

Company: Consolidation Coal Co.  
 Farm: Pocahontas Fuel Co.  
 Well No.: 4  
 Elevation: 2699.6'  
 Total Depth: 5511'  
 Location: Tazewell County  
           400' S of 37 10'  
           4650' E of 81°45'

Geologic log: samples studied by Stanley S. Johnson, Virginia  
 Division of Mineral Resources, November 12, 1965.  
 Formational boundaries and correlations by Marshall S. Miller,  
 Virginia Division of Mineral Resources, December 7, 1971.

<u>Formation</u>	<u>Top</u>	<u>Bottom</u>	<u>Thickness</u>
Pennsylvanian System			
Post Pocahontas Formation "in at surface"	730		730'
Middle Seaboard coal at surface			
Lower Seaboard coal at 50'			
Upper Horsepen coal at 230'			
Middle Horsepen coal at 285'			
*War Creek coal 410-412'			
Pocahontas Formation	730'	1500'	770'
Flat Top Mtn. sand 730-790			60'
*Poca. #4 or #5 coal 1000-1001			
Pocahontas #3 coal at 1120'			
Mississippian System			
Bluestone Formation	1500	2100	600'
Pride Shale	1920	2100	180'
Princeton Interval	2100	2240	140'
Little Stone Gap Member	2240	2270	30'
Maxon Sands	2850	2950	100'
	3300	3400	100'
Greenbrier Formation	3920	4740	820'
Maccrady	4740		

Company: Consolidation Coal Co.  
 Farm: Pocahontas Fuel Co.  
 Well No: 4  
 Elevation: 2699.6' (Ground)  
 Total Depth: 5511'  
 Location: Tazewell County  
     100 400' S. of 37°10' Lat. (approx.)  
     4250' E. of 81°45' Long. (approx.)  
 Drilling Commenced: 1964  
 Well Completed:  
 Result: Gas well: FOF 4,000 mcf/pd

Geologic Log  
 Samples studied and  
 described by  
 Stanley S. Johnson  
 Virginia Division of  
 Mineral Resources  
 November 12, 1965

GEOLOGIC LOG

<u>Depth</u>	<u>Thickness</u>	<u>Description</u>
Lee Formation (Pennsylvanian)		
0-400'	400'	No samples
400-410'	10'	Shale with coal and sandstone; shale is gray, moderately hard, with mica; coal is black, hard, brittle, blocky, with lustrous sheen; sandstone is grayish-white, hard, medium-grained, sub-angular, with mica.
410-420'	10'	Sandstone with shale and coal; sandstone is grayish-white, hard, medium-grained, sub-angular, with mica and chlorite; shale is gray, moderately hard, with mica, sample also contains a few fragments that are black, soft, and carbonaceous; coal is black, hard, brittle, with lustrous sheen.
420-440'	20'	Sandstone with shale; sandstone is grayish-white with yellow-brown coloration (on a few fragments), hard, fine-grained, sub-angular, well sorted, the fragments with the yellow brown coloration are angular and coarse, both with mica; shale, dark-gray, black, moderately hard, with mica; there are a few fragments of maroon to brown shale in sandstone sample 430-440'.
440-450'	10'	Sandstone with shale; sandstone is clear to white, with light-gray coloration, fine-grained, sub-angular, well sorted, with muscovite and biotite mica; shale is black, soft, and carbonaceous.

450-470'	20'	Sandstone with shale and coal; sandstone is clear, white, some with light-gray coloration, fine-grained, sub-angular, well sorted, with muscovite mica; shale is dark-gray to black, moderately hard, and carbonaceous; coal is black, hard, brittle, and elongate; sandstone sample 460'470' contains fragments of pyrite.
470-510'	40'	Sandstone with shale, and coal; sandstone is grayish-white, medium-grained, sub-angular to sub-rounded, well sorted, with muscovite mica, chlorite, and pyrite; sandstone sample 450-510' contains a few fragments that are calcareous; shale is dark-gray and moderately hard; coal is black, hard, brittle, and blocky; shale and coal are minor in sandstone samples 480-510'.
510-540'	30'	Sandstone and shale; sandstone is grayish-white, medium-grained, sub-angular to sub-rounded, well sorted, with muscovite mica, chlorite, and pyrite; shale is light to dark-gray, hard, and slightly brittle; samples 520-540' contain a few fragments of very calcareous shale.
540-560'	20'	Sandstone with shale; sandstone is grayish-white, medium-grained, sub-angular to sub-rounded, well sorted, with muscovite mica and chlorite; shale is medium-gray, moderately hard, and brittle.
560-580'	20'	Sandstone and shale; sandstone is grayish-white, medium-grained, sub-angular to sub-rounded, moderately well sorted, with mica; shale is gray, hard, and a few fragments are slightly calcareous.
580-610'	30'	Sandstone with shale; sandstone is grayish-white, medium-grained, sub-angular, well sorted, with mica; shale is light-to medium-gray and moderately hard.
610-630'	20'	Sandstone with shale; sandstone is grayish-white, fine-to medium-grained, sub-angular to sub-rounded, well sorted, with mica; shale is medium-gray, hard, and slightly brittle.

630-650'	20'	Shale with sandstone; shale is light-to medium-gray, moderately hard, brittle, good fissility, few fragments are calcareous; sandstone is white to grayish-white, fine-to medium-grained, sub-angular, moderately well sorted, with mica; samples also contain fragments of a brown-yellow siltstone.
650-700'	50'	Sandstone with shale; sandstone is clear to grayish-white, fine-grained, sub-angular to sub-rounded, well sorted, with muscovite mica and chlorite; shale is gray, moderately hard, and possesses good fissility; sample 660-670' contains pyrite in shale fragments; samples also contain fragments of brown-yellow siltstone.
700-730'	30'	Sandstone and shale; sandstone is white to grayish-white, fine-to medium-grained, sub-angular to sub-rounded, well sorted, with minor mica; shale is medium-gray, moderately hard, brittle, with pyrite; samples also contain fragments that have a light-green tint and fragments of a brown-gray, calcareous sandstone.
730-790'	60'	Sandstone, white, grayish-white, tan, medium-grained, sub-angular to sub-rounded, well sorted, with muscovite and biotite mica and chlorite; samples contain a few fragments of gray shale.
790-990'	200'	Sandstone with shale; sandstone is grayish-white, medium-grained, sub-angular to sub-rounded, moderately well sorted, few fragments are slightly calcareous, with mica and chlorite; shale is medium-gray, hard, brittle, with mica.
990-1000'	10'	Coal with shale; coal is black, soft, brittle, with lustrous sheen; shale is medium-to dark-gray, soft, slightly brittle, with good fissility, few fragments are slightly calcareous; sample also contains minor fragments of grayish-white sandstone.

1000-1030'	30'	Shale and silty shale; light-to medium-gray, moderately hard, fair to good fissility, with pyrite; samples contain a few minor fragments of grayish-white, medium-to coarse-grained, sub-rounded, micaceous sandstone.
1030-1060'	30'	Sandstone with shale; sandstone is light grayish-white, medium-grained, sub-angular to sub-rounded, moderately well sorted, with mica; shale is light-to medium-gray, moderately hard, and brittle; samples also contain a few fragments of coal.
1060-1100'	40'	Sandstone and shale; sandstone is grayish-white, fine-to medium-grained, sub-angular to sub-rounded, well sorted, with mica; shale is medium-gray, hard, fair fissility, with pyrite, a few fragments are dark-gray and very calcareous; sandstone sample 1090-1100' is mainly sandstone that contains no pyrite.
1100-1120'	20'	Shale with sandstone; shale is light-to medium-gray, moderately hard, and fairly brittle; sandstone is grayish-white, fine-to medium-grained, sub-angular to sub-rounded, and moderately well sorted, with mica; samples also contain fragments of brown, fine-grained siltstone with pyrite.
1120-1130'	10'	Sandstone and shale; sandstone is grayish-white, medium-grained, sub-angular, and well sorted; shale is medium-gray, hard, a few fragments are calcareous.
1130-1260'	130'	Sandstone with shale; sandstone is white to grayish-white, fine-to medium-grained, sub-angular to sub-rounded, moderately well sorted, with mica, a few fragments are calcareous; shale is medium-gray, hard, brittle, and contains fair fissility; samples 1170-1190' have a light-green tint; sample 1190-1260' contains fragments of light-brown siltstone and maroon shale.
1260-1270'	10'	Shale and silty shale; shale is light-gray, hard, brittle, fairly fissile, with mica; sample also contains a few fragments of grayish-white sandstone.

1270-1320'	50'	Shale and sandstone; shale is light-to medium-gray, moderately hard to hard, fairly fissile, with mica and pyrite; sandstone is grayish-white, some with light-green tint, medium-grained, sub-angular, with mica.
1320-1330'	10'	Sandstone and shale; sandstone is grayish-white, fine-to medium-grained, sub-angular to sub-rounded, well sorted, with mica; shale is medium-gray, hard, slightly dolomitic, with mica.
1330-1340'	10'	No sample
1340-1350'	10'	Shale, light-to medium-gray, hard, brittle, a few fragments are slightly calcareous, with mica.
1350-1370'	20'	No sample
1370-1500'	130'	Sandstone with shale; sandstone is grayish-white, some with light-green tint; fine-to medium-grained, sub-angular to sub-rounded, moderately well sorted, with minor mica; shale is light-to medium-gray, moderately hard, brittle, and poorly fissile; samples also contain a few fragments of brown siltstone.
Pennington Group (Mississippian)		
Bluestone Formation		
1500-1510'	10'	Shale, maroon, moderately hard, poorly fissile, a few fragments have light-green mottling that is calcareous, with minor mica.
1510-1530'	20'	Sandstone, clear, light greenish-gray, hard, fine-grained, sub-angular, calcareous, with mica; samples contain impurities of a dull black material (probably biotite); samples also contain a few fragments of maroon shale.
1530-1550'	20'	Silty shale with sandstone; shale is greenish-gray to light-gray, moderately hard, fairly fissile, slightly calcareous in places, with minor mica; sandstone is light greenish-gray, hard, fine-grained, calcareous, with mica; samples also contain a few fragments of maroon shale.

VDMR Well No: W-1237

1550-1590'	40'	Sandstone, clear, light-green, fine-grained, sub-rounded, well sorted, slightly calcareous, with mica; samples contain a few fragments of gray and maroon shale.
1590-1620'	30'	Limestone and siltstone; limestone is gray, some with brown tint, moderately hard, fossiliferous, fine-crystalline, slightly granular, and argillaceous; siltstone is gray, some with light-green tint, hard, brittle, siliceous, with mica and pyrite.
1620-1640'	20'	Shale, medium-gray, some with red tint, hard, tough, few fragments are slightly calcareous; samples contain a few fragments of light greenish-tan limestone.
1640-1650'	10'	Shale and siltstone; shale is red-brown, hard, tough, with mica; siltstone is light greenish-gray, moderately hard, tough, argillaceous, and slightly siliceous.
1650-1750'	100'	Shale, light-gray, hard, tough; many shale fragments are slightly calcareous and some have small stringers of light-green calcareous material; samples contain a few fragments of maroon to pinkish-brown shale and a few fragments of gray-white, fine-grained sandstone.
1750-1760'	10'	Shale, medium-gray, hard, tough, calcareous, and fossiliferous; samples contain a few fragments of red shale and fragments of limestone, that is gray, hard, medium-crystalline and very fossiliferous.
1760-1920'	160'	Shale with minor limestone; shale is medium-to dark-gray, hard, tough, calcareous, fossiliferous, with mica; a few shale fragments are maroon; limestone is light-tan to gray-brown, moderately hard, micro-crystalline, and fossiliferous, a few fragments are medium-crystalline; samples also contain fragments of siliceous limestone and fragments of grayish-green white, fine-grained, slightly calcareous sandstone.
1920-2000'	80'	Shale and silty shale, medium-gray, moderately hard to hard, brittle, fair fissility, slightly calcareous, a few siliceous fragments, with mica; samples also contain fragments of maroon shale.

2000-2020'	20'	Sandstone, gray-green, fine-to medium-grained, sub-angular, well cemented, calcareous, with minor mica; samples contain a few fragments of white sandstone, gray siltstone, and maroon shale.
2020-2100'	80'	Shale and siltstone, both medium-to dark-gray, hard, brittle, poorly fissile, slightly calcareous with mica; few fragments of red shale and gray-green sandstone; samples 2050-2060' and 2090-2100' contain a few fragments of crystalline, fossiliferous limestone.
Princeton Sandstone		
2100-2110'	10'	Sandstone, light grayish-white to white, hard, medium-to coarse-grained, angular to sub-angular, poorly sorted, slightly calcareous, with mica; sample also contains fragments of gray, siliceous siltstone, maroon siltstone, and black, carbonaceous shale.
2110-2120'	10'	No sample
2120-2140'	20'	Sandstone and shale; sandstone is light grayish-white to white, hard, fine-to medium-grained, sub-angular to sub-rounded, poorly sorted, slightly calcareous, with mica; shale is light-to dark-gray, hard, brittle, and poorly fissile; samples contain a few fragments of maroon siltstone.
Hinton Formation		
2140-2230'	90'	Sandstone, white, clean, fine-grained, moderately well-rounded, well sorted, and <u>slightly calcareous</u> ; samples contain a few minor fragments of medium-gray to black, <u>slightly calcareous shale</u> .
2230-2240'	10'	Siltstone, light gray-green, hard, siliceous, with mica and pyrite; sample contains a few <u>fragments of brown-gray limestone</u> .
2240-2250'	10'	Shale and silty shale; both are gray, hard, brittle, with mica and pyrite; sample contains a few fragments of gray-white sandstone.
2250-2260'	10'	Shale, medium-gray, hard, brittle, calcareous, with mica and pyrite.

VDMR Well No: W-1237

2260-2270'	10'	Limestone and shale; limestone is medium-gray, tan, moderately hard, microcrystalline, siliceous, and fossiliferous; shale is medium-gray, silty, hard, brittle, calcareous, with mica.
2270-2290'	20'	Shale, medium-gray, hard, brittle, and fairly fissile; samples contain a few fragments of sandstone that contain pyrite.
2290-2310'	20'	Sandstone and siltstone; sandstone is tan-gray, fine-grained, sub-angular, and calcareous; siltstone is gray, hard, tough, siliceous, and slightly calcareous.
2310-2460'	150'	Shale and siltstone; both are light-to medium-gray, hard, brittle, slightly calcareous, with pyrite, mica, and calcite; samples contain a few fragments of gray-brown, fossiliferous, siliceous limestone, and white, calcareous sandstone; samples 2440-2460' have maroon shale fragments; 2340-2350' no sample.
2460-2500'	40'	Shale and siltstone with limestone; shale is maroon to red-brown, moderately hard, brittle, and slightly calcareous; siltstone is greenish-gray, hard, siliceous, and calcareous; limestone is gray, hard, and very fine-crystalline; samples also contain fragments of a white, calcareous sandstone.
2500-2540'	40'	Siltstone, reddish-gray, moderately hard, tough, slightly calcareous, with mica; samples also contain fragments of red-brown, calcareous shale.
2540-2630'	90'	Shale, maroon to red-brown, hard, brittle, and calcareous; samples contain fragments of red-green shale and white sandstone; samples 2570-2600' contain a very calcareous, red, soft shale.
2630-2640'	10'	Siltstone and sandstone; siltstone is maroon to red-brown, hard, brittle, slightly calcareous, with mica; sandstone is light-green, hard, fine-grained, slightly calcareous, with mica.

2640-2670'	30'	Siltstone, red-brown, gray-green, hard, brittle, poorly fissile, slightly calcareous, siliceous, with mica, samples contain a few fragments of white sandstone.
2670-2700'	30'	Shale, slightly silty, red-brown, gray-green, hard, brittle, poorly fissile, slightly calcareous, with mica; samples contain fragments of white sandstone.
2700-2800'	100'	Shale, maroon to red-brown, gray-green, moderately hard, brittle, poorly fissile, slightly calcareous, with mica; samples contain some fragments of gray-green siltstone and white sandstone; samples 2730-2800' contain more gray-green shale than 2700-2730'.
2800-2850'	50'	Siltstone, light gray-green, hard, siliceous, and slightly calcareous; samples contain minor fragments of gray and red shale.
2850-2880'	30'	Sandstone and shale; sandstone is clear, white, fine-grained, sub-angular to sub-rounded, well sorted, and slightly calcareous; shale is gray, red-brown, hard, tough, calcareous, with pyrite.
2880-2900'	20'	Sandstone with shale; sandstone is clear, white, fine-grained, sub-angular to sub-rounded, well sorted, and slightly calcareous; shale is gray, red-brown, moderately hard, brittle, slightly calcareous, with pyrite.
2900-2910'	10'	Shale, medium-gray, hard, tough, with pyrite; sample contains fragments of white sandstone.
2910-2930'	20'	Sandstone, white, fine-grained, sub-angular, well sorted, slightly calcareous; samples contain fragments of gray and red shale.
2930-2950'	20'	Sandstone and shale; sandstone is clear, white, fine-to medium-grained, sub-angular, well sorted, slightly calcareous, with pyrite; shale is medium-gray, silty, hard, brittle, and slightly calcareous; samples contain fragments of brown and red shale.
Bluefield Formation (Mississippian)		
2950-2980'	30'	Siltstone, light gray-green, medium-gray, hard, brittle, slightly calcareous, siliceous, with pyrite.

VDMR Well No: W-1237

2980-3060'	80'	Shale, silty, medium-to dark-gray (some with green tint), red-brown, hard, brittle, siliceous, with mica and pyrite; red-brown shale is calcareous; samples have a few fragments of white sandstone.
3060-3070'	10'	Sandstone with shale; sandstone is white, many with light-green and pink tint, fine-grained, sub-angular, well sorted, slightly calcareous; shale is gray, red, moderately hard, brittle, with pyrite and mica.
3070-3090'	20'	Shale, siltstone, and sandstone; shale is medium-gray, red, hard, brittle, red fragments are calcareous; siltstone is light gray-green, hard, brittle, and slightly calcareous; sandstone is white, fine-grained, sub-angular, moderately well sorted, and slightly calcareous.
3090-3100'	10'	Shale, medium-gray, hard, tough, and slightly calcareous.
3100-3110'	10'	Shale, siltstone, and sandstone; shale is medium-gray, red, hard, brittle, slightly calcareous, with pyrite; siltstone is light gray-green, hard, and slightly calcareous; sandstone is white, medium-grained, sub-angular, moderately well sorted, and slightly calcareous.
3110-3130'	20'	Sandstone with shale and siltstone; sandstone is white, fine-grained, sub-angular, moderately well sorted; shale is light-to medium-gray, moderately hard, tough, a few fragments are calcareous; siltstone is light greenish-white, hard, some fragments are slightly calcareous; samples also contain a few fragments of red shale.
3130-3140'	10'	Shale with sandstone; shale is light-to medium-gray, moderately hard, tough, with mica; sandstone is light-green to white, fine-grained, sub-angular, moderately well sorted, and slightly calcareous; sample contains fragments of red, very calcareous shale.
3140-3220'	80'	Shale, maroon to red-brown, gray-green, moderately hard, tough, calcareous, with mica; samples 3150-3170' contain mostly all maroon to red-brown shale; samples also contain a few fragments of white sandstone.

VDMR Well No: W-1237

3220-3300'	80'	Shale, medium-gray, moderately hard, tough, with minor pyrite; samples contain fragments of red-brown, calcareous shale.
3300-3350'	50'	Sandstone and shale; sandstone is grayish-white, fine-to medium-grained, sub-angular to sub-rounded, moderately well sorted, slightly calcareous (in places), with mica; shale is light-to medium-gray, red-brown, hard, brittle, slightly calcareous, with mica and minor pyrite.
3350-3400'	50'	Sandstone with shale; sandstone is grayish-white, fine-grained, sub-angular to sub-rounded, well sorted, slightly calcareous, with minor mica; shale is medium-gray, red-brown, hard, brittle, with mica and pyrite; red-brown shale is calcareous.
3400-3430'	30'	Shale and siltstone with sandstone; shale is light-gray, hard, brittle, fairly fissile, with minor pyrite; siltstone is light-green, hard, siliceous, with mica; sandstone is grayish-white, fine-to medium-grained, sub-angular, moderately well-sorted, and slightly calcareous.
3430-3450'	20'	Shale, silty, light-gray, hard, brittle, siliceous, with mica; samples contain a few fragments of red-brown, calcareous shale.
3450-3490'	40'	Shale, dark-gray, hard, brittle, calcareous, with mica and minor pyrite.
3490-3510'	20'	Shale with limestone; shale is dark-gray, hard, brittle, calcareous, with mica and minor pyrite; limestone is gray, tan-white, moderately hard, microcrystalline, and slightly siliceous.
3510-3580'	70'	Shale and sandstone; shale is slightly silty, medium-gray, hard, brittle, with mica and pyrite; sandstone is grayish-white, fine-grained, sub-angular, moderately well sorted, and slightly calcareous.
3580-3600'	20'	Shale, dark-gray, hard, brittle, fairly fissile, with mica and pyrite; samples contain fragments of gray-white sandstone.

3600-3640'	40'	Shale with sandstone; shale is dark-gray, hard, brittle, fairly fissile, with mica and pyrite; sandstone is white, hard, fine-to medium-grained, sub-angular, and slightly calcareous.
3640-3670'	30'	Shale, dark-gray, moderately hard, brittle, fair to good fissility, with minor pyrite.
3670-3730'	60'	Shale and sandstone; shale is dark-gray, moderately hard, brittle, fair to good fissility, with minor pyrite; sandstone is white, fine-to medium-grained, sub-angular, and very calcareous in places; samples contain minor fragments of red-brown shale; sample 3720-3730' contains a few fragments of dark-gray limestone.
3730-3770'	40'	Limestone with shale and sandstone; limestone is dark-gray, some with tan to white coloration, hard, microcrystalline, and slightly fossiliferous; shale is medium-to dark-gray, hard, brittle, and slightly calcareous; sandstone is light-green, fine-grained, and slightly calcareous; samples contain fragments of red-brown shale.
3770-3820'	50'	Limestone, dark-gray, some with tan to white coloration, moderately hard, argillaceous, shaly, microcrystalline, slightly fossiliferous, with pyrite; samples contain fragments of calcareous shale and sandstone.
3820-3840'	20'	Limestone, medium-to dark-gray, moderately hard, fine-crystalline to microcrystalline, argillaceous, some shaly, fossiliferous, with light-pink calcite rhombohedrons, limestone samples contain fragments of gray, calcareous shale.
3840-3920'	80'	Shale, medium-gray, hard, brittle, very calcareous (in places), siliceous, with minor mica, calcite, and pyrite; samples contain many fragments of dark-gray, shaly limestone.
Greenbrier Limestone (Mississippian)		
3920-3970'	50'	Limestone, light-to medium-gray, hard, fine-crystalline, siliceous, fossiliferous, with calcite and pyrite; samples contain fragments of dark-gray, calcareous shale.

3970-4060'	90'	Limestone, medium-gray, moderately hard, fine-crystalline, siliceous, slightly fossiliferous, with white to tan-white calcite and calcite rhombohedrons and pyrite; samples have fragments of brown siltstone.
4060-4300'	240'	Limestone, light green-tan, some gray, moderately soft, very fine-to fine-crystalline, argillaceous, fossiliferous, with calcite and pyrite.
4300-4380'	80'	Limestone, medium-gray, light-green to light green-tan, red-brown, moderately soft, very fine-to medium-crystalline, argillaceous, with calcite rhombohedrons and pyrite; red-brown limestone fragments are present only from 4300-4320'.
4380-4390'	10'	Limestone, medium-gray, moderately hard, fine-crystalline, argillaceous, fossiliferous, with calcite and calcite rhombohedrons; sample contains fragments of very fine-crystalline limestone.
4390-4410'	20'	Limestone, medium-gray tan, moderately hard, very fine-to fine-crystalline, argillaceous, fossiliferous, cherty, with calcite.
4410-4460'	50'	Limestone, dark-gray, tan, moderately hard, fine-crystalline, argillaceous, fossiliferous, cherty, with calcite and pyrite, samples 4440-4460' contain a few fragments with slickenside.
4460-4470'	10'	Limestone, gray, tan-gray, hard, very fine-crystalline, argillaceous, slightly fossiliferous, cherty, with calcite and pyrite; sample contains quartz grains that are clear to light-yellow, very coarse-grained, and well-rounded; sample contains few fragments of black, iron-stained siltstone (?) and fragments of iron-stained sandstone.
4470-4480'	10'	Limestone, light-gray, hard, fine-to medium-crystalline, siliceous, fossiliferous, cherty, with pyrite and calcite; sample contains clear, well-rounded quartz grains.

VDMR Well No: W-1237

4480-4550'	70'	Limestone, light-gray, dull white, tan, fine- to medium-crystalline, siliceous, argillaceous, sugary, slightly fossiliferous, with pyrite and calcite; samples contain clear, well-rounded quartz grains; samples 4520-4540' contain fragments that have a pisolitic structure.
4550-4600'	50'	Limestone, medium-gray, light-tan, hard, microcrystalline to medium-crystalline, siliceous, argillaceous, fossiliferous, cherty, with calcite; samples contain fragments that have an oolitic to pisolitic structure.
4600-4630'	30'	Limestone, dark-gray, light-tan, hard, microcrystalline, siliceous, argillaceous, with calcite; samples contain fragments of red-brown shale.
4630-4700'	70'	Limestone, medium-gray, some light-tan, hard, fine-crystalline, siliceous, argillaceous, fossiliferous, with calcite and pyrite; samples contain fragments of red siltstone; 4660-4670' no sample.
4700-4710'	10'	Limestone, light-gray, hard, fine-crystalline, siliceous, argillaceous, fossiliferous, with calcite; sample contains fragments of red siltstone.
4710-4740'	30'	Limestone, dark-gray, moderately hard, fine-crystalline, slightly siliceous, and argillaceous, with calcite and pyrite; samples contain fragments of red shale; sample 4730-4740' contains fragments of translucent, blue-white quartz.
Maccrady Formation (Mississippian)		
4740-4770'	30'	Dolomite, medium-gray, some with green tint, hard, fine-crystalline, argillaceous, with calcite; samples contain fragments of dark-gray limestone, clear quartz, and red shale.
4770-4780'	10'	Anhydrite and dolomite; anhydrite is white, light-green, soft, and medium-grained; dolomite is dark gray-green, moderately hard, fine-grained, and mixed in part with anhydrite; sample also contains fragments of limestone.

4780-4790'	10'	Siltstone and dolomite with anhydrite; siltstone is brown, soft, slightly calcareous, no apparent bedding; dolomite is light-green, moderately hard, fine-grained, slightly siliceous, and mixed in part with anhydrite; anhydrite is white, light-pink, soft, and medium-grained; sample contains a few fragments of quartz and sandstone.
4790-4800'	10'	Shale, maroon to red-brown, moderately hard, brittle, calcareous, with mica; sample contains fragments of white anhydrite.
4800-4810'	10'	Shale, gray, hard, brittle, slightly calcareous, with mica and pyrite; sample contains a few fragments of red shale and white anhydrite.
4810-4860'	50'	Limestone, gray, hard, fine-crystalline, siliceous, argillaceous (in places), fossiliferous, with calcite, pyrite, and dull white limestone; samples contain a few fragments of gray and red shale.
4860-4890'	30'	Limestone and shale; limestone is gray, moderately hard, fine-crystalline, slightly siliceous, fossiliferous, with pyrite and calcite; shale is gray, hard, brittle, slightly calcareous to dolomitic, with mica and pyrite; samples also contain fragments of white anhydrite and red shale.
4890-4900'	10'	Shale with limestone; shale is gray, hard, brittle, slightly dolomitic, with mica and pyrite; limestone is gray, moderately hard, fine-crystalline, slightly siliceous, and fossiliferous.
4900-4930'	30'	Sandstone and siltstone with minor limestone; sandstone is gray-white, hard, fine-grained, calcareous, with mica; siltstone is medium- to coarse-grained, hard, brittle, slightly dolomitic, siliceous, with mica and pyrite; limestone is gray, hard, fine-crystalline, and siliceous; samples contain a few fragments of anhydrite and red shale.

Top (?) of Price Formation (Mississippian)

4930-4940'	10'	Shale and sandstone; shale is gray, moderately hard, brittle, slightly dolomitic, with mica and pyrite; sandstone is gray-white, hard, fine-grained, with mica; sample contains fragments of red shale and gray limestone.
4940-4950'	10'	Sandstone with shale; sandstone is gray-white, hard, fine-to medium-grained, sub-angular, with minor mica; shale is gray, moderately hard, brittle, with minor pyrite; sample contains a few fragments of red siltstone.
4950-5000'	50'	Sandstone and shale with siltstone; sandstone is gray-white, hard, fine-to medium-grained, sub-angular, with minor mica; shale and siltstone are gray, moderately hard, brittle, slightly calcareous, with minor pyrite; samples contain a few fragments of red shale and tan-gray to dark-gray limestone; a few fragments of limestone from 4970-4980' have a pisolitic texture.
5000-5020'	20'	Shale and siltstone with minor sandstone; shale and siltstone are medium-gray, hard, brittle, a few fragments are slightly calcareous, with mica; sandstone is white to gray-white, hard, fine-grained, with mica; samples contain a few fragments of gray and tan limestone and red siltstone.
5020-5030'	10'	Sandstone and shale; sandstone is gray-white, hard, fine-grained, with mica and pyrite; shale is gray, moderately hard, brittle, with mica and pyrite; sample contains a few fragments of gray limestone and red siltstone.
5030-5060'	30'	Shale, medium-gray, soft, with mica and pyrite; samples contain fragments of white sandstone and gray-white to gray limestone.
5060-5090'	40'	Shale and sandstone; shale is medium-gray, moderately hard, brittle, with mica and pyrite; sandstone is white to light-gray, hard, fine-grained, with mica; samples contain fragments of gray-tan to white limestone and red siltstone.
5090-5250'	160'	Shale, medium-gray, hard, brittle, fair fissility, with pyrite and mica; samples contain a few fragments of red siltstone and gray-white to white sandstone, some with pink tint.

VDMR Well No: W-1237

5250-5380'	130'	Shale, medium-gray, hard, brittle, good fissility, with mica; samples contain fragments of brown-gray shale, gray-white to gray-green sandstone, and siltstone; sample increases in sandstone content from 5360-5370'.
5380-5390'	10'	Shale, dark-gray, soft, dull, greasy (?), good fissility, with pyrite.
5390-5400'	10'	Sandstone, light-gray, hard, fine-to medium-grained, sub-angular, moderately well sorted, with pyrite and mica; sample contains a few fragments of gray shale.
5400-5415'	15'	No Sample
5415-5420'	5'	Sandstone and shale; sandstone is clear, white, fine-to coarse-grained, sub-angular to rounded, a few fragments are slightly calcareous; shale is light-green, light-red, light-to medium-gray, soft, light-green shale is very argillaceous, light-red shale is slightly calcareous, and gray shale is calcareous.
5420-5425'	5'	Sandstone, clear, white, very fine-to fine-grained, angular to sub-angular, well sorted, slightly calcareous, with minor mica; sample contains fragments of green, gray, and red shale; sandstone appears as loose grains.
5425-5435'	10'	No Sample
5435-5440'	5'	Sandstone, white to gray-white, fine-grained, angular to sub-angular, well sorted, calcareous, no visible porosity; sample contains fragments of soft, gray shale.
5440-5475'	35'	Shale, medium-gray, hard, brittle, with minor mica and rare pyrite; samples contain fragments of red shale and white sandstone; 5450-5455' no sample.
5475-5480'	5'	Shale, medium-gray, hard, brittle, with minor mica and rare pyrite; sample contains fragments of shale with clear, acicular, radiating crystals of gypsum (?) on partings, and fragments of white sandstone.

VDMR Well No: W-1237

5480-5490'	10'	Shale and siltstone, medium-gray, moderately hard, brittle, with mica and minor pyrite; sample contains fragments of red shale; sample 5480-5485' contains moderate amounts of gray-white to tan-white, fine-grained sandstone.
5490-5505'	15'	Sandstone, medium-gray, hard, very fine-grained, well sorted, slightly calcareous, with mica; samples contain fragments of clear, white, fine-grained sandstone; most of the sandstone samples appear as loose grains.
5505-5510	5'	Sandstone, light-gray to gray-white, hard, fine-grained, well sorted, no visible porosity, with mica.

GEOLOGIC SUMMARY

Pennsylvanian System  
Lee Formation

surface - 1500'

Mississippian System  
Bluestone Formation  
Princeton Sandstone  
Hinton Formation  
Bluefield Formation  
Greenbrier Limestone  
Maccrady Formation  
Price Formation

1500-2100'  
2100-2140'  
2140-2950'  
2950-3920'  
3920-4740'  
4740-4930' (?)  
4930' (?) - TD