

Vol. XVII, p 39

Unpublished

W. H. Frehour Ni (6116)

Union District, Putnam Co. W. Va.

By Pittsburgh & W. Va. Gas Co.

Holbrook Squad

Elevation 1097

PERMIT Pit 810

Located 3.71 miles W of $80^{\circ}50'$ & 5.1 miles S. of $39^{\circ}10'$

Examined by C. N. Apicini. 8-1452

Samples donated by. 1452-2479

dredged 1940

2 trays

0	10	10	Shale, red, 50% (II) Shale, yellowish-green, 50%
10	17	8	Shale, red, 80% (II) Siltstone, yellowish-green, 20%
18	38	20	Shale, red, 50% (II) Shale, yellowish-green, silty, 50%
38	46	8	Shale, red, 95% (II) Shale, yellowish-green, 5%
46	52	6	Shale, red, 90% (II) Shale, yellow, silty, 5% (III) Shale, green, 5%
52	56	4	Samples missing
56	65	9	Shale, red, 80% (II) Shale, yellowish-green, silty, 20%
65	70	5	Shale, gray, completely disintegrating in water, 85% (II) Shale, dark-gray, 15%
70	90	20	Siltstone, green, somewhat shaly, 70% (II) Siltstone, very light-brown, 10%
90	103	13	Shale, green, 70% (II) Shale, brown, 10% (III) Shale, red, 5% (IV) Siltstone, green, 15%
103	110	7	Siltstone, green, 88% (II) Shale, brown, 5% (III) Shale, red, 2% (IV) Siltstone, light-brown, 5%

110	131	9	Siltstone, green, ^{sandy,} carrying muscovite, chlorite, biotite and siderite
131	138	7	Shale, red, 15% (II) Siltstone, very light-gray 5% (III) Shale, dark-gray, 20% (IV) Shale, brownish-gray, disintegrating in water, 5% (V) Shale, gray, 5%
138	160	29	Shale, red, 70% (II) Siltstone, green, 30%
160	166	6	Siltstone, green
166	172	6	Siltstone, green, 74% (II) Shale, red, 3% (III) Shale, brown, 3%
172	185	13	Siltstone, as above, 85% (II) Shale, red 10%
185	195	10	Siltstone, green
195	205	10	Shale, red, disintegrating in water, 85% (II) Siltstone, as above, 15%
205	211	6	Shale, green, slightly silty, 80% (II) Shale, brown, 20%
211	216	5	Shale, green, 45% (II) Siltstone, green, 50% (III) Shale, red, 5%
216	221	5	Siltstone, green, of sandy nature containing, muscovite, chlorite, biotite and specks of siderite

- 221 238 17 Sandstone, or sandy siltstone, having the same minerals as the bed immediately above
- 238 244 6 Siltstone, or very fine sandstone, white, 40% (I) siltstone, light-green, 10% (II) Limestone, light-brown, 30% (IV) Shale, light-green, 20%
- 244 250 6 Shale, light-green, silty, 80% (II) Limestone, light-brown, 20%
- 250 257 7 Shale, light-green, portions of which are silty, 45% (II) Sandstone, white, very fine-grained, angular, 10% (III) Limestone, light-brown, 45%
- 257 260 3 Shale, red, 85% (II) Shale, green, 15%
- 260 280 20 Shale, red
- 280 287 7 Siltstone, green
- 287 293 6 Siltstone, green, 90% (II) Shale, red, 10%
- 293 299 6 Siltstone, green
- 300 310 10 Shale, light-green, partly silty, 85% (III) Shale, red, 5%

- 310 315 5 Siltstone, light-gray, containing carbonaceous material, 50% (II) Shale, light-gray, 50%
- 315 320 5 Siltstone, very light-gray, sandy
- 320 330 10 Siltstone, light-gray, 50% (II) Shale, light-gray, to gray
- 330 340 10 Shale, light-gray to gray, 50% (II) Shale, gray, clayey, disintegrates in water
- 340 345 5 Shale, clayey, as above, disintegrates in water, 70% (II) Shale red, 20% Siltstone, light-brown, 10%
- 345 360 15 Shale, red
- 360 372 12 Siltstone, green
- 372 385 13 Siltstone, light-green, sandy 50% (II) Shale, yellow, 40% (III) Shale, red, 10%
- 385 432 47 Shale, red, 85% (II) Marl, gray to brown, 15%, occurring in nodules scattered in the red material
- 432 438 6 Siltstone, green, 50% (II) Shale, red, calcareous, 50%

- 438 444 6 Siltstone, green, 80% (II) shale, green, 20%
- 444 456 19 Siltstone, green
- 456 474 18 Siltstone, ~~green~~, sandy, with spherulites of siderite
- 474 480 6 Shale, light-gray to gray, 50% (II) shale, ~~medium gray~~, 10% (II) shale, red, 40%
Some of the red shale fragments effervesce in HCl
- 480 495 15 Shale, red, 80% (II) Marl and/or limestone, very light-brownish-white, studded with crystals of Pyrite, 20% in the upper five feet. In the lower horizons it a few grains only
- 495 520 25 Siltstone, green, sandy, chloritic with few specks of siderite, 50% (II) shale, red, 40% (III) Marl or limestone, as above, 10%
- 520 527 7 Shale, red, 60% (II) Siltstone, green, sandy, with muscovite, white, chlorite and specks of siderite

527	533	6	Siltstone, green, ^{sandy,} 40% (I) Shale, red, 60% (II) Limestone, very light-brown, 10%
533	540	7	Siltstone, green, sandy, 90% (I) Shale, red to reddish-brown, 10%
540	547	7	Siltstone, as above, 50% (I) Shale, as above, 50%
547	554	7	Shale, red, 80% (I) Shale, reddish-brown, 20%
554	561	7	Shale, of lilac color, clayey, disintegrating in water, 60% (I) Shale, red, 20% (II) Shale, green, 20%
561	582	9	Siltstone, green, sandy, chloritic containing spherulites of siderite
582	589	7	Shale, reddish-brown, disintegrating in water, 90% (I) Siltstone, as above, probably due to cavings from above, 10%
589	600	11	Shale, gray, 90% (I) Siltstone, as above, 10%
600	607	7	Shale, as above, 70% (I) Siltstone, as above, 30%
607	620	13	Shale, gray, calcareous, 50% (I) Limestone, light-brown, 35% (II) Shale, red, 15%
620	644	24	Shale, red, 50% (I) Shale, gray, calcareous with a few limy fragments scattered in the sample, 50%

- 649 650 6 Shale, of blue color, disintegrating in water
- 650 656 6 Siltstone, green, sandy, almost a very fine-grained sandstone, containing mica, chlorite & specks of siderite
- 656 668 12 Sandstone, white being a coarser facies of the above siltstone.
- 668 672 14 Shale, light-green, slightly silty
- 672 679 7 Siltstone, green, 75% (II) Shale, grayish-green, 15% (III) Siltstone brown, with small calcareous nodules of brown color. Effervesces in HCl, 10%
- 679 686 7 Shale, grayish-brown 85% (II) Shale, red, 5% (III) Siltstone, green, probably due to cement from above, 10%
- 686 693 7 Shale, very light-gray, 85% (II) Shale, very dark-gray, 15% (III) Shale, red, 20%
- 693 707 14 Shale, brownish-yellow, clayey, disintegrating in water and effervescing in HCl
- 707 714 7 Shale, gray, clayey, completely disintegrating in HCl.

- 714 728 14 Shale, red, associated with brown limestone which may occur as nodules in the shale
- 728 740 12 Shale, as above, 95% (II) Siltstone, green, sandy, chloritic; 5% in the lower six feet its proportion increases to about 20%
- 740 765 25 Shale, red, as above
- 765 777 12 Siltstone, green, sandy, chloritic
- 777 788 11 Siltstone, as above, 75% (II) Shale, red, 25%
- 788 805 17 Shale, red to yellow, containing calcareous material and effervescing in acid
- 805 838 33 Shale red, containing fragments of compact limestone, which occurs as nodules in the shale
- 838 844 6 Shale, red, 75% (II) Siltstone, green, shaly, 25%
- 844 849 5 Shale, green, 65% (II) Siltstone, green, 15% Shale, red, 20%
- 849 855 6 Shale gray, 80% (II) Shale, dark gray, 20%

- 855 861 6 Limestone, light-brown, 75% (II) Shale of various colors, due to cavings from above, 25%
- 861 867 6 Shale, grayish-green, 60% (II) Shale, red, 10% (III) Shale, very dark-gray, 5% (IV) Limestone, light-brown, compact, 25%
- 867 891 24 Limestone, light-brown, compact, 70% (II) Shale, grayish-green, 30%
- 891 922 31 Shale, green, 85 (II) Shale, red, 15% (III) Limestone fragments, due to caving
- 922 929 7 Shale, greenish-gray, clayey, disintegrating in water. It contains a considerable amount of calcareous material & effervesces in HCl.
- 929 935 6 Limestone, brownish-white, compact, 70% (II) Shale, green, 10% (III) Siltstone, green, 10% (IV) Shale, red, 10%
- 935 955 20 Shale, red, calcareous, effervesces in HCl, 90% (II) Limestone, as above, probably due to caving, 10%, as it does not persist below the top of the bed
- 955 962 7 Shale, red
- 962 983 31 Shale, red, 50% (II) Shale, green, silty, 50%

- 993 999 6 Shale, green, silty
- 999 1011 12 Shale, as above 95%, associated with white limestone fragments.
- 1011 1017 6 Shale, dark to very dark-gray, 90%
(II) Shale, green, 10%
- 1017 1032 15 Shale, chocolate brownish-gray, 92%
(II) Shale, dark-gray to very dark gray, 8%
- 1032 1040 8 Shale, brownish-gray, 90% (II) Cavings from above
- 1040 1048 8 Limestone, very light brown, compact, 80%
(II) Shale, red, 10% (III) Cavings from above
- 1048 1053 5 Shale, red, associated with calcareous nodular material and effervescing in HCl, 70% (II) Shale, light-gray, disintegrating in HCl
- 1053 1063 10 Shale, gray, very calcareous, vigorously effervescing in HCl.
- 1063 1073 10 Shale, very dark-gray, 90% (II) Shale, very light gray, associated with limestone, 10%

- 1073 1083 10 Shale, very dark-gray
- 1083 1093 10 Shale, as above, 90% (II) Sandstone, white, very fine-grained, angular, calcareous, effervescent in HCl, 10%
- 1093 1110 17 Shale, very light-gray, with brown spherulites of siderite
- 1110 1128 18 Shale, as above, 60% (II) Shale, gray, 25% (III) Shale, red, 15%. The samples contain enough calcareous material to show effervescence in HCl
- 1128 1138 10 Shale, green
- 1138 1148 10 Sandstone, white, very fine-grained, angular, slightly frosted, 60% (II) Shale, green, as above
- 1148 1164 16 Sandstone, as above, containing, in addition, large angular fragments of milky quartz 85% (II) Shale, green, 15%
- 1164 1171 7 Siltstone, green, somewhat shaly
- 1171 1178 7 Shale, grayish-green
- 1178 1192 14 Shale, grayish-green, 85% (II) Siltstone, green, 15%

- 1192 1200 8 shale, gray, portions of which are silty
- 1200 1210 10 Sandstone, white, very fine-grained, angular, slightly frosted, 75% (II) shale, as above, 25%
- 1210 1220 10 Sandstone, as above, 60% (II) siltstone, gray, shaly, 35% (III) shale, brown, 5%
- 1220 1230 10 Sandstone, as above, but of coarser texture
- 1230 1240 10 Sandstone, as above, 60% (II) shale, gray, 40%
- 1240 1250 10 shale, gray, slightly silty, 80% (II) shale, white, clayey, containing small calcareous nodules and effervescent in HCl.
- 1250 1260 10 shale, grayish-green, 75% (II) shale, very dark-gray, 15% (III) shale, green, 10%
- 1260 1275 15 Sediments, as above, 95% (II) shale, white, compact, 5%
- 1275 1282 7 shale, gray, 75% (II) shale, greenish-gray, 25%

- 1282 1303 21 Shale, gray, 60% (II) Limestone, brown, some fragments of which are sandy, 40%
- 1303 1310 7 Shale, grayish-green, silty, 85% (II) Limestone as above, 15%
- 1310 1368 58 Shale, as above, 90% (II) Shale, white, compact, 10%
- 1368 1378 10 Siltstone, gray, shaly
- 1378 1388 10 Shale, gray
- 1388 1398 10 Shale, gray 85% (II) Shale, white, 15%
- 1398 1417 19 Shale, gray, 85% (II) Shale, brownish-gray, 15%
- 1417 1431 14 Shale, white, with brown spherulites of siderite, 85% (II) Shale, brownish-gray, 15%
- 1431 1460 29 Shale, gray, 20% (II) Shale, brownish-gray, 5% (III) Shale, very dark-gray, 5% (IV) Shale, brown, with spherulites of siderite, 5% (V) Shale, white, as above, 10% (VI) Sandstone, white, very fine-grained, angular, 5%
- 1460 1470 10 Shale, gray, slightly silty

1470	1480	10	Shale, gray, 90% (II) Siltstone, gray, 10%
1480	1490	10	Siltstone, gray, partly shaly, 60% (II) Sandstone, white, very fine-grained angular, with spherulites of siderite, 40%
1490	1500	10	Shale, gray, 80% (II) Shale, very dark-gray, 15% (III) Sandstone, as above, 5%
1500	1520	20	Shale, as above, 60% and 20% respectively (II) Shale, very slightly silty, white, 20%
1520	1540	20	Shale, gray, containing organic material, 92% (II) Shale, very dark-gray, 5% (III) Sandstone, probably due toavings from above, 3%
1540	1548	8	Shale, gray, 70% (II) Shale, white, 30%
1548	1569	21	Shale, gray & dark-gray, 90% (II) Shale, white, as above, 10%
1569	1583	14	Shale, gray
1583	1620	37	Shale, gray, 80% (II) Siltstone, gray, with spherulites of siderite, 20%
1620	1631	11	Shale, gray, slightly silty
1631	1650	19	Shale, gray, 80% (II) Shale, white to very light brownish-white, with some spherulites of siderite, 20%

1650	1670	20	Shale, gray, as above, silty, 80% (II) Shale, white to brownish - white as above, 20%
1670	1677	7	Shale, gray, 85% (II) Shale, brown, 15%
1677	1691	14	Sediments as above, 90% (IV) Shale, white to very light-gray, with a few spherulites of siderite, 10%
1691	1708	17	Shale, gray, silty, 85% (II) Shale, very light-gray, silty, 15%
1708	1730	22	Shale, gray, silty
1730	1740	10	Siltstone, gray, shaly, with a small amount of specs of siderite
1740	1767	27	Siltstone, as above, 92% (II) Siltstone, white sandy, almost a 'very fine-grained' sandstone, 5% (III) Shale, brown, 3%
1767	1779	12	Sandstone, white, extremely fine-grained, is rather a sandy siltstone, with specs of siderite, 85-90% (II) Shale, dark-gray, 5% (III) Shale, white, clayey, disintegrates in water
1779	1790	11	Siltstone, white, as above, 50% (II) Shale, gray to dark-gray, slightly silty, 50%
1790	1800	10	Siltstone, as above, 25% (II) Shale, as above, 75-80%

- 1800 1827 28 Shale, gray to dark gray, 90% (II) Sandstone, white, very fine-grained, subangular, slightly frosted, 10%
- 1828 1840 12 Shale, gray, slightly silty, 80% (II) Shale, very dark-gray, 90% (III) Siltstone, white, probably a facies of the above white sandstone, 10%
- 1840 1850 10 Siltstone, white, sandy, with pecks of siderite, almost a very fine-grained sandstone, 85% (II) Shale, brownish gray, 10% (III) Shale, very dark-gray, 5%
- 1850 1855 5 Siltstone, as above, slightly coarser
Murch. Chert?
- 1855 1860 5 Limestone, light-brown, 90% (II) Shale, red, 20% (III) Shale, gray, 8%
- 1860 1865 5 Siltstone, white, sandy
- 1865 1870 5 Shale, green, 75% (II) Siltstone, light-green, 15% (III) Shale, grayish-brown, 10%
- 1870 1882 12 Shale, red, 70% (II) Shale, green, partly silty, 30%
- 1882 1890 8 Shale, green, 75% (II) Shale, red, 25%

- 1890 1895 5 Shale, grayish-green, 85% (II) Limestone, brown, 15%
- 1895 1900 5 Shale, gray to grayish-green
(II) Limestone, brown, 25%
(II) Shale, gray, thinly laminated and tending to partur when in water
Little Limestone
- 1900 1907 7 Limestone, brown, compact, fossiliferous, 90% (II) Shale, green, red, gray, about 10%. The gray shales show tendency to partur, when placed in water
- 1907 1915 8 Limestone, brown, compact
- 1915 1928 8 Limestone, as above, 60% (II) Shale, gray, very calcareous, vigorously effervesces in HCl.
- 1923 1933 10 Shale, calcareous, gray, to light-gray, 70% (II) Shale, green, 5% (III) Limestone, brown, 25%
Greenbrier L
- 1933 1940 7 Limestone, brown, 40% (II) Shale, light-gray to gray, calcareous, 60%
- 1940 1945 5 Limestone, light brown to brown, compact, portions of which are oolitic,

- 1945 1953 11 Limestone, brownish-white, oolitic, 85%
(II) Limestone, brown, 15%
- 1956 1962 6 Limestone, light brown, of saccharoidal texture due to the presence of dolomite rhombohedrons
- 1962 1967 5 Limestone, light-brown, some fragments of which are shaly
- 1967 1978 11 Limestone, light-brown, compact
- 1978 1981 3 Limestone, as above, a few fragments are of saccharoidal texture, though not dolomitic
- 1981 1999 18 Limestone, light-brown, compact
- 1999 2012 13 Limestone, brownish-white, compact
- 2012 2016 4 Limestone, as above, very slightly sandy
- 2016 2019 3 Limestone, light-brown, sandy and slightly shaly
- 2019 2040 21 Sandstone, white, cemented by limestone, medium- to fine-grained, subangular to subrounded

- 2040 2047 7 Limestone, light-brown slightly sandy, with saccharoidal texture owing to the presence of dolomite rhombohedron
- 2047 2051 4 Limestone, very light-brown, slightly sandy, compact
- 2051 2068 17 Limestone, very light-brown, of saccharoidal texture, dolomitic & slightly sandy
- 2068 2071 3 Limestone, as above, 90% (II) ~~Limestone~~ brown, slightly shaly, 10%
- 2071 2086 15 Limestone, light-brown, sandy, dolomitic, 75% (II) Shale, gray, slightly calcareous, 25%
- 2086 2108 22 Shale, gray, some fragments of which contain spherulites of siderite, 90% (II) Limestone, as above, due to cavings from above
- 2108 2120 12 Shale, as above, 80% (II) Shale, brownish-gray, 20%
- 2120 2145 25 Shale, gray, portions of which are very slightly silty
- 2145 2152 7 Shale, gray

2152	2160	8	Shale, gray, slightly silty
2160	2175	15	Siltstone, gray, shaly
2175	2183	8	Siltstone, gray, sandy
2183	2193	10	Siltstone, light-gray, sandy, 75% (II) Shale, gray, 25%
2193	2207	14	Shale, light-gray, silty, 20% (II) Shale, gray, 30%
2207	2214	7	Siltstone, gray, sandy, with specks of siderite
2214	2244	30	Siltstone, very light-gray to gray, 20% (II) Shale, gray, slightly silty, 30%
2244	2302	58	Siltstone, light-gray to gray, containing specks of siderite
2302	2318	16	Siltstone, as above, 90% (II) Shale, gray, 10%
2318	2325	7	Siltstone, as above, 25% (II) Shale, as above, 25%
2325	2342	17	Shale, gray, slightly silty
2342	2360	18	Shale, gray, 40% (II) Siltstone, very light-gray, 60%
2360	2380	25	Shale, gray

- 2385 2495 110 Shale, gray, 20% (II) Shale, light-gray, 10%
- 2495 2404 9 Shale, gray
- 2404 2419 15 Shale, gray, 85% (II) Sandstone, brown, very fine-grained containing few larger grains of quartz, 15%
- 2419 2422 3 Shale, gray
- 2422 2445 23 Shale, gray to light-gray, 70% (II) Shale, light-gray, silty, 30%
- 2445 2453 8 Shale, very light-gray, 85% (II) Shale, gray, 15%
- 2453 2461 8 Shale, light-gray
- 2461 2467 6 Shale, light-gray, silty
- 2467 2475 8 Shale, gray, 70% (II) Siltstone, light grayish-green, shaly, 30%
- 2475 2479 4 Siltstone, greenish-gray, 70% (II) Shale, light-gray, 30%