (5YR 6/1), very finely clastic.
- 3215-3221 Limestone, medium brownish gray (5YR 5/1), very finely clastic, some small dark inclusions and markings.

Interval

- 3221-3226 Limestone, slightly dolomitic, medium gray (N5), very finely clastic, trace shaly material.
- 3226-3231 Limestone, as above, very slightly dolomitic; several pieces of light brownish gray (5YR 6/1) chert.
- 3231-3234 Dolomite, very limy, very light gray (N8); granular.
- 3234-3240 Ditto.
- 3240-3246 Shale, slightly dolomitic, medium gray (N5), slightly micaceous, moderately, hard.
- 3246-3258 Siltstone, shaly, pale red (5R 6/2), fine-grained, subrounded, rather poorly sorted, slightly micaceous, moderately well cemented; and siltstone, medium light gray (N6), as pale red siltstone.
- 3258-3262 Siltstone, as above, pale red, grayish red (10R 4/2), medium light gray and greenish gray (5GY 6/1); and shale, silty, medium red (5R 5/2), finely micaceous.
- 3262-3267 Shale, silty, medium gray (N5), and grayish red (5R 4/2), finely micaceous, some with green nodular inclusions.
- 3267-3276 Shale, silty to very silty, medium gray (N5), slightly micaceous; some shale, grayish red (5R 4/2), very finely micaceous; little shale, dark grayish red (5R 3/2), very finely micaceous.
- 3276-3285 Ditto.
- 3285-3288 Shale, medium gray (N5), as above; shale, slightly dolomitic to dolomitic, silty, medium red (10R 5/2), slightly micaceous.
- 3288-3297 Siltstone, shaly, medium red (10R 5/2), medium-grained, subrounded, moderately well sorted, very slightly micaceous, slight trace dolomitic material; shale, medium gray (N5), non-silty, very slightly micaceous.
- 3297-3300 Siltstone, as above.
- 3300-3310 Siltstone, as above, trace dolomitic material.
- 3310-3320 Siltstone, to silty shale, to some non-silty shale, medium-gray (covered with fine red dust), slightly micaceous.
- 3320-3326 Shale, silty to non-silty, as above; some shale, dark grayish red (5R 5/2), non-silty to slightly silty; sediments covered with red dust, as above.
- 3326-3330 Shale, silty, grayish red (5R 4/2), very slightly dolomitic.

Interval

- 3330-3337 Shale, as above very silty, very slightly dolomitic.
- 3337-3341 Ditto, approaching siltstone.
- 3341-3343 Siltstone, as shale, above, medium-grained, subrounded.
- 3343-3350 Siltstone, as above, and some shale, medium gray (N5), slightly micaceous.
- 3350-3357 Shale, silty, grayish red (10R 4/2), slightly micaceous.
- 3357-3364 Shale, as above, very silty; and shale, slightly silty, medium gray (N5), slightly micaceous.
- 3364-3370 Shale, grayish red (10R 4/2), slightly micaceous; shale, medium gray (N5), non-silty to slightly silty, slightly micaceous; sample covered with red dust.
- 3370-3378 Shale, silty, grayish red (5R 4/2), micaceous.
- 3378-3381 Siltstone, shaly, fine-grained, as shale above; some medium-grained siltstone, few pieces showing contact to two.
- 3381-3387 Siltstone, as above; and light gray (N7), medium-grained.
- 3387-3390 Siltstone, light gray (N7), medium-grained, subrounded, moderately well sorted, slightly micaceous, trace dolomitic material.
- 3390-3395 Ditto.
- 3395-3401 Shale, silty to very silty, medium light gray (N6), slightly micaceous.
- 3401-3405 Shale, very silty, medium gray (N4.8), slightly micaceous.
- 3405-3415 Shale, as above, to part fine-grained siltstone.
- 3415-3420 Shale, very dolomitic, silty to sandy (few medium-grained subrounded to rounded quartz, grayish red (10R 4/2), micaceous.
- 3420-3424 Siltstone, light gray (N7), coarse-grained, subrounded, slightly shaly; about 1/3 shale, medium gray (N5), slightly micaceous.
- 3424-3430 Shale, silty to non-silty, medium dark gray (N4.3), finely micaceous.
- 3430-3437 Sandstone, conglomeratic, light gray (N7), very fine-grained, subrounded, moderately well sorted matrix with angular quartz fragments to very coarse-grained size, some medium-grained to coarse-grained, subrounded quartz, mostly loose grains.

Interval

- 3437-3446 Ditto.
- 3446-3457 Graywacke, very dolomitic, light gray (N7), very fine-grained (approaching siltstone), subrounded, moderately poorly sorted, micaceous, peppered with dark inclusions, moderately friable to friable.
- 3457-3461 Shale, very silty to little non-silty, medium gray (N5), slightly micaceous, very finely micaceous.
- 3461-3467 Ditto, silty to slightly silty.
- 3467-3475 Siltstone, slightly calcareous, light gray (N7.5), very coarse-grained subrounded to subangular, poorly sorted, micaceous, peppered with dark inclusions, moderately friable.
- 3475-3482 Ditto, very light gray (N8).
- 3482-3488 Shale, silty to non-silty, medium gray (N5), micaceous.
- 3488-3495 Siltstone, slightly calcareous, very light gray (N8), medium-grained, rounded, moderately poorly sorted, slightly peppered with dark inclusions, slightly micaceous, moderately friable.
- 3495-3505 Shale, medium gray (N5), finely micaceous, part slightly silty.
- 3505-3515 Shale, as above, non-silty.
- 3515-3526 Siltstone, light gray (N7), coarse-grained, rounded, poorly sorted, slightly micaceous, some dark inclusions, moderately friable.
- 3526-3535 Shale, silty to non-silty, medium gray (N5), slightly micaceous.
- 3535-3545 Shale, as above, non-silty.
- 3545-3553 Ditto, some siltstone, light gray (N7), medium-grained, subrounded, moderately poorly sorted, moderately hard, possibly siltstone lense.
- 3553-3560 Shale, very silty to non-silty, medium gray (N5), trace mica.
- 3560-3571 Shale, medium gray (N5.2), trace very finely micaceous material.
- 3571-3585 Shale, as above, medium gray (N5).
- 3585-3595 Ditto, slightly trace phlogopite.
- 3595-3609 Ditto, trace pyrite (no phlogopite noted).
- 3609-3621 Ditto, dark medium gray (N4.5).

Interval

3621-3630 Ditto, medium dark gray (N4).

3630-3640 Ditto, (N4/2); trace pyrite.

3640-3650 Ditto, medium gray (N5).

3650-3662 Ditto; no pyrite noted.

3662-3673 Ditto.

3673-3684 Ditto.

3684-3696 Ditto.

3696-3705 Ditto, part silty; trace (lense?) medium light gray (N6) siltstone, coarse-grained, rounded, moderately poorly sorted, moderately well cemented.

3705-3715 Ditto, little more siltstone.

3715-3735 Shale, medium gray (N5), little slightly silty, trace very finely micaceous material; trace pyrite.

3725-3738 Shale, and some (lense?) siltstone, medium light gray (N6), coarse-grained, rounded, medium poorly sorted, moderately hard.

3738-3750 Shale, medium gray (N5), trace very finely micaceous material.

3750-3764 Shale, as above, slightly fissile.

3764-3776 Shale, medium dark gray (N4), very finely micaceous material.

3776-3782 Ditto.

3782-3792 Ditto.

3792-3803 Ditto; trace pyrite.

3803-3818 Shale, medium gray (N5), very finely micaceous material; slightly to very slightly fissile.

3818-3831 Shale, as above, to very silty to about 15% siltstone, slightly dolomitic, medium light gray (N6), fine-grained, rounded, poorly sorted, very well cemented; trace pyrite.

3831-3843 Shale, medium dark gray (N4), very finely micaceous material.

3843-3853 Ditto.

3853-3867 Ditto, slightly fissile. (Sample needed washing).

Interval

- 3867-3875 Shale, as above; about 20% siltstone, medium light gray (N6), very fine-grained, subrounded, moderately poorly sorted, very finely micaceous, some pyrite inclusions; trace pyrite in shale.
- 3875-3886 Shale, medium dark gray (N3.5), very slightly fissile, slight trace very finely micaceous material.
- 3886-3897 Shale, medium dark gray (N4), very slightly fissile, very finely micaceous.
- 3897-3899 Siltstone, medium light gray (N6.5), fine-grained, rounded, moderately poorly sorted, peppered with dark inclusions, slightly micaceous to micaceous, moderately well cemented; trace pyrite.
- 3899-3902 Siltstone, light brownish gray (5YR 6/1), very slightly dolomitic, as siltstone above; trace pyrite.
- 3902-3909 Siltstone, as above, part light gray (N7), very well cemented.
- 3909-3916 Siltstone, very slightly dolomitic, light gray (N7), medium-grained to coarse-grained, rounded, moderately well sorted, micaceous, some dark inclusions, well cemented.
- 3916-3920 Siltstone, as above, coarse-grained.
- 3920-3928 Shale, medium gray (N5), very finely micaceous, small part silty.
- 3928-3938 Shale, to part slightly silty to silty.
- 3938-3950 Ditto; little siltstone, slightly dolomitic, light gray (N7), possibly thin lense; trace pyrite.
- By Sh* 3950-3963 Shale, as above, slightly micaceous.
- 3963-3974 Shale, as above, non-silty.
- 3974-3984 Shale, medium dark gray (N4), slightly fissile, very finely micaceous.
- 3984-3991 Shale, very slightly silty, to some very silty; about 10% siltstone, medium light gray (N6), medium-grained, rounded, moderately well sorted, micaceous, moderately well cemented.
- 3991-4000 Shale, silty to very silty, medium dark gray (N4), finely micaceous; about 10% siltstone; dolomite, medium gray (N5), medium-grained, rounded, moderately well sorted, slightly micaceous, very well cemented.
- 4000-4012 Shale, as above, non-silty to very silty; about 25% siltstone, slightly dolomitic, medium light gray (N6), as above.

Interval

- 4012-4024 Shale, as above; siltstone, non-calcareous.
- 4024-4031 Shale, very silty, part slightly dolomitic, medium dark gray (N4), micaceous; hard; trace pyrite.
- 4031-4037 Shale, as above; about 25% shale, very silty (approaching siltstone), medium light gray (N6), micaceous.
- 4037-4047 Shale, medium dark gray (N4), slightly fissile to fissile, finely micaceous; shale, very silty, medium light gray (N6), as above, part very light dolomitic, 50%.
- 4047-4060 Shale, silty, medium dark gray (N4), micaceous; trace pyrite.
- 4060-4070 Shale, slightly silty, medium gray (N5), very finely micaceous; about 25% shale, very silty (approaching siltstone), medium light gray (N6), micaceous, hard.
- 4070-4080 Siltstone, slightly dolomitic, medium light gray (N6), fine-grained, rounded, poorly sorted, micaceous, few dark inclusions, moderately well cemented.
- 4080-4090 Shale, silty, medium gray (N5), finely micaceous.
- 4090-4100 Shale, very silty, medium light gray (N6), slightly micaceous.
- 4100-4110 Shale, slightly silty, medium gray (N5), finely micaceous.
- 4110-4120 Siltstone, slightly shaly, medium gray (N5/3), coarse-grained, subrounded, poorly sorted, micaceous, very small dark inclusions, very well cemented.
- 4120-4130 Shale, silty to very silty, medium light gray (N6), micaceous, very hard.
- 4130-4138 Siltstone, medium light gray (N6), as shale, above, fine-grained rounded, moderately well sorted, slightly micaceous; and shale, medium dark gray (N4), trace very finely micaceous material.
- 4138-4154 Siltstone, as above; siltstone, slightly dolomitic, micaceous, medium-grained; shale, medium gray (N5), slightly silty, micaceous, few pieces show contact.
- 4154-4160 Siltstone, as above.
- 4160-4168 Ditto, very slightly dolomitic, coarse-grained.
- 4168-4182 Shale, very silty, medium dark gray (N4), micaceous, very hard.
- 4182-4186 Shale, silty, medium gray (N5), micaceous, hard.

Interval

- 4186-4208 Shale, medium dark gray (N4), very finely micaceous, slightly fissile; some siltstone, dolomitic, medium light gray (N6), coarse-grained, rounded, moderately well sorted, (sample needed washing).
- 4208-4218 Siltstone, medium light gray (N6), coarse-grained, rounded, moderately well sorted, dark inclusions, very micaceous (large flakes of muscovite?), some part dolomitic, small part with dark green very fine-grained inclusions.
- 4218-4228 Shale, medium dark gray (N4), slightly fissile, trace very finely micaceous material.
- 4228-4239 Siltstone, shaly, medium light gray (N6), fine-grained, rounded, poorly sorted, dark peppering, slightly micaceous, hard, about 30%; shale, medium gray (N5), slightly micaceous.
- 4239-4290 Siltstone, as above, coarse-grained, micaceous, trace dolomitic material.
- 4250-4262 Shale, silty to very slightly silty, medium gray (N5), slightly fissile, micaceous.
- 4262-4274 Siltstone, shaly, medium light gray (N6), medium-grained to fine-grained, rounded, moderately poorly sorted, peppered with dark inclusions, finely micaceous, well cemented.
- 4274-4289 Ditto, very shaly.
- 4289-4300 Siltstone, as above; about 10% shale, medium gray (N5), trace very finely micaceous material.
- 4300-4310 Shale, very silty, medium gray (N5), very slightly fissile, micaceous.
- 4310-4320 Shale, slightly silty, medium gray (N5), fissile, finely micaceous, small part non-silty.
- 4320-4330 Shale, silty to very silty, medium light gray (N6), micaceous; little medium light gray siltstone, medium-grained, dark peppering, very well cemented.
- 4330-4345 Shale, dark medium gray (N4.5), slightly fissile, trace finely micaceous material.
- 4345-4356 Shale, as above, non-silty to slightly silty; siltstone, light gray (N7), coarse-grained, rounded, poorly sorted, dark peppering, well cemented.
- 4356-4364 Shale, dark medium gray (N4.5), trace very finely micaceous material (sample needs washing).

Interval

- 4364-4374 Siltstone, shaly, medium light gray (N6), medium-grained, trace dolomitic material, poorly sorted, slightly micaceous, well cemented.
- 4374-4384 Shale, silty to non-silty, medium gray (N5), slightly fissile, finely micaceous.
- 4384-4397 Siltstone, medium light gray (N6), very slightly dolomitic, medium-grained, rounded, moderately poorly sorted, slightly micaceous.
- 4397-4407 Shale, medium dark gray (N4), slightly fissile, very finely micaceous.
- 4407-4417 Shale, medium gray (N5), as above.
- 4417-4424 Siltstone, light gray (N7), medium-grained, rounded, poorly sorted, micaceous, peppered with dark inclusions and few minute pyrite (?) nodules, very well cemented.
- 4424-4434 Shale, medium gray (N5), slightly fissile, micaceous; trace small pyrite nodules in shale.
- 4434-4444 Ditto.
- 4444-4452 Shale, silty to very silty, medium light gray (N6), slightly fissile, very micaceous, dark peppering.
- 4452-4456 Shale, as above, light gray (N7); shale gray to medium dark gray (N3-4), part slightly silty, fissile to slightly fissile, finely micaceous to slightly micaceous.
- 4456-4467 Shale, medium dark gray (N4), very finely micaceous. (Sample needs washing).
- 4467-4482 Siltstone, medium light gray (N6), coarse-grained, rounded, moderately poorly sorted, slightly micaceous, dark peppering, well cemented.
- 4482-4492 Shale, dark gray (N3), very finely micaceous. (Sample needs washing).
- 4492-4504 Siltstone, shaly, light gray (N7), medium-grained, rounded, poorly sorted, micaceous, dark peppering, well cemented; some silty shale, light gray (N7), as siltstone.
- 4504-4514 Siltstone, very slightly dolomitic, medium light gray (N6), medium-grained, as above.
- 4515-4528 Shale, medium dark gray (N4), very finely micaceous; about 1/3 shale, silty, medium gray (N5), slightly fissile, micaceous.

Interval

- 4528-4535 Shale, very silty (approaching siltstone), medium light gray (N6), very slightly fissile, micaceous.
- 4535-4545 Shale, medium gray (N5), fissile, micaceous; siltstone, light gray (N7), coarse-grained, rounded, moderately well sorted, very micaceous to slightly micaceous, moderately well cemented.
- 4545-4555 Shale, silty to very silty, medium light gray (N6), slightly fissile, micaceous.
- 4555-4565 Shale, silty to non-silty, medium light gray (N6), very finely micaceous. (Sample needs washing).
- 4565-4575 Shale, very silty, medium light gray (N6), micaceous, grading to siltstone, shaly, medium light gray (N6), medium-grained, rounded, poorly sorted, micaceous, moderately well cemented.
- 4575-4585 Shale, medium dark gray (N4), trace micaceous material.
- 4585-4596 Siltstone, slightly dolomitic, medium light gray (N6), coarse-grained, rounded, moderately well sorted, very micaceous few dark bandings, very well cemented.
- 4596-4604 Shale, medium dark gray (N4), slightly fissile, trace finely micaceous material.
- 4604-4616 Shale, very silty, medium light gray (N6), slightly fissile, micaceous.
- 4616-4626 Shale, medium gray (N5), fissile.
- 4626-4637 Ditto, medium dark gray (N4).
- 4637-4647 Shale, as above; some (possible lense) siltstone, shaly, very slightly dolomitic, medium light gray (N6), coarse-grained, rounded, moderately well cemented, micaceous, well cemented.
- 4647-4656 Shale, medium gray (N5), slightly fissile, trace micac (sample needs washing).
- 4656-4665 Shale, very silty to shaly siltstone, medium light gray (N6), fine-grained, rounded, moderately poorly sorted, micaceous, moderately well cemented.
- 4665-4675 Shale, as above; shale, medium dark gray (N4), trace very finely micaceous material.
- 4675-4690 Shale, medium dark gray (N4), as above; shale, very silty, very slightly dolomitic, medium light gray (N6), micaceous.
- 4690-4700 Shale, as above, medium dark gray shale, silty; few pieces quartz crystals in shale, secondary?

Interval

- 4700-4707 Shale, slightly silty, medium gray (N5), micaceous to very micaceous.
- 4707-4716 Shale, medium dark gray (N4), fissile.
- 4716-4730 Shale, very silty, very slightly dolomitic, medium light gray (N6), micaceous.
- 4730-4744 Shale, silty, light medium gray (N5.5), micaceous.
- 4744-4754 Shale, dark medium gray (N4.5), slightly fissile, very finely micaceous; shale, silty, dark medium gray (N4.5), fissile, micaceous.
- 4754-4764 Shale, silty, medium light gray (N6), micaceous, very hard.
- 4764-4775 Shale, dark gray (N3), fissile, trace very finely micaceous material.
- 4775-4785 Siltstone, shaly, slightly dolomitic, light gray (N7), coarse-grained, rounded, poorly sorted, micaceous.
- 4785-4795 Shale, medium dark gray (N4), fissile, finely micaceous, few pyrite spherules in shale.
- 4795-4816 Shale, as above.
- 4816-4825 Shale, as above, trace micaceous material, no spherules noted, (sample needs washing).
- 4825-4830 Ditto, noted pyrite spherules.
- 4830-4841 Ditto, no pyrite spherules noted. (sample needs washing).
- 4841-4852 Ditto, noted spherules.
- 4852-4868 Shale, medium gray (N5), fissile, part very slightly silty, trace very finely micaceous material.
- 4868-4882 Shale, medium gray (N5.5), slightly fissile, trace very finely micaceous material.
- 4882-4900 Shale, as above, with some siltstone, slightly dolomitic, shaly, medium light gray (N6), coarse-grained, rounded, moderately poorly sorted, micaceous; few pyrite (?) spherules noted.
- 4900-4908 Ditto, more dolomitic siltstone.
- 4900-4025 Shale, medium dark gray (N4), fissile, trace finely micaceous material; few crystals dolomite (?).

Interval.

- 4925-4937 Shale, as above, trace dark gray (N3), very fissile; few pyrite spherules noted.
- 4937-4950 Shale, slightly carbonaceous, medium dark gray (N4), fissile, finely micaceous.
- 4950-4956 Shale, as above.
- 4956-4962 Ditto, dark gray (N3).
- 4962-4972 Ditto.
- 4972-4978 Shale, silty, medium dark gray (N4), finely micaceous.
- 4978-4983 Shale, micaceous, some with numerous pyrite inclusions.
- 4983-4987 Ditto, slightly silty, one pyrite spherule noted.
- 4987-4996 Ditto, silty to very silty, no pyrite noted.
- 4996-5005 Ditto.
- 5005-5014 Ditto, and shale, carbonaceous, dark gray (N3), trace micaceous material; considerable pyrite in sample.
- 5014-5020 Shale, medium gray (N5), fissile, trace very finely micaceous material.
- 5020-5029 Ditto.
- 5029-5035 Shale, silty to sandy, dark gray (N3.5), micaceous; trace pyrite.
- 5035-5045 Shale, silty, medium dark gray (N4), very slightly fissile, finely micaceous, trace pyrite.
- 5045-5050 Shale, carbonaceous, dark gray (N3.5), trace finely micaceous material.
- 5050-5057 Shale, silty, medium light gray (N6).
- 5057-5064 Shale, carbonaceous, dark gray (N3).
- 5064-5070 Shale, medium gray (N5), very finely micaceous.
- 5070-5079 Shale, as above, slightly trace dolomitic material; trace pyrite.
- 5079-5088 Shale, silty, medium dark gray (N4), micaceous; trace pyrite.
- 5088-5098 Shale, medium dark gray (N4), slightly fissile, slightly micaceous (sample needs washing).
- 5098-5107 Shale, silty, medium dark gray (N4), finely micaceous.

Interval

- 5107-5118 Shale, slightly carbonaceous, slightly silty, medium dark gray (N4), very finely micaceous.
- 5118-5128 Shale, medium gray (N5), fissile to slightly fissile, finely micaceous; trace pyrite.
- 5128-5138 Siltstone, slightly dolomitic to dolomitic, medium light gray (N6), medium gray, rounded, poorly sorted, very slightly peppered with dark inclusions, considerable loose fine-grained angular fragments of clear quartz, very well cemented, considerable pyrite.
- 5138-5150 Shale, very carbonaceous dark gray (N3), fissile, trace very finely micaceous material.
- 5150-5176 Shale slightly carbonaceous, medium dark gray (N4), fissile to slightly fissile, slightly micaceous.
- 5176-5187 Shale, as above, part non-carbonaceous; trace pyrite.
- 5187-5200 Shale, slightly carbonaceous, medium dark gray (N4), fissile, very finely micaceous; trace pyrite.
- 5200-5215 Shale, slightly carbonaceous, slightly silty, medium dark gray (N3.5), fissile, very finely micaceous; trace pyrite.
- 5215-5230 Shale, slightly carbonaceous, medium dark gray (N3.5), fissile, very finely micaceous.
- 5230-5244 Shale, slightly carbonaceous, slightly silty, medium dark gray (N4), fissile, trace micaceous material; pyrite, in crystals and spherules.
- 5244-5263 Shale, slightly carbonaceous, medium dark gray (N4), fissile, very finely micaceous; trace pyrite.
- 5263-5275 Shale, medium gray (N5), slightly fissile, finely micaceous; trace pyrite.
- 5275-5290 Shale, as above.
- 5290-5305 Shale, medium light gray (N6), slightly fissile, very finely micaceous, very small pyrite crystal inclusions.

Total Depth: 5305'

Samples run by Eloise T. Jacobsen
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Lexington, Kentucky
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