

Estel Miller No. 721 Well

Center District, Wetzel County, W. Va.

By Hope Natural Gas Company, Clarksburg, W. Va.

On Laurel Run, 1.95 mi. W. of 80°35' and 3.77 mi. S. of 38°45' -MC- Littleton

Quadrangle, 5.4 mi. W. of Littleton.

Permit, Wet-181.

Elevation, 1262' L.

Drilling commenced August 4, 1930; completed December 26, 1933.

Shot, January 4, 1939 at 2391 to 2409'.

Volume, not available.

Fresh water at 100 feet.

Casing 13", 156 feet (pulled); 10", 1307 feet; 6 1/2", 2037 feet; 6-5/8", 2301 feet.

Top Bottom Thickness

Dunkard Group, 790 feet

Top	Bottom	Thickness	Description
0	5	5	Loam, brown
5	15	10	Clay, yellow
15	20	5	Clay, gray, with limestone nodules
20	35	15	Sandstone, gray, fine, micaceous; with considerable soft gray shale and some limestone
35	45	10	Shale, red and gray, soft, calcareous
45	65	20	Sandstone, greenish-gray, very fine, micaceous
65	90	25	Clay, brown, gray, yellow, etc., with abundant limestone nodules
90	105	15	Sandstone, light grayish green, micaceous and calcareous
105	115	10	Limestone, brown, very impure
115	130	15	No sample
130	155	25	Sandstone, grayish-green, fine, micaceous
155	170	15	Shale, gray, green and red; with considerable amount of gray to green siltstone and fine sandstone
170	175	5	Sandstone, very fine, gray, micaceous, calcareous
175	190	15	Shale, gray and green; some soft and clayey and some hard and silty; contains limestone nodules
190	205	15	Limestone, brown, clayey; most of the interval may be soft shale or clay with abundant limestone nodules

Top	Bottom	Thickness	
205	225	20	Shale and siltstone, gray, calcareous; some of shale is soft and clay-like
225	235	10	Clay, red
235	240	5	Sandstone, green, fine
240	250	10	Sandstone, light-green, very fine; and red, green and yellow soft shale
250	265	35	Sandstone, light-green, fine to very fine, micaceous
265	315	50	Clay and soft shale, red, calcareous; samples also contain some yellow clay and gray and green shale
315	330	15	Sandstone, gray, medium-grained
330	335	5	Clay, red and yellow, calcareous
335	340	5	Limestone, gray, clayey
340	345	5	Shale, gray and green, soft, calcareous
345	365	20	Clay, red, with small limestone nodules
365	390	25	Shale and siltstone, gray and green, calcareous; some of the shale is very soft and clay-like
390	410	20	Shale, gray and green, partly calcareous
410	460	50	Shale and siltstone, gray and green; samples also contain a little red and yellow clay and some limestone nodules, perhaps cavings
460	470	10	Sandstone, gray, fine
470	480	10	Shale, gray, mostly soft and fine-textured
480	495	15	Siltstone, gray, with considerable amount of shale and a little limestone
495	521	26	Shale, greenish-gray; fine and soft at top, becoming hard and silty toward bottom
521	523	2	Coal
523	540	17	Shale, gray, soft, mostly calcareous; some limestone near top
540	555	15	Clay, gray, with very small limestone nodules; lighter and more uniform in color than last and shows no lamination
555	570	15	Siltstone, gray, with smaller amounts of shale and limestone

Top	Bottom	Thickness	
570	590	20	Shale, gray, soft, clay-like; with considerable amount of limestone
590	605	15	Siltstone, gray, calcareous; with much light-brown limestone
605	660	55	Shale and siltstone, gray to grayish-green, with some calcareous material throughout
660	685	25	Shale, black, with some thin streaks of coal
685	700	15	Clay and soft shale, gray to green; with some limestone
700	735	35	Siltstone, gray, partly calcareous; samples also contain some shale and limestone
735	740	5	Coal
740	765	25	Sandstone, gray, very fine, micaceous; with considerable amount of brown impure limestone
765	790	25	Sandstone, light-gray, fine; contains some mica, chlorite, and kaolin (Waynesburg Sandstone)

Monongahela Formation, 345 feet

790	795	5	Coal, black, partly shaly (Waynesburg Coal)
795	820	25	Shale and siltstone, gray
820	840	20	Shale, dark-gray, mostly very fine; contains some highly calcareous material, of which there is more toward bottom
840	850	10	Shale, red, soft
850	855	5	Clay, gray, with small limestone nodules
855	885	30	Siltstone, greenish-gray with varying amounts of gray clay and shale
885	890	5	Shale, gray and red, soft, calcareous
890	895	5	Limestone, gray; and red and gray shale
895	900	5	Shale, grayish-green, soft
900	905	5	Sandstone, grayish-green, very fine
905	935	30	Shale, red; top half is highly calcareous mixed with gray clay and not much laminated; bottom half only slightly calcareous, distinctly laminated and red is mixed with green
935	950	15	Shale, grayish-green, silty; micaceous

Top	Bottom	Thickness	
935	950	15	Shale, grayish-green, silty, micaceous
950	990	40	Limestone, brownish-gray, fine-textured
990	1000	10	Shale, gray; with considerable amount of limestone
1000	1015	15	Limestone, brownish-gray
1015	1020	5	Coal (Sewickley Coal?)
1020	1035	15	Limestone, gray to brownish, with large amount of gray to green clay and shale
1035	1070	35	Limestone, gray; large proportion of shale and siltstone from 1060 to 1070'
1070	1075	5	Shale, grayish-green, silty
1075	1095	20	Limestone, gray; with considerable soft gray and green shale
1095	1105	10	Limestone, gray 50%; soft gray and green shale 50%
1105	1120	15	Siltstone, dark-gray, shaly, micaceous; with some gray clay and limestone
1120	1130	10	No sample; reported as "lime"
1130	1135	5	Coal (Pittsburgh Coal)
<u>Conemaugh Formation, 535 feet</u>			
1135	1145	10	Limestone, gray, 50%; gray clay and soft shale, 50%
1145	1150	5	Shale, gray
1150	1165	15	Shale, red, brown and gray, calcareous
1165	1185	20	Siltstone, grayish-green, shaly
1185	1190	5	Shale, red and gray, soft, calcareous
1190	1215	25	Siltstone and shale, grayish-green; samples also contain some soft red shale and a little limestone and sandstone
1215	1240	25	Shale, red and gray, soft, calcareous; samples also contain considerable amounts of fine- to medium-grained light-green sandstone
1240	1265	25	Sandstone, white to green fine- to medium-grained; samples also contain large amounts of clay and soft shale, mostly red
1265	1305	40	Clay, red, yellow and gray, soft, with small limestone nodules; mostly samples also contain some green shale
1305	1330	25	Shale, gray and green, soft; with up to 20% of light-gray limestone

Top	Bottom	Thickness	
1330	1390	60	Shale, gray, green and red; with 10 to 30% of light-gray limestone
1390	1400	10	Sandstone, grayish-green, fine, slightly calcareous
1400	1456	56	Clay, red and gray, calcareous
1450	1465	15	Sandstone, light grayish green, fine
1465	1470	5	Siltstone, light-gray, with siderite spherulites
1470	1485	15	Shale, dark- and light-gray, with streaks of fine sandstone
1485	1500	15	Clay, light-gray, with siderite spherulites
1500	1510	10	Shale, green and red; with much light gray clay like that above
1510	1555	45	Sandstone, light-gray, fine- to medium-grained; contains some mica, kaolin and chlorite and in bottom 15 feet some dark shaly material
1555	1565	10	Shale, green, red, gray and yellow; soft and claylike
1570	1605	35	Shale, dark-gray, very silty at top, finer toward bottom; a little pyritic and carbonaceous limestone in bottom 10 feet
1605	1620	15	Clay, light-gray to medium-gray, partly calcareous
1620	1635	15	Clay and soft shale, red, gray, green and yellow; many siderite spherulites in gray part
1635	1670	35	Shale, green with some red and gray and a few loose grains of sand; this interval is described as "Big Dunkard Sand" but samples show very little sand; the seven samples from this interval seem to be all alike; they are small samples and contain a large proportion of mud

Allegheny and Pottsville Formations, 555 feet (?)

1670	1675	5	Coal and dark-gray shale (Upper Freeport Coal)
1675	1690	15	Shale, dark-gray; with some coal
1690	1715	25	Sandstone, gray with brown and green specks, mostly fine-grained
1715	1730	15	Shale, dark-gray, micaceous
1730	1735	5	Limestone, dark-brown, very fine textured

Top	Thickness	Bottom	
1755	1755	20	Siltstone, gray; with some limestone as above
1755	1810	55	Sandstone, white, medium-grained; contains a very little mica, chlorite and kaolin
1810	1815	5	Shale and siltstone, gray (actual thickness perhaps less than 5 feet)
1815	1845	30	Sandstone, white with some rusty stain, medium- to coarse-grained
1845	1870	25	Shale and siltstone, gray, carbonaceous; samples also contain much sandstone
1870	1895	25	Shale and siltstone, gray
1895	1915	20	Sandstone, white, medium-grained, nearly all quartz
1915	1920	5	Shale, black, with a little impure coal
1920	1940	20	Shale, light-gray, soft, with many siderite spherulites
1940	1945	5	Sandstone, gray, fine
1945	1996	41	Shale, medium-to dark-gray, partly silty; small amounts of coal in some samples
1996	2032	36	Siltstone, dark-gray, shaly
2032	2047	15	Sandstone, light-gray; top 3 feet very coarse
2047	2054	7	Siltstone, gray
2054	2073	19	Sandstone, gray, very fine
2073	2105	32	Sandstone, light-gray, medium- to fine-grained, slightly calcareous
2105	2130	25	Shale, dark-gray, mostly silty
2130	2140	10	No sample
2140	2160	20	Sandstone, light-gray, very fine, becoming almost a siltstone at top; contains some dark-gray shale and siltstone throughout
2160	2205	45	Sandstone, white, fine; nearly all quartz, but contains a little chlorite, very small specks of pyrite and a little kaolin or similar clayey material
2205	2220	15	Siltstone, gray, shaly, about 50%; and white fine sandstone about 50%
2220	2247	27	Sandstone, white fine to very fine, nearly all quartz very slightly calcareous, (small of oil 2240-2247)

Top Bottom Thickness

Depth was apparently corrected from 2247 to 2225

but possibly a sample or two is missing and the exact correction is uncertain

Top	Bottom	Thickness	Description
2225	2280	55	<u>Greenbrier Limestone, 120 feet</u> Limestone, light-gray, slightly brownish when wet; a little gray and green shale in sample from 2245 to 2250'
2280	2320	40	Limestone, brownish-gray, darker than that above
2320	2345	25	Limestone, gray, very sandy; larger sand grains fairly well rounded (Loyalhanna Limestone)

Lower Mississippian and Upper Devonian, 865+ feet

2345	2360	15	Shale, gray, with about equal amount of fine, light-gray sandstone; samples are strongly calcareous, but this seems to be due mostly to limestone from above
2360	2475	115	Sandstone, nearly white, medium-to fine-grained; considerable yellow stain on samples below 2395'; gas at 2397'
2475	2530	55	Sandstone, light-gray, fine, with streaks of darker gray siltstone and silty shale; some of sandstone fragments contain carbonaceous material resembling coal
2530	2700	170	Shale, gray interstratified with varying amounts of siltstone of a little lighter color than the shale; some samples toward the bottom are more than half siltstone and those near the top about three-fourths shale
2700	2740	40	Sandstone, gray, very fine, shaly; with rather small amount of darker gray shale; most of the sandstone is so fine as to almost be a siltstone
2740	2770	30	Siltstone, gray, shaly
2770	2835	65	Shale, gray, silty, micaceous, pyritic; a little darker than the siltstone above
2835	2950	115	No samples (possibly Berea Sandstone is in this interval)
2950	3090	140	Shale, gray; with thin streaks of gray to green siltstone mostly in lower part; between 3025 and 3090' there are a very few scattered fragments of red shale
3090	3145	55	Sandstone, grayish-green, poorly sorted, slightly calcareous; has very coarse, rounded quartz grains and

Top Bottom Thickness

small pebbles embedded in fine matrix; samples also contain considerable gray shale and gray to green siltstone

3145	3155	10	Sandstone, light-gray with a few green and brown specks; mostly fine, but is poorly sorted and contains a few medium to coarse grains; slightly calcareous
3155	3205	50	Shale, gray; with small amount of fine to very fine, light-gray sandstone
3205	3210	5	Sandstone, light-gray, very fine, slightly calcareous; the last sample, labelled 3200 to 3210' is about half shale and half sandstone; the driller's record gives "Fourth Sand 3205 to 3209'", so the last foot is presumably in shale
	3210		Total depth