

Operator: Appalachian Oil & Mineral Development Co., Inc.

Farm: A. R. Harris

Well No: 1 (3)

Location: Scott County

15,050' N. of 36°40' Approximate

6,950' E. of 82°50'

Elevation: 1318' Ground

Total Depth: 3912'

Commenced: 1961

Completed: 1964

Result: Dry hole

Geologic Log:

Samples examined by
Warren J. Souder,
Virginia Division of
Mineral Resources,
July, 1964.

GEOLOGIC LOG

Samples are available from 10 feet to total depth of 3912'.

At 10' the samples are Brallier shale of Devonian age.

| <u>Depth</u> | <u>Thickness</u> | |
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| 10' - 50' | 40' | Shale, clay, gray-green, siliceous, slightly calcareous, finely micaceous, medium soft, and shale, dark-grey, black, waxy, soft, with pyrite crystals. |
| 50' - 90' | 40' | Shale, dark grey-black, waxy, soft, pyritic, slickensided, with some shale clay, grey, medium soft, siliceous. |
| 100' - 150' | 50' | Shale, grey to grey-green, medium soft, slightly calcareous, platy, and shale, dark grey-black soft, some pyrite crystals. |
| 150' - 360' | 210' | Shale, dark grey-black, waxy, soft, disseminated, pyrite crystals, slickensided, fractured, and often indistinct bedding. 180' - 190' - with much disseminated pyrite. 310' - 360' - less waxy, with some lighter grey shale interbedded. |
| 360' - 470' | 110' | Shale, clay, grey-green, micaceous. 380' - 450' - Shale, clay, grey-black, slightly calcareous, finely micaceous, slickensided, disseminated pyrite, indistinct bedding, fractured. |

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| | | 450' - 470' - less waxy, medium soft, less slickensided, bedding more distinct. |
| 470' - 630' | 160' | Shale, grey-green, medium soft, platy. 490' - with disseminated pyrite, some slickensideness, more distinct bedding. |
| 630' - 700' | 70' | Shale, clay, grey to dark green to black, pyrite, medium soft, some slickensides. |
| 700' - 710' | 10' | Dolomite, light grey to grey-brown tinted, mottled, medium crystalline, glauconitic, pyritic, and milky to light brown chert. |
| 710' - 720' | 10' | Dolomite, dark grey, argillaceous, as above. |
| 720' - 730' | 10' | Dolomite, as above, with many disseminated sand grains which are coarse, sub-rounded and frosted. |
| 730' - 740' | 10' | Dolomite, light grey to dark grey, mottled, medium fine crystalline, with some sand grains, as above, cherty and porous. |
| 740' - 780' | 40' | Sandstone, white, fine grained, well sorted, well cemented, sub-angular grains, doubtful porosity, and is calcareous. 760' - 770' - drilling trouble ? |
| 780' - 830' | 50' | Limestone, grey to dark grey-brown, finely crystalline, dense, calcite crystals in veining, and is argillaceous. 810' - 820' - shaley. |
| 830' - 840' | 10' | Limestone, light grey and tan tinted, platy, finely crystalline, dense, with soft light grey calcareous mudstone. |
| 840' - 870' | 30' | Limestone, dolomitic, dark grey to brown, slightly mottled, finely crystalline, dense, argillaceous with a few disseminated calcareous mudstone pellets. 850' - 860' - with sucrosic texture, and is siliceous. |

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| | | 860' - 870' - with light grey to brown sucrosic, siliceous limestone dolomite. |
| 870' - 889' | 19' | Dolomite, tan to whitish, finely crystalline, sucrosic, honey comb type of vugular porosity with oolitic, milky chert. |
| | | 878' - 883' - with vugs, very small dolomite crystals incrustings. There is porosity. |
| | | 883' - 889' - with dark grey, argillaceous, sucrosic dolomite. |
| 889' - 896' | 7' | Dolomite, dark grey to brown, finely crystalline dense, sucrosic. |
| 896' - 899' | 3' | Dolomite, light grey to tan, crystalline, sucrosic, with porous honey comb type of vugular porosity. |
| 899' - 930' | 31' | Dolomite, dark grey, dense, argillaceous, sucrosic, with light grey to tan vugular and porous dolomite interbedded. |
| | | 915' - 920' - with a small amount of very fine grained sand. |
| 930' - 955' | 25' | Dolomite, dark grey, dense to sucrosic, argillaceous and having a few dark grey to black shale partings. |
| | | 950' - 955' - with a little very fine grained sand |
| 955' - 960' | 5' | Sandstone, white, fine to very fine grained, well sorted, and friable. |
| 960' - 965' | 5' | Limestone, dolomitic, grey to dark grey, with some mottling, crystalline, sucrosic, with limited porosity. |
| 965' - 970' | 5' | Sandstone, white, medium fine to fine grained, friable, with some rounded frosted sand grains that are larger. |
| 970' - 980' | 10' | Dolomite, light to dark grey, crystalline, sucrosic, fossiliferous, slightly sandy and oolitic, with limited porosity. |

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| 980' - 990' | 10' | Dolomite, dark grey to black, crystalline, granular, argillaceous, and porous. |
| 990' - 1010' | 20' | Dolomite, rusty to reddish, granular, siliceous with disseminated sand grains, which are large and fine grained, porous. |
| | | 1000' - 1010' - with light grey-green, dense dolomite, and grey-green to dark grey shale. |

Clinton Formation
(Silurian)

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| 1010' - 1015' | 5' | Shale, clay, grey to grey-green, platy, siliceous, finely micaceous. |
| 1015' - 1045' | 30' | Sandstone, white to greenish tinted, maroon iron stained, fine grained, calcareous with no porosity. |
| | | 1023' - 1045' - There is no iron staining but there is interbedded grey, clay shale. |
| 1045' - 1075' | 30' | Shale, clay, grey to dull maroon, siliceous, medium hard, platy, with fine mica flakes. |
| 1075' - 1100' | 25' | Shale, clay, grey-green, platy, siliceous, medium hard, with fine mica flakes. |
| 1100' - 1110' | 10' | Shale, clay, dull maroon, siliceous, medium hard, with fine mica flakes. |
| 1110' - 1150' | 40' | Shale, clay, grey-green, platy, medium soft. |
| 1150' - 1160' | 10' | Dolomite, light maroon to rust, granular, crystalline, porous, (possibly a mislabeled sample). |
| 1160' - 1190' | 30' | Shale, clay, grey-green, platy, medium soft, slightly siliceous. |
| | | 1180' - 1190' - with reddish "Clinton-type iron" that has some pellets that have centrally depressed discs, and some maroon shale. |
| 1190' - 1200' | 10' | Shale, dull maroon, platy, slightly calcareous, medium hard, fine mica flakes, and slickensided grey-green shale with some dolomitic veinings. |

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| 1200' - 1210' | 10' | Shale, clay, grey-green, platy, with fine mica flakes. |
| 1210' - 1330' | 120' | Shale, clay, grey, grey-green, and several shades of maroon alternately interbedded, siliceous, slightly calcareous. |
| | | 1280' - 1290' - with reddish "Clinton Ironstone!" |
| | | 1290' - 1330' - with fine grained, iron-stained sand. |

Clinch Formation
Poor Valley Ridge Member
(Silurian)

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| 1330' - 1400' | 70' | Sandstone, white, greenish tinted, medium fine to fine grained, well sorted, sub-rounded, porous. |
| | | 1350' - 1360' - with shale, clay, dark-grey, medium soft. |
| | | 1360' - 1400' - the sandstone is friable and contains a few larger frosted grains. |
| 1400' - 1410' | 10' | Sandstone, as above, iron stained, reddish. |
| 1410' - 1450' | 40' | Sandstone, white, greenish tinted, medium fine to fine grained, well sorted, sub-rounded, porous. |
| | | 1420' - 1450' - with iron staining, reddish, and a few rounded frosted grains. |
| 1450' - 1530' | 80' | Sandstone, white to tan, friable, medium fine to fine grained, with some larger frosted sand grains, porous. |
| | | 1520' - 1530' - with shale, clay, grey. |

Hagan Shale Member
(Silurian)

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| 1530' - 1590' | 60' | Shale, clay, platy, medium soft, very fine mica flakes. |
| | | 1540' - 1560' - with sandstone, very fine grained, white with greenish tint, well cemented and hard. |

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| 1590' - 1620' | 30' | Sandstone, white, green tinted, medium to fine grained, sub-rounded, with larger sub-rounded frosted sand grains, and shale, clay, grey, medium-soft. |
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Sequatchie Formation
(Ordovician)

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| 1620' - 1710' | 90' | Shale, clay, dull maroon, calcareous, medium soft, fine mica flakes, with some crystalline, maroon limestone. |
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1640' - 1650' - with sandstone, very fine grained, and maroon stained.

1660' - 1710' - with interbedded shale, clay, green, medium-soft, slightly calcareous.

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| 1710' - 1750' | 40' | Shale, grey to dark-grey, clay, silty, calcareous |
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1740' - 1750' - with limestone, light-grey to grey mottled, fossiliferous, and argillaceous.

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| 1750' - 1800' | 50' | Shale, clay, dull maroon, calcareous, medium soft, fine mica flakes. |
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1770' - 1780' - with limestone, grey to maroon crystalline.

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| 1800' - 2000' | 200' | No samples. |
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| 2000' - 2200' | 200' | Shale, clay, dark grey, platy, calcareous, siliceous, with interbedded limestone, light-grey to grey-mottled, fossiliferous, argillaceous scattered calcite crystals from veins and on bedding planes. |
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2020' - 2050' - with limestone as above.

2050' - 2100' - with much less limestone.

2100' - 2130' - with increase in limestone.

2130' - 2160' - with less limestone.

2160' - 2170' - with increase in limestone.

2170' - 2200' - with less limestone.

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| 2200' - 2210' | 10' | Limestone, dark grey, fossiliferous, argillaceous. |
| 2210' - 2424' | 214' | Shale, clay, dark grey, platy, siliceous, calcareous, with interbedded limestone, grey to dark-grey mottled, some granular, some coarse crystalline, fossiliferous. |
| | | 2230' - 2260' - with limestone, as above. |
| | | 2260' - 2310' - predominantly shale, as above. |
| | | 2310' - 2320' - with some limestone, as above. |
| | | 2320' - 2330' - no sample. |
| | | 2330' - 2390' - predominantly shale, as above. |
| | | 2390' - 2400' - with limestone, as above. |

Upper Trenton Limestone
(Ordovician)

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| 2424' | | (Note: the top of the Trenton is arbitrarily picked where there is an increase in the number of limestone beds. The upper Trenton is shaley). |
| 2424' - 2500' | 76' | Limestone, dark-grey to whitish mottled, coarse crystalline, argillaceous, fossiliferous, with shale, dark grey, platy, siliceous, calcareous. |
| | | 2437' - 2467' - predominantly shale, as above. |
| | | 2467' - 2480' - with limestone, as above, having black argillaceous shale partings. |
| | | 2490' - 2500' - mostly shale, as above. |
| 2500' | | Middle Trenton ? |
| 2500' - 2540' | 40' | Limestone, dark grey to black, argillaceous, fossiliferous, and dark grey to black shale that is, in part, a very argillaceous limestone. |
| 2540' - 2550' | 10' | Shale, clay, dark grey, calcareous, platy. |
| 2550' - 2620' | 70' | Limestone, dark grey to whitish mottled, coarse to fine crystalline, fossiliferous, argillaceous. |
| | | 2586' - 2595' - with a trace of dark brown chert. |

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| 2620' | | Lower Trenton ? (Note: it is doubtful that any member of the Trenton can be identified exactly, except for possibly the massive, thick, middle member). |
| 2620' - 2650' | 30' | Shale, black, platy, calcareous, with some interbedded limestone that is dark grey to whitish mottled, crystalline and fossiliferous. 2638' - 2650' - with a trace of milky chert. |
| 2650' - 2747' | 97' | Limestone, light to dark grey, mottled, medium crystalline, with some smokey chert, and interbedded shale that is black, platy, calcareous, medium-soft. 2676' - 2747' - with an increase in interbedded shales, as above. |
| 2747' - 2769' | 22' | Limestone, grey to dark-grey, some light-grey mottled, coarse crystalline, fossiliferous, with crystalline porosity, and a few beds with open-vugular porosity. |
| 2769' - 2810' | 41' | Limestone, light and dark-grey mottled, medium crystalline, and interbedded dark-grey, platy, calcareous, shale, medium soft. |
| 2810' - 2845' | 35' | Shale, dark-grey, platy, calcareous with some interbedded limestone that is grey, fossiliferous argillaceous. |
| 2845' - 2875' | 30' | Shale, grey, platy, calcareous, slightly siliceous, and less interbedded limestone than 2810' - 45'. |
| 2875' - 2945' | 70' | Shale, grey, platy, calcareous, with interbedded limestone, grey to light-grey, fossiliferous, medium crystalline, with some crystalline porosity and granular porosity, slightly dolomitic. 2885' - 2895' - zone of greatest porosity in granular crystalline limestone. 2915' - 2925' - no sample. 2925' - 2945' - as above but with a decrease in limestone. |

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| 2945' - 2956' | 11' | Limestone, grey to whitish mottled, coarse crystalline, with some crystalline porosity, fossiliferous. |
| 2956' - 2981' | 25' | Shale, grey, platy, calcareous, with a few interbedded thin, fossiliferous crystalline limestones. |
| 2981' - 3130' | 149' | Shale, clay, grey to dark grey and black, calcareous, with some thin interbedded crystalline, light grey limestones and some bentonite. 3045' - 3058' - with a thin bentonite, light green, with bronze mica flakes. 3108' - 3118' - with a thin bentonite, light green, splintery, with some dark brown mica flakes. 3118' - 3130' - with a few pieces of dark brown chert. |
| 3130' - 3160' | 30' | Limestone, dark grey to white mottled, coarse crystalline, fossiliferous, with shale, clay, dark grey to black, calcareous, platy, medium soft. 3140' - 3150' - with grey to brown chert. |
| 3160' | | Eggleston Formation (Ordovician) |
| 3160' - 3170' | 10' | Shale, clay, light green, platy, calcareous, pyrite disseminated throughout in small crystals, with some limestone. |
| 3170' - 3252' | 82' | Limestone, grey brown, finely crystalline, dense, and shale, dark, grey, platy, calcareous, with greenish bentonites, slightly calcareous and containing bronze mica flakes. (Note: the strata in proximity to the bentonites are often siliceous and hardened. Chert is usually present.) 3180' - 3187' - with bentonite, green to light green, calcareous with bronze mica flakes. |

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| | | 3217' - 3229' | - with bentonite, light green to whitish, and brown chert, and silicified limestone. |
| | | 3242' - 3252' | - with bentonite, green to light green, very micaceous, dark bronze color, slightly calcareous. |
| 3252' | - 3282' | 30' | Shale, clay, grey-green, brownish tinted, calcareous, platy, medium soft, with some grey-brown, finely crystalline, dense, argillaceous limestone. |
| | | 3272' - 3282' | - with a few pyrite crystals. |
| 3282' | - 3310' | 28' | Limestone, grey-brown, finely crystalline, argillaceous, dense, thin-bedded, and interbedded grey, calcareous, clay shale. |
| 3310' | - 3443' | 133' | Limestone, dark grey-brown, finely crystalline, dense, argillaceous, with calcite crystals, some greenish bentonites that contain mica flakes and are often calcareous, with variable amounts of interbedded grey, calcareous clay shales. |
| | | 3340' - 3350' | - with greenish bentonite, calcareous, slightly siliceous, black chert and silicified limestone that is impregnated with bentonite. |
| | | 3380' | - with an increase in argillaceous materials in the limestone and an increase in interbedded grey, calcareous clay shales. |
| 3443' | - 3700' | 257' | Limestone, dark grey-brown, medium crystalline, with clusters of calcite crystals, interdisseminated "birds eye", with an occasional bentonite. |
| | | 3460' - 3467' | - with many calcite crystals. |
| | | 3467' - 3477' | - with bentonite, light green, compacted and squeezed, crumbles and is flakey. |
| | | 3477' - 3488' | - with argillaceous materials in the limestone. |

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3512' - 3522' - fossiliferous.

3542' - 3550' - bentonite, light green to green, flakey, and calcareous.

3662' - 3669' - with many large clusters of calcite crystals and is fossiliferous.

3700' - 3900'

200'

Limestone, grey-brown, finely crystalline, dense, siliceous and brittle, with interbedded light grey to whitish, soft "mudstone" that is argillaceous. Calcite crystals. There are interbedded dark-grey limestones, medium crystalline, granular, fossiliferous that have limited porosity.

3725' - 3760' - with dark-grey limestone, medium crystalline, granular, fossiliferous, with limited porosity.

3770' - 3780' - with some limestone, coarse crystalline, with calcite clusters, "birds eye".

3780' - 3790' - with some shale, black, thin bedded, calcareous.

3800' - 3815' - with bentonitic shale, green, flakey, very micaceous, calcareous.

3860' - 3900' - predominantly limestone grey-brown, finely crystalline, dense.

3874' - 3887' - bentonite, grey-green, calcareous, flakey, micaceous.

3900' - 3912' T. D.

12'

(Samples) Limestone, grey to dark grey-green, mottled, medium to fine crystalline, argillaceous, dense.