

Howland Land Company No. 1 (663) Well

Marsh Fork District, Raleigh County, W. Va.

By Columbian Carbon Company, Charleston, W. Va.

Located 3.02 mi. N. of 81°25' and 0.28 mi. S. of 37°50' - SW - Boolea

Quadrangle.

Elevation, 1422.0' L.

Permit RAL-17

Drilling commenced May 6, 1942; completed May 6, 1943.

Fresh water at 26 and 420-425'.

Salt water 1050, 1983, 5983 and 6627-6630'.

Coal was encountered at 230-232' and 452-454'.

18" casing, 24'2"; 16", 42'2"; 13 3/8", 304'6"; 10 1/2", 1598'3"; 8 5/8", 2944';
7", 5996'2".

Dry hole.

Section based on nearly complete set of samples examined by J. K. C. Mertens.

Most of samples are very small and many are so stained with rust that true color cannot be described satisfactorily.

Top Bottom Thickness

Pottsville Formation, 1040+ feet

0	21	21	Sandstone, brown, coarse
21	32	11	Sandstone, light-gray, very fine (fresh water, 26', 3 1/2-16" bailers per hour)
32	52	20	Sandstone, nearly white, medium - to fine-grained, with a few pieces of black carbonaceous matter; mostly broken up into individual grains
52	115	63	Sandstone, white to light-gray, fine; has high proportion of quartz, with crystal faces on many grains
115	165	50	Sandstone, white, coarse, with traces of coal and black shale
165	174	9	Siltstone, gray, sandy
174	219	44	Shale, dark-gray, silty; also some siltstone
219	224	6	Sandstone, gray, fine, silty
224	228	4	Sandstone, fine, with much rust stain
228	231	3	Sandstone, nearly white, very fine

Top	Bottom	Thickness	
231	241	10	Sandstone, light-gray, very fine, 80%; gray shale, 20%
241	251	10	Sandstone, light-gray, very fine
251	263	12	Shale, black, silty, 70%; gray, fine to very fine sandstone, 30%
263	269	6	No sample
269	278	9	Shale, black, silty, 60%; gray, fine to very fine sandstone, 40%
278	285	7	Sandstone, light-gray, fine
285	288	3	Sandstone, light-gray, very fine, 60%; black, silty shale, 40%
288	293	5	No sample
293	310	17	Sandstone, light-gray, very fine
310	324	14	Shale, black
324	329	5	Shale and siltstone, black to dark-gray
329	335	6	Sandstone, light-gray, very fine
335	342	7	Siltstone, gray
342	352	10	Siltstone and silty shale, dark-gray to black
352	360	8	Sandstone, light-gray to brownish, fine, 70%; black to dark-gray silty shale, 30%
360	377	17	Sandstone, white, fine, nearly all quartz
377	398	21	Sandstone, white with some rust stains, fine, nearly all quartz
398	401	3	No sample
401	416	15	Shale, dark-gray, very silty, 70%; light-gray fine sandstone, 30%
416	432	16	Sandstone, white to light-gray, fine, also some dark silty shale (fresh water, 420-425', 8-12" bailers per hour)
432	448	16	Sandstone, white with some rust stain, medium-grained
448	452	4	Sandstone, white, coarse
452	466	14	Shale, black, with a little coal, 60%; gray siltstone, 40%
466	473	12	Coal and black shale, 70%; white, fine sandstone, 30%; not much pure coal

Top	Bottom	Thickness	
478	494	15	Sandstone, white, fine, 70%; coal and black shale, 30%
494	521	27	Sandstone, white, fine
521	533	12	Sandstone, light-gray, fine
533	556	23	Sandstone, white, fine - to medium-grained; has moderate amount of rust stain
556	562	6	Sandstone, white, coarse
562	590	28	Sandstone, light-gray, very fine to fine
590	620	30	Sandstone, white with some rust stain, medium-grained
620	626	6	Shale, gray, very silty
626	650	24	Sandstone, white, fine-to medium-grained; some rust stain from drill steel throughout
650	655	5	No sample
655	675	20	Sandstone, white, coarse, poorly sorted
675	701	26	Shale, dark-gray to black, silty; also some siltstone
701	727	26	Shale, dark-gray to black
727	743	16	Shale and siltstone, dark-gray
743	748	5	Sandstone, gray, very fine; silty, 60%; black shale with trace of coal, 40%
748	764	16	Siltstone and silty shale, gray
764	774	10	Shale, dark-gray
774	809	35	Siltstone, gray, with a little dark-gray to black shale
809	814	5	Sandstone, gray, very fine, 60%; gray shale and siltstone, 40%
814	819	5	Sandstone, white, coarse
819	842	23	Sandstone, gray; fine to very fine
842	867	25	Sandstone, gray, mostly very fine, with large amount of dark-gray siltstone
867	874	7	Sandstone, light-gray, fine, 70%; dark-gray shale, 30%
874	879	5	Shale, very dark gray, silty
879	885	6	No sample
885	899	14	Shale, black
899	904	5	Shale, black, with a little coal, 70%; very fine gray sandstone, 30%
904	908	4	Sandstone, gray, very fine, 60%; black shale and coal, 40%

Top	Bottom	Thickness	
908	945	37	Sandstone, light-gray to nearly white, fine
945	956	11	Shale, dark-gray, silty
956	961	5	Sandstone, gray, very fine, 70%; black silty shale, 30%
961	967	6	Shale, black
967	975	8	Shale, gray
975	991	16	Siltstone, gray, 50%; black shale with a little coal, 50%
991	997	6	Siltstone, gray; small amount of black shale
997	1005	8	No sample
1005	1010	5	Siltstone, gray; also some gray clay
1010	1015	5	Siltstone, very dark gray, fine
1015	1040	25	Shale, black
<u>Mauch Chunk Group, 1033 feet</u>			
1040	1044	4	Clay, brownish-gray, 50%; green, micaceous shale, 50%
1044	1050	6	Siltstone, green, 60%; brownish-gray clay, 40%
1050	1054	4	Siltstone, green
1054	1059	5	Siltstone, light-gray to green, sandy
1059	1063	4	No sample
1063	1075	12	Shale, gray, micaceous
1075	1117	42	Siltstone and shale, gray
1117	1165	48	Sandstone, light-gray, fine - to medium-grained
1165	1188	23	Shale and siltstone, dark-gray
1188	1202	14	Shale, dark-gray to black
1202	1219	17	No sample
1219	1277	58	Shale, black, distinctly laminated and closely jointed
1277	1295	18	Sandstone, white, very fine, 50%; black, gray and greenish shale, 50%
1295	1299	4	Sandstone, white, very fine, with some shale as above
1299	1318	19	Shale, dark-gray to greenish, thinly laminated and closely jointed; also a little siltstone and very fine sandstone and a few pieces of dolomite
1318	1328	10	Siltstone, gray to greenish, 80%; gray, green and brown shale, 20%
1328	1338	10	Siltstone, gray, 50%; gray to brown limestone, 30%; gray shale, 20%

Top	Bottom	Thickness	
1359	1342	4	Shale, gray and green, thinly laminated, 80%; light-brown limestone, 20%
1342	1362	20	Shale, gray and green, thinly laminated and closely jointed; a few pieces slickensided
1362	1402	40	Shale, gray, laminated, 80 to 70%; gray limestone, 20 to 30% (this interval may be mostly limestone)
1402	1405	3	Shale, grayish-green, 80%; red silty shale, 15%; gray limestone, 5%
1405	1409	4	Shale, gray, 30%; red silty shale, 20%
1409	1412	3	Shale, grayish-green, 60%; red shale, 30%; light-green siltstone, 20%
1412	1420	8	Shale, red, 50%; grayish-green shale, 40%; light-green siltstone, 10% (gas show, 1418)
1412	1463	51	Shale, red, calcareous; also small amounts of grayish-green shale
1463	1472	9	Sandstone, white to pink, very fine, silty, 80%; red and gray shale, 20%
1472	1481	9	Shale, red
1481	1484	3	Sandstone, light-red and light-green, very fine
1484	1490	6	Sandstone, light-green and white, very fine, 60%; red and gray shale, 40%
1490	1493	3	Shale, gray, 60%; red shale, 20%; light-gray to greenish siltstone and very fine sandstone, 20%
1493	1501	8	Shale, gray
1501	1512	11	No sample
1512	1572	60	Shale and siltstone, red
1572	1576	4	Dolomite, brown, very fine textured
1576	1577	1	Shale, red and green
1577	1583	6	Shale, gray, silty, micaceous
1583	1598	15	Dolomite, gray, very fine textured; also much gray shale (gas, 1594-1598'; 60 M. cu. ft.)
1598	1604	6	Siltstone, light-red, 60%; nearly white siltstone, 20%; dolomite, shale, etc, 20%

To	Bottom	Thickness	
1604	1611	7	Dolomite, gray, very fine textured, 70%; red shale, 30%
1611	1614	3	Dolomite, gray, 40%; gray shale and siltstone, 40%; red shale, 20%
1614	1619	5	Siltstone, reddish to nearly white, coarse
1619	1635	16	Siltstone, gray, shaly, 60%; light-gray, very fine sandstone, 40% (gas, 1633-1635', 84 M. cu. ft.)
1635	1665	30	Shale, gray, with a few fossils
1665	1674	9	Siltstone, gray, fine; also some gray shale
1674	1684	10	Sandstone, light-red, with some green specks, very fine
1684	1694	10	Siltstone, gray, with some pink and green; not much finer than sandstone above
1694	1711	17	Sandstone, nearly white, very fine
1711	1720	9	Sandstone, white, medium-grained
1720	1730	10	Sandstone, very light-brown, fine
1730	1740	10	Shale, greenish-gray (gas, 1730', 25,830 cu. ft.)
1740	1750	10	Siltstone, and shale, gray
1750	1760	10	Sandstone, white, very fine to fine, 70%; gray to greenish shale and siltstone, 30%
1760	1837	77	Sandstone, white, fine, nearly all quartz; crystal faces on many grains
1837	1847	10	Shale, gray, silty
1847	1863	16	Shale, gray
1863	1880	17	Shale, red
1880	1888	8	Shale, grayish-red, 60%; gray and green shale, 40%
1888	1894	6	Shale, gray
1894	1907	13	Dolomite, gray, very fine textured, 50%; gray and red shale, 50%
1907	1927	20	Limestone, gray, mostly dolomitic, 70%; gray and red shale, 30%
1927	1955	28	Shale, dark-gray, very silty

Top	Bottom	Thickness	
1955	1970	15	Siltstone, gray to dark-gray
1970	1981	11	Sandstone, gray, very fine
1981	1998	17	Sandstone, white to light-gray, with some rust stain; fine to very fine (salt water, 1993; $\frac{1}{2}$ -10" bailer per hour)
1998	2020	22	Shale, gray with much rust stain
2020	2031	11	Limestone, gray; also much gray, silty and calcareous shale
2031	2066	35	Limestone, gray to brownish, with some gray shale
2066	2072	6	Limestone, brown, fossiliferous
2072	2080	8	Shale, gray to light-green, calcareous and dolomitic; also some limestone
2080	2088	8	Limestone, gray, fossiliferous
2088	2096	8	Shale, gray, fossiliferous and calcareous
2096	2102	6	Limestone, dark-gray to brownish, oolitic (?)
2102	2138	36	Shale, gray, fossiliferous, distinctly laminated; also a few pieces of limestone
<u>Greenbrier Limestone, 358 feet</u>			
2138	2146	8	Limestone, light-gray, fossiliferous, 60%; gray fossiliferous shale, 40%
2146	2161	15	Limestone, gray
2161	2179	18	Limestone, gray, shaly and silty, fossiliferous
2179	2257	78	Limestone, light-brown to brown
2257	2270	13	Limestone, gray and brown, oolitic (?)
2270	2293	23	Limestone, light-brown
2293	2302	9	Limestone, light-brown, with small round objects resembling oolites
2302	2372	70	Limestone, very light-brown
2372	2379	7	Limestone, nearly white
2379	2416	37	Limestone, gray and light-brown
2416	2426	10	Limestone, nearly white, oolitic; oolites are thoroughly cemented together

Top	Bottom	Thickness	
2426	2465	39	Limestone, light-brown
2465	2480	15	Limestone, brown to gray
2480	2489	9	Limestone, dark-gray, with some well rounded sand grains
2489	2496	7	Dolomite, gray to brownish, silty and sandy; contains about 10% of white anhydrite; many pieces of the dolomite are highly pyritic
<u>Pecono Formation, 526 feet</u>			
2495	2500	4	Siltstone, light-gray to brownish, with a few small spots of red; sandy and dolomitic
2500	2514	14	Shale, gray, silty (gas, 2504-2507', 169,000; blew down to 84,000 18 hrs.)
2514	2525	11	Siltstone, gray to light-gray
2525	2534	9	Shale, gray, silty
2534	2563	29	Siltstone, gray to light-gray, fairly coarse
2563	2695	32	Shale and siltstone, gray
2595	2633	38	Sandstone, light-gray, very fine
2633	2671	38	Sandstone, light-gray, very fine, silty, 50 to 70%; dark-gray shale, 50 to 30%
2671	2695	24	Shale, dark-gray; also some siltstone and very fine sandstone
2695	2716	21	Shale, dark-gray
2716	2723	7	Shale, dark-gray, 50%; gray siltstone and very fine sandstone, 50%
2723	2746	23	Sandstone, light-gray, very fine, 70%; dark-gray shale, 30%
2746	2910	164	Shale, dark-gray, with some interbedded siltstone
2910	2984	74	Siltstone and silty shale, gray
2984	2990	6	Shale, dark-gray, with some siltstone
2990	3004	14	Shale, black
3004	3014	10	Sandstone, light-gray, very fine, 30%; dark-gray to black shale, 30%; gray siltstone, 40% (Berea Sandstone)

Top	Bottom	Thickness	
3014	3022	8	Sandstone, light-gray, very fine, 20%; gray siltstone, 60%; gray to dark-gray shale, 20%
<u>Devonian Shales, 2808 feet</u>			
3022	3033	11	Siltstone and shale, gray
3033	3043	10	No sample
3043	3742	699	Shale and siltstone, gray
3742	4170	428	Shale, gray to dark-gray; also some siltstone, but generally much less than in the interval above; some very small spherical pyrite concretions in several of the samples from below 3947'
4170	4245	75	Siltstone, gray to light-gray, shaly, 70%; very dark gray shale, 30%
4245	4400	155	Shale, very dark gray, 50 to 80%; lighter gray siltstone, 50 to 20%
4400	5270	870	Shale, very dark gray to gray; small amounts of siltstone in many samples; there is generally more of this above 4600'
5270	5305	35	Shale, black; many pieces are shiny and slickensided, resembling anthracite coal
5305	5767	462	Shale, very dark gray to black; some slickensided fragments in every sample; a few small calcite veins, (5711-5767')
5767	5887	20	Shale, black, slickensided, with small calcite veins
	5930		Corrected depth to bottom of shale and top of "Corniferous", based on SLM
<u>Huntersville Chert, 84 feet</u>			
5930	5936	6	Limestone, gray to brownish, very cherty, containing small amount of yellow sphalerite
5936	5942	6	No sample
5942	5948	6	Limestone, gray, very cherty
5948	5974	26	Chert and very cherty limestone, gray to brownish
5974	5986	12	Limestone, gray, very cherty; contains some silt and a little glauconite

Top Bottom Thickness

5086	6014	28	Limestone, gray, very silty and cherty; broken into very small pieces; some of this might be called calcareous and cherty siltstone
<u>Oriskany Sandstone, 18 feet</u>			
6014	6032	18	Sandstone, light-gray, fine, calcareous
<u>Halderberg Group, 153 feet</u>			
6032	6039	7	Limestone, light-gray (1) silty and cherty; samples are broken very fine and have much rust stain
6039	6054	15	Limestone, light-gray, very silty and somewhat cherty
6054	6065	11	Chert, gray, silty and calcareous
6065	6124	59	Limestone, light-gray, fossiliferous; mostly contains rather small amount of chert and fairly abundant silt and fine to very fine sand
6124	6141	17	Limestone, gray, silty and cherty
6141	6165	24	Limestone, gray to dark-gray, fossiliferous, silty partly shaly
<u>Salina and Lockport Formation, 533 + feet</u>			
6165	6173	8	Limestone, dark-brown, very fine textured, slightly dolomitic
6173	6192	19	Dolomite, gray to brownish, very finely crystalline
6192	6199	7	Limestone, dark-gray, highly dolomitic; only slightly different from interval above
6199	6206	8	Limestone, dark-brown
6206	6229	24	Limestone, dark-brown, highly dolomitic
6229	6242	13	Dolomite, gray to brownish; also some small doubly terminated quartz crystals, fragments of larger quartz crystals, and cleavage fragments of anhydrite
6242	6259	17	Dolomite, brown
6259	6277	18	Dolomite, brown, with rather small amounts (5 to 10%) of anhydrite
6277	6297	20	Dolomite, gray to brownish
6297	6312	16	Limestone, dark-brown, dolomitic

Top	Bottom	Thickness	
6313	6318	5	Dolomite, gray
6318	6336	18	Dolomite-anhydrite rock; dark-brown dolomite mixed with 30 to 40% of anhydrite, much of which is white
6336	6340	4	Dolomite, dark-brown
6340	6363	23	Dolomite, brown, with some anhydrite
6363	6377	14	Dolomite-anhydrite rock, brown
6377	6414	37	Dolomite, brown to gray with about 5 to 20% of anhydrite
6414	6440	26	Dolomite, brown to light-brown, with small amount of anhydrite
6440	6445	5	Dolomite, dark-gray, shaly
6445	6478	33	Dolomite, brown, with small amounts of anhydrite, some of which is in clear cleavage fragments
6478	6612	134	Dolomite, brown to gray; varies some in texture but more is as coarse as is typical of Lockport Dolomite in Ohio; all is broken up fine
6612	6623	11	Dolomite, silty; much stained with iron rust
6623	6632	9	Sandstone, very fine, somewhat dolomitic; heavily stained with brown rust so that natural color can not be seen (water at 6627-6630', 3 bailers per hour)
6632	6655	23	Dolomite, silty; very heavily stained with rust; samples are broken up very fine
6655	6665	10	Dolomite, dark-gray; contains some silt and very fine sand
6665	6670	5	Dolomite, silty, rust stained
6670	6684	14	Dolomite, dark-gray (?) silty; may include some dolomitic limestone
6684	6708	24	Limestone, dark-gray, dolomitic, silty and partly shaly; samples broken very small and heavily stained with rust
	6708		Total depth; corrected to 6703 by SIM