# SUBSURFACE STUDY
# OF THE
# LEE FORMATION
# IN
# BUCHANAN COUNTY, VIRGINIA

by

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"It cannot fail to be remarked, that in the perplexing and laborious investigations which are so often undertaken with the view of discovering or tracing the coal seams or other strata of the region under consideration, great assistance would be derived from the knowledge of some one bed or stratum, whose continuity over wide areas and constancy in position with regard to the other rocks, had been satisfactorily demonstrated."

William Barton Rogers, 1840

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# SUBSURFACE STUDY OF THE LEE FORMATION IN BUCHANAN COUNTY, VIRGINIA

## INTRODUCTION

### Location of the Area

Buchanan County is in the coal-bearing Appalachian Plateau of southwestern Virginia (Fig. 1) and lies between the parallels of 37° 00' and 37° 35' north latitude and the meridians of 81° 40' and 82° 20' west longitude. The county is roughly quadrilateral in shape and encompasses an area of 507 square miles. It is bounded on the northwest by Pike County, Kentucky, on the northeast by Mingo and McDowell Counties, West Virginia, on the southeast by Tazewell and Russell Counties, Virginia, and on the southwest by Dickenson County, Virginia. Grundy is the county seat and largest town.

The rugged surface of Buchanan County is characterized by steep hills and narrow, winding valleys. The county has a maximum relief of 2,890 feet. The highest elevation, Big A Mountain, is 3,735 feet above sea level; the lowest elevation, on Levisa Fork at the Kentucky boundary, is 845 feet above sea level. The topography is the result of extensive dissection by streams. All of the drainage in the county is toward the west to the Gulf of Mexico via the Big Sandy, Ohio, and Mississippi Rivers.

### Purpose of Investigation

The study was made in an effort to determine what role, if

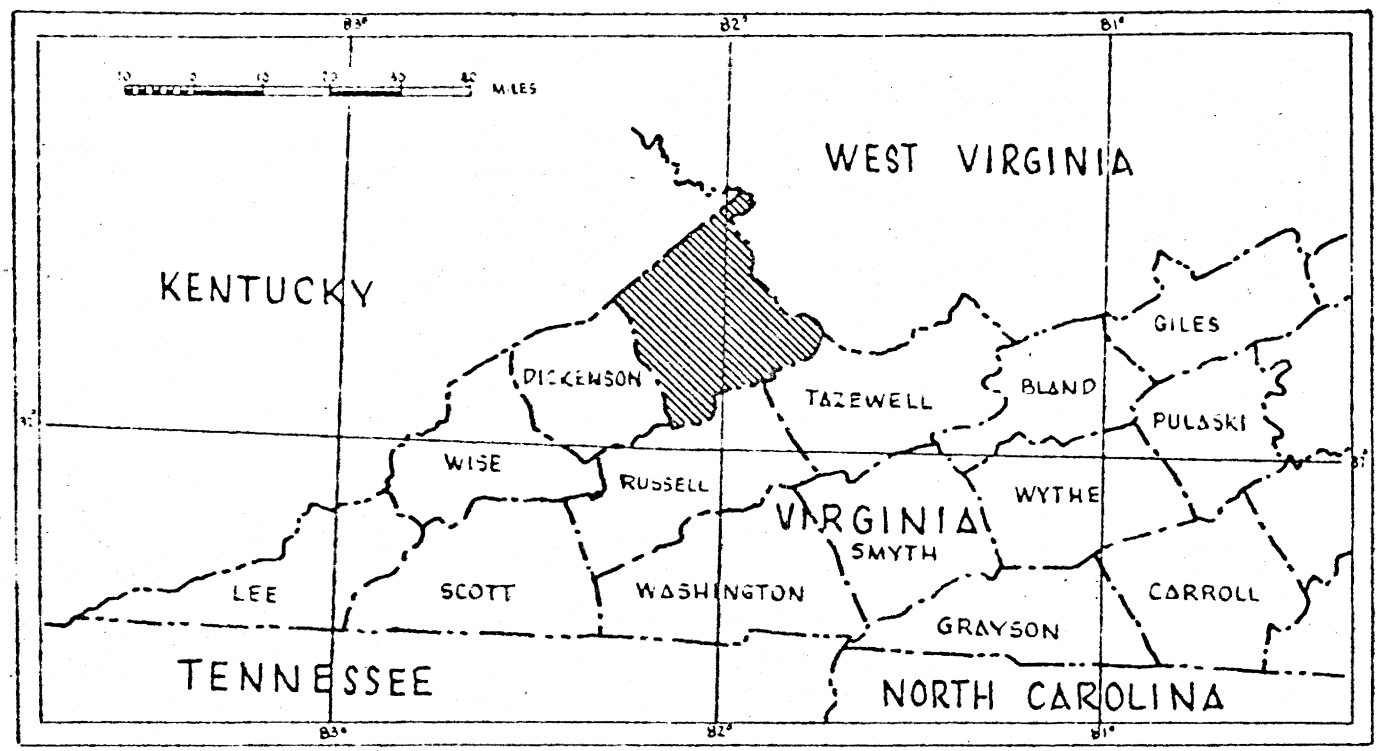


**Figure 1. Index map showing the location of Buchanan County in southwest Virginia.**

any, tectonism might have played in regard to deposition of the Lee Formation during Early Pennsylvanian time. Present knowledge of the Lower Pennsylvanian rocks in southwest Virginia indicates that these beds were deposited rapidly in a coastal plain environment. This environment is dissimilar to the foreland shelf environment of Middle and Upper Devonian and Lower Mississippian rocks and indicates westward migration of the Appalachian depositional basin. A broader object of the investigation was to gain an insight into the tectonic changes, and their causes, that resulted in the particular environment of deposition of the Lee Formation as contrasted to the shelf environment of the earlier Paleozoic rocks.

In addition to the above, it was hoped that the study might shed light on the character of the pre-Lee surface, the reason for the initiation of Lee sedimentation, and the provenance of the Lee clastics.

## Acknowledgments

Dr. B. N. Cooper, Head, Department of Geological Sciences, Virginia Polytechnic Institute, suggested the problem, evinced continued keen interest, and offered much helpful criticism. Dr. W. D. Lowry and Dr. B. W. Nelson of the Virginia Polytechnic Institute Department of Geological Sciences served on the writer's graduate committee and made numerous helpful suggestions. Mark Fara of the Engineering Experiment Station at Virginia Polytechnic Institute contributed to an understanding of the Lee Formation as a result of several discussions. Dr. J. L. Calver, State Geologist and

Commissioner of the Virginia Division of Mineral Resources, graciously allowed the writer to study the Division's well cuttings and well records, provided space in which to work, and kindly permitted the use of the Division's preliminary well-location map. D. C. LeVan, Petroleum Geologist, Virginia Division of Mineral Resources, compiled the well locations on the Division's preliminary well-location map and assisted the writer with the well files. J. L. Hutchinson, Chief Geologist, United Fuel Gas Company, kindly allowed the writer access to the company's well cuttings and well records, and provided space for the writer to examine cuttings for two weeks. J. M. Knight and E. J. Fitzgerald of the California Oil Company, greatly aided the writer with the final drafting of illustrations. Maxine Palmer typed the manuscript in her usual proficient manner. Margery Ahrendt Bowen, the writer's wife, offered much help and constant encouragement. The work was done under Project 220 of the Virginia Engineering Experiment Station.

## Method of Study

The present investigation is based on information obtained from well cuttings examined by the writer and augmented by surface and subsurface data obtained from published and unpublished sources. All of the cuttings examined by the writer came from wells drilled for natural gas by cable-tool rigs. At the time of the study, the United Fuel 74-8295 Kentland Coal and Coke well was the only well in the county that had been drilled with rotary tools. The cuttings from this

well were not examined by the writer, but a description of them was obtained from the operator.

Driller's logs of wells provided valuable supplementary information. Despite the very general descriptive terminology commonly used, cable-tool drillers usually note lithologic changes quite accurately, and their records are useful in isopach studies when bolstered with well-cuttings descriptions of nearby wells. The well-cuttings descriptions made by the writer, the cuttings description of the United Fuel 74-8295 Kentland Coal and Coke well, and the driller's logs used in the investigation are included in the appendix which follows the report.

The cuttings were prepared for examination by placing a small amount of the sample in a watch glass and immersing the watch glass in water. The immersed sample was then examined under a low-power binocular microscope with 10x to 15x magnification. Examination of wet samples facilitated recognition of size and shape of grains, color, accessory minerals, and other features.

The well cuttings, stored at the Virginia Division of Mineral Resources in Charlottesville, were examined by the writer from June through December of 1958. Samples from two wells drilled by United Fuel Gas Company, the 1-6431 McRae and the 8415 National Shawmut Bank of Boston, were examined at the company offices in Charleston, West Virginia, in August, 1958.

Graphic logs of the section penetrated by each well were plotted from the sample descriptions on standard well-log strips. The

log strips were then used to correlate the formations from well to well. Following the correlation of particular intervals, the maps and cross-sections accompanying this report were constructed.

Most of the descriptions of well cuttings used in the report were made by the writer, but some descriptions are used which were prepared by other geologists. In these instances, any interpretations, additions, deletions, errors, or changes which differ from the description as given by the original worker are the responsibility of the present writer, as well as any formation identifications or correlations as used in this report.

## Previous Work

The first worker to describe the Lee Formation was Virginia's great pioneer geologist, W. B. Rogers (1884), who discussed it in a general way in his reports published from 1835 to 1841. Rogers referred to the Lee Formation as Number XII. Stevenson (1881) gave the name "Bee Rock" to a prominent conglomeratic sandstone which was considered subsequently the topmost member of the Lee. The Lee Formation was named and defined by Campbell (1893, quoted by Eby, 1923, p. 65) who named it after exposures in Lee County, Virginia, but indicated the type section to be that exposed at Big Stone Gap, Wise County, Virginia. Hennen (1915) reported on the geology of McDowell County, West Virginia, and his work provides useful information about the West Virginia equivalents of the Lee Formation. In 1916, Hinds discussed the Lee in his report on the Clintwood and Bucu quadrangles which include a limited portion of Buchanan County. The geology of Buchanan County was

described in 1918 by Hinds with the emphasis naturally placed on the coal resources and surface geology of the county. Hinds (p. 13-16), however, does give the record of the Seng Camp core hole which is valuable because it provides a standard section of the Lee Formation for the southeastern portion of Buchanan County. Between 1919 and 1925 the Virginia Geological Survey published a series of reports on the other coal-bearing counties of southwest Virginia. All of these reports (Harnsberger, 1919; Giles, 1921; Wentworth, 1922; Eby, 1923; and Giles, 1925) contain information about the Lee Formation pertinent to the present study. The most valuable is the one by Eby (1923, p. 65) who named the middle conglomeratic sandstone the Bald Rock Conglomerate Member after a topographic feature in Wise County. He informally referred to the lowermost conglomeratic sandstone as the "basal sandstone of the Lee." A driller's log of a well drilled in Buchanan County was published in 1936 in a West Virginia Geological Survey report prepared by Tucker (1936, p. 276). Butts (1940) commented on the Lee Formation in southwestern Virginia. Martens (1943) described the Lee Formation from cuttings obtained from a well drilled just across the county line in Russell County. In 1949, Wilpolt and Marden in their work on the Upper Mississippian of southwestern Virginia mentioned briefly the Lee Formation. A continuation of the work by Huddle, Jacobsen, and Williamson (1956) gives useful subsurface criteria and summarizes well logs which proved to be of value. Also helpful were the detailed well-sample descriptions (Huddle,

Jacobsen, Williamson, and others, 1955) placed on open-file at the Virginia Division of Mineral Resources.

In summary, several publications are available and considerable work has been done on the geology of Buchanan County and vicinity. However, because the Lee Formation in Buchanan County is almost entirely covered by younger rocks, the formation has been largely neglected even though numerous wells have been drilled in the county in the past fifteen years.

## Geologic Setting

Buchanan County is in the eastern edge of the Appalachian Plateau province (see Fig. 2). The Appalachian Plateau province is actually a tectonic province surfaced generally by rocks of Pennsylvanian age and characterized structurally by broad open gentle folds. With the minor exception of a small area of complexly folded and thrust-faulted rocks of Cambrian through Mississippian age in the southern corner of the county which projects slightly into the Valley and Ridge province, the surface rocks of Buchanan County are entirely of post-Lee Formation Pennsylvanian age. Throughout most of the county, the regional dip at the surface is gently to the northwest at an approximate average rate of about 100 feet per mile with minor reversals and variations.

The Cumberland overthrust block lies southwest of Buchanan County. The Russell Fork fault bounds the northeast side of the block and its trace parallels the southwestern border of the county except

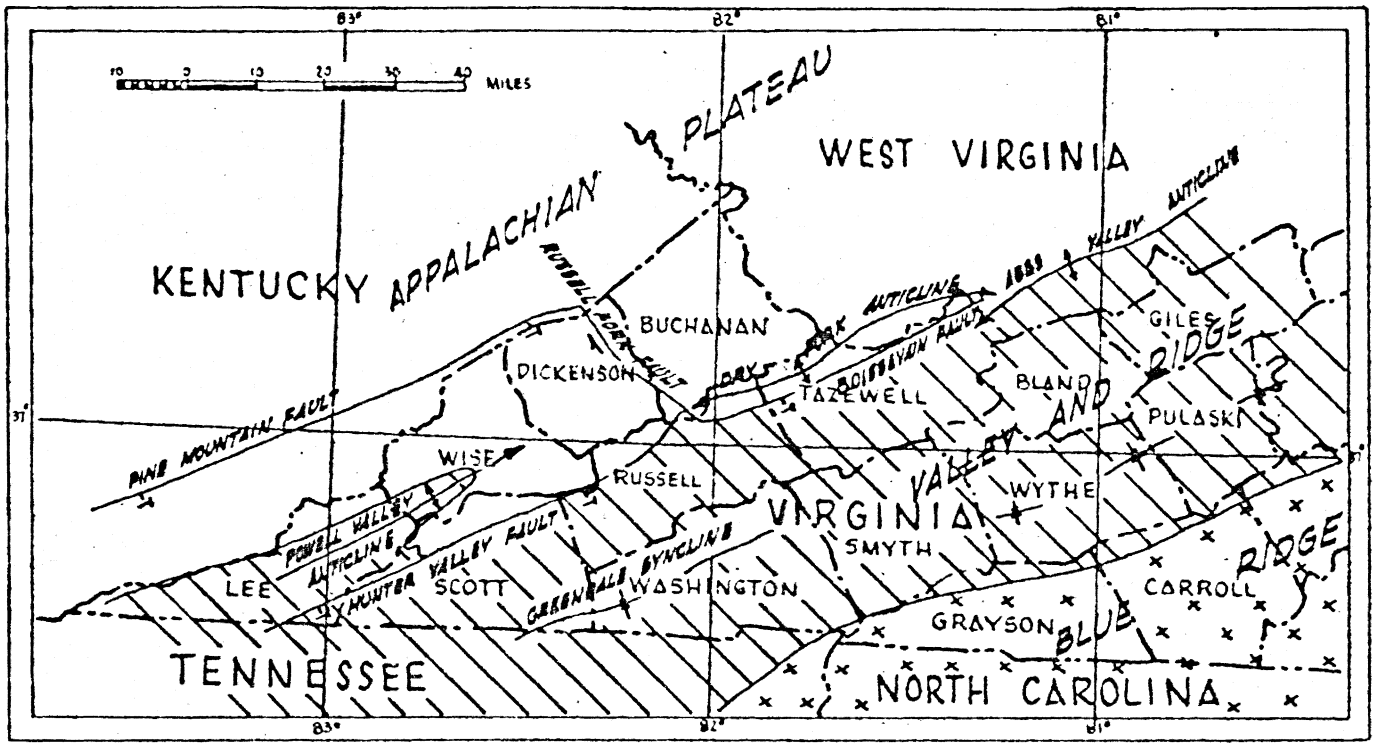


Figure 2. Map of southwest Virginia and vicinity showing the tectonic provinces and some of the major tectonic features.

for a segment which cuts across the southern corner. The high-angle Russell Fork fault was formed by the essentially horizontal displacement of the Cumberland Block on the southwest (Wentworth in Giles, 1921, p. 58-59) which moved about two miles northwestward relative to the stationary block that included Buchanan County (Butts, 1940, p. 465). The Cumberland block is bounded on the southeast by the Hunter Valley fault. The northeast-trending trace of this thrust fault extends across the southern corner of Buchanan County where it intersects the Russell Fork fault. The folded and faulted lower Paleozoic rocks in southern Buchanan County occur just southeast of the Hunter Valley fault. The Hunter Valley fault marks the southeastern edge of the Appalachian Plateau province in this part of Virginia. The Russell Fork fault and the Hunter Valley fault are the only faults recognized in Buchanan County. The Valley and Ridge province, about 30 miles wide, is immediately southeast of the county. Southeast of the Valley and Ridge province is the Blue Ridge province, a region of predominantly igneous and metamorphic rocks.

The near-surface structure of Buchanan County is shown on Plate I which depicts the present structural configuration of the top of the gray shale member of the Bluestone Formation, a probable time-marker surface near the top of the Mississippian. This map agrees well with the surface structure shown on the Geologic Map of Buchanan County, Virginia (Hinds, 1918). Hinds used coal beds as the contoured surface.

Plate I shows the northeast-trending Dry Fork Anticline, most of which lies to the southeast in Tazewell County. From the

southeastern border the rocks dip gently northwestward interrupted about midway in the county by a gentle anticlinal reversal. This anticline is shown less prominently on Hinds' map than on Plate I. Hinds did not name the structure, so it is proposed here that it be termed the Grapevine Branch Anticline after a small stream by that name which rises near the culmination of the structure as shown on Hinds' map. The synclinal areas northwest and southeast of the Grapevine Branch Anticline are probably the bifurcated nose of the great Middlesboro Syncline. Northwest of the northwestern branch of the Middlesboro Syncline, the mapped surface is folded into a minor anticlinal nose and then continues to dip northwestward into Kentucky.

A structural contour map of the base of the Greenbrier Limestone (Wilpolt and Marden, sheet 1) shows that the regional dip of the deeper formations in Buchanan County is toward the southeast in contrast to the near-surface formations. This feature is a result of the general thickening to the southeast of most of the formations.

## Pre-Pennsylvanian Formations

The general character of the pre-Pennsylvanian formations as determined mainly from data available through drilling operations in the area is given in Table 1. The oldest rocks penetrated in Buchanan County through 1958 are formations of probable Late Silurian age, but these and older beds are not considered because of lack of control.

Briefly, the Devonian System consists of essentially a thin (about 200 feet) basal, primarily carbonate, unit overlain by a thick (1700 to 1900 feet) sequence of shale and siltstone. The Devonian

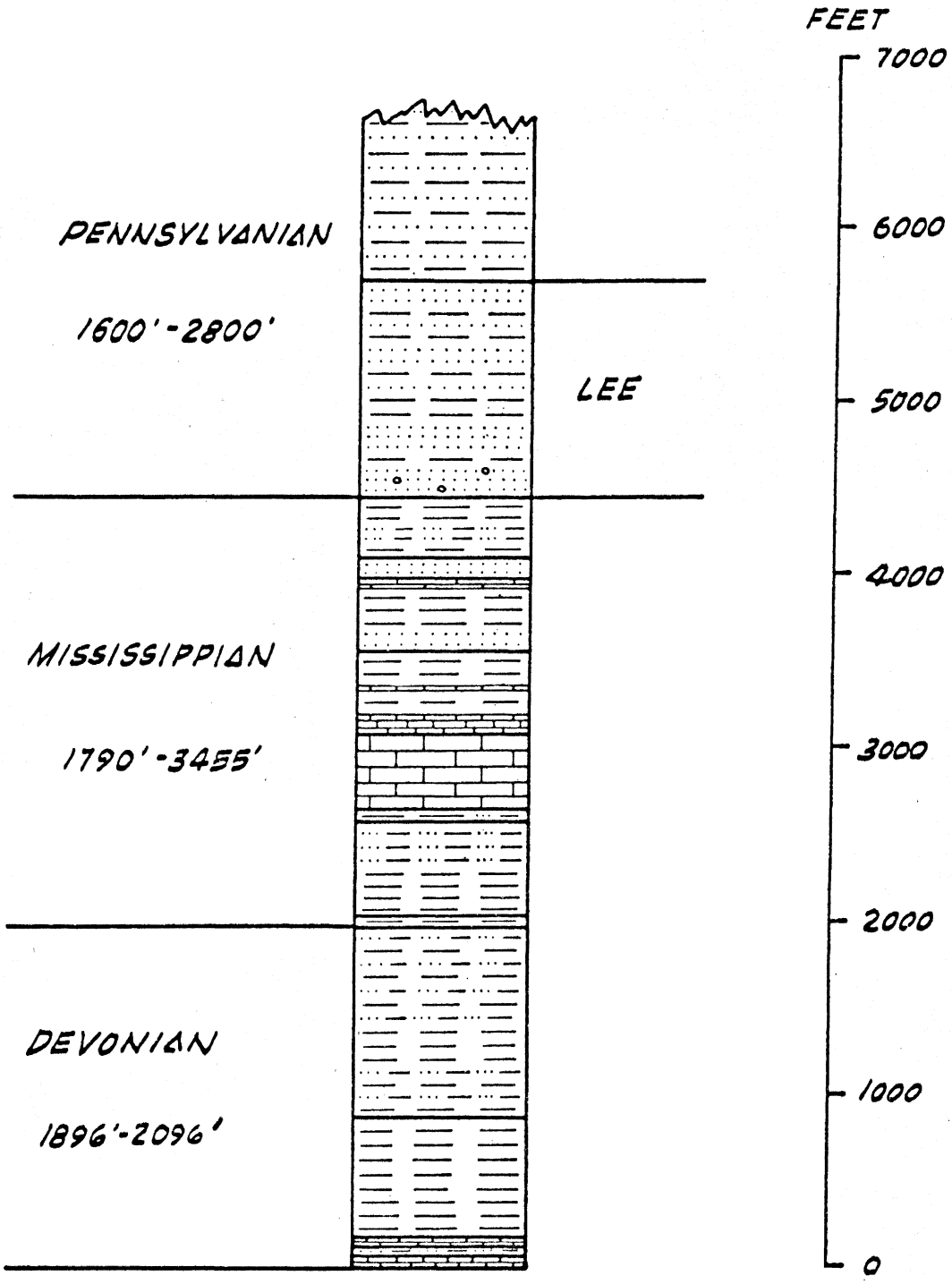


Figure 3. Generalized partial columnar section for Buchanan County, Virginia, showing the character and thickness of the Lee Formation as compared to other units. Maximum and minimum thickness of each system is indicated.

Table 1. Pre-Pennsylvanian Formations

| Formation | Thickness | Character |
|---|---|---|
| MISSISSIPPIAN | | |
| Bluestone Formation | 250-450 | Basal sequence of generally dark-gray to black carbonaceous shale overlain by green to gray sandstone followed by an upper unit comprised of red, green, and light-gray shale and siltstone with minor beds of limestone. |
| Princeton Sandstone | 50-100+ | Erratic, locally conglomeratic, fine-to medium-grained quartzose sandstone. |
| Hinton Formation | 350-700 | Basal light-gray quartzose sandstone (Stony Gap) overlain by greenish-gray and red shales in turn overlain by a thin gray argillaceous limestone (Avis). |
| Bluefield Formation | 250-700 | Basal sequence of interbedded dark argillaceous limestones and shales grading upward into sandstone, siltstone, and shale. The upper shales range from gray in the southeast to red and green in the northwest. |
| Greenbrier Limestone | 300-550 | Mostly light-gray to light-tan limestone ranging in character from crystalline to dense to fossiliferous to oolitic. Locally cherty. Thin zone of red shale and limestone sometimes present near base. |
| Maccrady Formation | 0-155 | Purple to red shale and siltstone containing minor amounts of white anhydrite. Locally absent. |
| Price Formation | 500-600 | Predominantly gray shale in lower two-thirds to half overlain by mostly gray to greenish-gray siltstone. |

Table 1. - Continued

| Formation | Thickness | Character |
|---|---|---|
| MISSISSIPPIAN - Continued | | |
| Big Stone Gap Shale | 40-100 | Mainly black to dark-gray, pyritic shale with a silty to sandy middle zone. May be partly or wholly of Devonian age. |
| DEVONIAN | | |
| Brallier and "Chemung" Formations | 1100 | Mostly gray, silty shale interbedded with thin siltstones. Formations difficult to separate. |
| Millboro Shale | 600-800 | Gray to light-gray shale sequence containing an upper and lower black shale unit each about 100 feet thick. |
| Huntersville Chert | 60 | Gray to white, crystalline, glauconitic, impure limestone, in part chertified. |
| Rocky Gap Sandstone | 55 | Quartzose, glauconitic siltstone. |
| New Scotland Limestone | 78 | Dark, dense limestone. |

rocks were deposited in a predominantly marine shelf environment as indicated by the contained fossils and lithologic character of the rocks (Butts, 1940, p. 490-495). Very likely, a slight or no depositional interruption occurred at the end of Devonian time as indicated by the stratigraphic relation of the Big Stone Gap Shale to the underlying Devonian formations and overlying Mississippian formations (Cooper, 1944, p. 144). The basal 550 to 850 feet of Mississippian rocks represent an apparent continuation of the deposition of fine clastics initiated in the Devonian. A major change of environment is indicated by the succeeding Greenbrier Limestone, an accumulation of 300 to 550 feet of shelf-type carbonate. The overlying Bluefield, Hinton, Princeton, and Bluestone Formations, totaling 1000 to 2000 feet in thickness, represent a slow but continuing change from the marine carbonate deposition of Greenbrier time to the continental clastic deposition of Pennsylvanian time.

In summary, the overall rock record of the Devonian and Mississippian represents a gradual change in the Buchanan County area from a shelf environment to a continental environment spanning a time of about 83 million years.

## BLUESTONE FORMATION

### General Character

The Bluestone Formation includes the uppermost beds of the Mississippian System in Buchanan County, and is of particular interest because it directly underlies the Lee Formation. The Bluestone Formation consists of a basal member of generally dark-gray to black, locally carbonaceous shale overlain by a green to gray sandstone which locally grades to siltstone. These two units together form the gray shale member as defined by Wilpolt and Marden (1949, sheet 1). The upper portion of the Bluestone Formation is mostly red, green, and light-gray shale and siltstone which contains a minor amount of interbedded sandstone and limestone. The formation ranges in thickness from 450 feet to 250 feet, and in general it thins from southeast to northwest across the county.

### Age

The Bluestone Formation is considered to be post-Elvira in age, and is younger than any of the Mississippian formations in the Ohio and Mississippi Valleys. It is the youngest Mississippian formation in the Appalachian region (Weller, 1944, chart 5 and p. 107).

### Gray Shale Member

The gray shale member of the Bluestone Formation as originally recognized by Wilpolt and Marden (1949, sheet 1) included the basal shale body and overlying sandstone (locally siltstone). Use of their term "gray shale member" is restricted in the present report to the shale body and to its apparent lateral, locally developed, sandstone equivalent.

Observed features of the gray shale member are: (1) the member is predominantly a dark-gray to black shale which indicates quiet-water deposition, (2) the member is underlain and overlain by near-shore to continental beds (Princeton Sandstone and balance of the Bluestone Formation, respectively), (3) the member is widespread and more persistent than other beds of the Bluestone, (4) the top of the member is sharply marked and not gradational, and (5) the base of the member is gradational with the underlying Princeton Sandstone.

The top of the gray shale member is used in this investigation as a time-marker surface, and although this hypothesis can not be proved, the observations cited above tend to lend support. Based on the observations cited above, the gray shale member probably represents quiet, shallow-water conditions following deposition of the near-shore Princeton Sandstone. Quiet-water conditions below wave base apparently prevailed for a time in striking contrast to preceding and succeeding environments of deposition. The end of gray shale member time was marked by an abrupt influx of sand and mud and a return to a near-shore to continental environment.

## PRE-LEE DEPOSITIONAL SURFACE

### General Statement

The character of the surface upon which the beds of the Lee Formation were deposited in Buchanan County had considerable influence upon Lee sedimentation. The following questions will be discussed in this section to gain an understanding of the pre-Lee surface of deposition: (1) was post-Bluestone pre-Lee time a time of emergence, (2) if so, what was the topographic character of the surface, and (3) what Late Bluestone and/or pre-Lee tectonism took place to affect the surface?

### Type of Surface

The writer believes that post-Bluestone pre-Lee time in Buchanan County was a time of emergence and erosion for the following reasons: (1) there is scant indication of a gradational contact or interfingering relationship between the Bluestone and Lee (see Plate III), (2) no Bluestone-type argillaceous material is incorporated interstitially within the basal sandstone of the Lee, and (3) correlation of the Bluestone suggests that a portion of the top of the formation has been removed locally by erosion.

In southeastern Buchanan County, rare thin red and green beds of Bluestone-type lithology are present in the lower part of the Lee Formation (see Plate III). These beds are believed not to represent a gradational contact within the county because of their rarity and vertical distance above the top of the Bluestone. The lowest is less than 100 feet above the Bluestone, but the most persistent is about 200

to 300 feet above the Bluestone. These beds will be discussed more fully in a following section. Bluestone sediments are believed to have been consolidated and lithified prior to Lee deposition because no green or red argillaceous material is incorporated within the sandstone of the Lee. If the Lee sands had been deposited without interruption upon the soft red and green clays of the Bluestone it seems likely that some of this argillaceous material would have been incorporated within the sands. Although the upper beds of the Bluestone are irregularly distributed, correlation of the interval suggests that erosion has removed portions of the formation locally. For instance, the highest Bluestone bed preserved in the United Producing 1-1454 Yukon - Pocahontas well is a green silty shale and siltstone (see Plate III). In adjacent wells the highest Bluestone bed is a red shale and thin limestone unit which appears to be the same unit lying beneath the green silty shale and siltstone in the 1-1454 Yukon - Pocahontas well. The relationship of these Bluestone units cited above to the overlying Pocahontas No. 3 coal and the underlying top of the gray shale member of the Bluestone Formation, which are time surfaces, strongly suggests that the local preservation of the green silty shale and siltstone is a result of erosion and not local variations in deposition.

## Topography

The topography of the post-Bluestone pre-Lee surface is inferred from the isopach map of the interval from the base of the Lee Formation to the top of the gray shale member of the Bluestone Formation

(Plate IV). The top of the gray shale member as a time surface is considered to be flat; consequently the isopach map represents pre-Lee hills in areas of thickening and valleys in areas of thinning. The isopach map implies that a northeast-trending ridge existed about midway across Buchanan County coincident with the present-day Grapevine Branch Anticline. The southeastern portion of the county was occupied by a low depression possibly opening toward the northeast, and the northwestern portion of the county was occupied by a basin-like valley opening toward the northwest. The maximum indicated relief in the area was about 150 to 200 feet. Drainage on the post-Bluestone surface probably was consequent to the initial slope of the newly-emerged surface. The resultant of the inferred northeast and northwest drainage vectors is toward the north. This suggests that the initial slope of the post-Bluestone surface was toward the north.

The isopach map of the interval between the two time surfaces, the Pocahontas No. 3 coal and the gray shale member (see Plate IV), shows that the two surfaces converge toward the northwest at an average rate of about 13 feet per mile. This means that at the end of deposition of the Pocahontas No. 3 coal the gray shale member dipped gently southeastward, but it is uncertain whether this dip was inaugurated during Bluestone, post-Bluestone pre-Lee, or early Lee time. Probably at least some of the southeast dip dates from late Bluestone time because the Bluestone thickens toward the southeast which indicates that subsidence was taking place in that direction throughout Bluestone time. Since Pocahontas No. 3 coal time, the regional dip of

the gray shale member has been reversed toward the northwest as shown by the present-day structural configuration of the top of the gray shale member (Plate I).

# STRATIGRAPHY OF THE LEE FORMATION

## General Statement

This investigation of the Lee Formation was made in an attempt to shed light on the role played by tectonism contemporaneous with deposition, the character of the pre-Lee surface, the environment of deposition, and the provenance of the formation. In addition to the above, problems revealed by the study of the Lee include the following: (1) the formation is about twice as thick in the southeastern part of Buchanan County as in the northwestern part, (2) clean orthoquartzitic sandstone is predominant in the northwestern part of the county, but the formation consists of about equal amounts of "dirty" sandstone and shale in the southeastern part, (3) conglomerate is negligible in the southeast, but common in the northwest which is farther from the presumed source area, (4) coarse sandstones and coals are closely associated, and (5) thin red and green shales and siltstones of Bluestone-type lithology are present in the formation.

In the Wise County and Lee County area (the type section of the Lee is at Big Stone Gap, Wise County) where the Lee Formation is well exposed, the formation is characterized by three thick massive sandstones separated by intervening shales. The sandstones in many places are conglomeratic, a distinguishing feature of the Lee. The upper sandstone is the "Bee Rock" Member (Stevenson, 1881) and is the top bed of the Lee. The middle sandstone is the Bald Rock Conglomerate Member (Eby, 1923, p. 65). The lower sandstone is the bottom bed of

the Lee and has not been formally named. Eby (1923, p. 65) referred to it simply as the "basal sandstone of the Lee."

The Lee Formation in the subsurface of northwestern Buchanan County is very similar to the formation as exposed in Lee and Wise Counties except that it has relatively more sandstone and less shale and is much thinner. The reduction in thickness is apparently the result of the absence of the thick intervening shales present in Lee and Wise Counties. The Lee does become thicker toward the southeastern part of Buchanan County primarily because of an increase in the volume of shale. In addition, the sandstones lose their conglomeratic nature. These changes make difficult and less certain the placing of the upper contact of the Lee with the overlying, lithologically similar, Norton Formation. The correlations discussed above are illustrated on the fence diagram showing the correlation of the Lee Formation in southwest Virginia (Plate II).

The several coal beds in the Lee Formation are significant because of their use as environment indicators, key beds, and time surfaces. Precise use of most of the coals is not possible in the present study because the investigation is based on the examination of cable tool well cuttings. If coal is present in a particular sample of cable tool well cuttings, it is often difficult to determine with certainty whether the coal fragments came from that particular interval or whether the fragments are cavings from higher in the well. In addition, a few grams of sample represent a vertical section of rock ranging usually from 5 to 15 feet in thickness, and in many instances

it is difficult to determine whether the coal fragments represent an actual coal bed a few feet thick or a locally developed coal lens an inch or two thick.

## Age

The age of the Lee Formation has been determined by studies of its fossil flora to be Early Pennsylvanian (Butts, 1940, p. 413). The Lee Formation has been correlated with the Lower Pottsville of the southern anthracite basin of Pennsylvania (Moore, and others, 1944, chart 6), and is therefore as old as the oldest Pennsylvanian rocks of the Appalachian region. Significantly, this oldest Pennsylvanian formation rests on the youngest Mississippian unit known in the Appalachian region, the Bluestone Formation, a formation younger than any of the Mississippian rocks of the Ohio and Mississippi Valleys. This relationship implies little, if any, interruption of deposition between the Mississippian and Pennsylvanian periods in Buchanan County. The duration of the hiatus between Mississippian and Pennsylvanian time increases progressively toward the northwest (Moore, and others, 1944, chart 6), but may decrease to the southeast toward and into the Hurricane Ridge Syncline.

## Lower Member

General remarks. - The term lower member is used informally in this report to designate the lower third to half of the Lee Formation. The lower member may be partly or entirely equivalent to the Bald Rock Conglomerate Member and the basal sandstone member of the Lee Formation of Eby (1923, p. 65), and it is probably the approximate

equivalent of the Pocahontas Group of the West Virginia Geological Survey (Hennen, 1915, p. 215-241).

Lithology. - The lower member consists predominantly of white to light-gray, fine- to coarse-grained quartzose sandstone (see Plate III, stratigraphic section of the Lee). Intercalated with the sandstone are beds of gray siltstone, gray to dark-gray shale, and coal. Two thin zones of red and green shale, siltstone, and sandstone of Bluestone-type lithology occur within the member. Lithologies other than sandstone comprise less than 5 per cent of the member in northwestern Buchanan County and about 25 per cent of the member in southeastern Buchanan County. The member varies in thickness, but in general it becomes thicker toward the southeast. It is between 350 and 400 feet thick in the northwest and about 700 feet thick in the southeast. The following summarized section presents the typical character of the member:

United Producing Co. 1-1454 Yukon-Pocahontas Coal Co. Well
Buchanan County, Virginia
Located 1.79 miles east of 82° 05',
0.99 miles south of 37° 15'

Upper member
Lower member (estimated thickness 460 feet)

| | | Feet |
|---|---|---|
| 855-864 | Shale, gray to light-gray; and white, medium- to fine-grained, quartzose sandstone . . . . . | 9 |
| 864-983 | Sandstone, white, medium-grained becoming coarse-grained at base, quartzose, clean, numerous fragments of milky-white quartz pebbles . . . . . | 19 |
| 983-985 | Shale, dark-gray; and coal . . . . . | 2 |

| | | |
|---|---|---|
| 985-994 | Siltstone, gray; some gray to light-gray shale | 9 |
| 994-1041 | Sandstone, light-gray, medium- to fine-grained, quartzose, moderately micaceous and chloritic | 47 |
| 1041-1050 | Siltstone, gray; a little coal | 9 |
| 1050-1105 | Sandstone, same as 994-1041 but becoming white and fine-grained toward base | 55 |
| 1105-1115 | Coal and gray shale (Pocahontas No. 3 coal) | 10 |
| 1115-1151 | Shale, gray; a little gray siltstone | 36 |
| 1151-1185 | Sandstone, light-gray, fine-grained, quartzose, moderately feldspathic and micaceous, slightly chloritic | 34 |
| 1185-1252 | Sandstone, white, mostly fine-grained, quartzose, slightly micaceous and chloritic | 67 |
| 1252-1255 | Sandstone, same as above; and light-greenish gray, micaceous siltstone (Alpha colored zone) | 3 |
| 1255-1267 | Siltstone, gray to light-gray | 12 |
| 1267-1290 | Shale, light-tannish gray to gray, in part contains black (siderite?) nodules | 23 |
| 1290-1320 | Sandstone, white, fine-grained grading downward to medium-grained, quartzose, slightly micaceous and chloritic | 30 |

Bluestone Formation

In conjunction with the preponderance of sandstone, the distinguishing feature of the lower member is the orthoquartzitic and conglomeratic (the pebbles appear to be milky-white vein quartz) nature of much of the sandstone as compared to the upper member of the Lee (see Plate III). The member is nearly entirely orthoquartzitic and conglomeratic sandstone in the northwestern part of the county, and it maintains this lithology as far southeast as the Grapevine Branch

Anticline where it is about three-quarters orthoquartzite although the amount of conglomerate is considerably diminished. The member changes character southeast of the Grapevine Branch Anticline because of an increase in the amount of interbedded shale and siltstone, and because much of the orthoquartzite grades laterally into micaceous, chloritic, glauconitic, and locally slightly feldspathic sandstone. Conglomerate and conglomeratic sandstone are absent in the southeasternmost wells. The upper orthoquartzite, marking the top of the lower member, is the most persistent of the orthoquartzites, and also is the most constantly conglomeratic of the sandstones in either the lower or upper member of the Lee Formation.

The Pocahontas No. 3 coal, near the middle of the lower member, is the only coal recognized with assurance by the writer although several other coal beds are present. Recognition of the Pocahontas No. 3 coal was based on its greater thickness throughout much of the county as compared to the other coals, its stratigraphic position near the middle of the member, and its position below the conglomeratic sandstone of the lower member. The Pocahontas No. 3 coal and the additional coals interbedded in the member indicate that continental conditions prevailed during portions at least of lower member time. The Pocahontas No. 3 coal is a very dependable time surface because it represents a relatively short duration of time and because it is easily recognized throughout much of the county.

Two red and green shale and siltstone/sandstone zones occur in the lower member in southeastern Buchanan County. These zones

exhibit the distinctive pale pastel hues characteristic of the Bluestone Formation and this feature, in addition to their tendency to persist laterally, distinguishes them from the rare red and green beds in the upper member. The two colored zones are thin relative to the total thickness of the Lee, although the lower colored zone in most places is 30 to 50 feet thick. The upper colored zone is about 10 feet thick. Both colored zones thin and pinch out toward the northwest.

It is proposed here that the lower colored zone be named the Alpha colored zone. The Alpha colored zone is well represented in the United Producing 1-1724 McNeil well, and a summarized description follows:

United Producing Co. 1-1724 McNeil Well
Buchanan County, Virginia
Located 1.29 miles west of 81° 50',
1.08 miles south of 37° 15'

Lower member
Alpha colored zone (estimated thickness 55 feet)

| | | Feet |
|---|---|---|
| 1510-1521 | Shale, light-gray, siderite nodules; and light-greenish gray, in part faintly pink shale | 11 |
| 1521-1532 | Shale, green and red; with some green, quartzose siltstone | 11 |
| 1532-1555 | Siltstone, green, quartzose, micaceous, slightly argillaceous; with a little interbedded green, slightly silty shale | 23 |
| 1555-1571 | Sandstone, white with an extremely faint greenish cast, fine-grained, quartzose, nearly clean | 16 |

Lower member

In the 1-1454 Yukon-Pocahontas Coal Co. well, the most northwesterly well in which the Alpha colored zone is recognized, the Alpha

colored zone is present as a light-greenish gray siltstone and is at most 3 feet thick (see previously cited description of typical section of the lower member). Normally, the Alpha colored zone occupies a position about 100 to 150 feet above the base of the Lee. Other than the thin remnant in the 1-1454 Yukon-Pocahontas well, the zone is present only in the eastern corner of Buchanan County (see Plate III), that portion of the county in which the Lee attains its maximum thickness.

The upper colored zone is called here the Beta colored zone. A section typical of the Beta colored zone follows:

United Producing Co. 7-1672 Yukon-Pocahontas Coal Co. Well
Buchanan County, Virginia
Located 2.04 miles west of 81° 55',
1.71 miles south of 37° 15'

Lower member
Beta colored zone (estimated thickness 11 feet)

| | | Feet |
|---|---|---|
| 2100-2108 | Shale, light-green, a small amount is light-gray, in part with siderite nodules; and light-olive green, quartzose siltstone . . . | 8 |
| 2108-2116 | Shale, gray to light-gray; some siltstone, same as above . . . . . | 8 |

Lower member

In the United Producing 1-1601 Matney well, the most northwesterly well in which the Beta colored zone is recognized with assurance, the Beta colored zone is represented by 4 feet of dark-greenish gray and dusky-red shale. The Beta colored zone is normally present about 50 feet below the Pocahontas No. 3 coal. Except for the occurrence in the 1-1601 Matney well and a questionable occurrence in the 2-A Curtis well, the

Beta colored zone is present, similarly to the Alpha colored zone, only in southeastern Buchanan County (see Plate III), that portion of the county in which the Lee attains its maximum thickness.

That the colored zones called Alpha and Beta are actually in the Lee Formation and not in the Bluestone Formation is supported by the following observations: (1) sandstone coarser-grained (typical of the Lee) than that in the Bluestone lies between the Alpha colored zone and the colored shales placed in the top of the Bluestone (e.g., see sample descriptions of the 1-1724 McNeil well), and (2) the interval (approximately 50 feet) separating the Beta colored zone from the definitely recognized Pocahontas No. 3 coal is unreasonably thin if the Beta zone were to be the top of the Bluestone.

Lower contact. - The basal contact of the lower member of the Lee Formation with the underlying Bluestone Formation is marked by the lithologic change from the massive generally white sandstone of the Lee to the varicolored shale of the Bluestone. The contact is usually recognized without difficulty throughout Buchanan County except in the southeastern portion. For example, in the United Fuel 1-6431 McRae well in southeastern Buchanan County the lower 40 feet of Lee sandstone is apparently interbedded with about 10 per cent gray shale and traces of red and maroon shale. The top 20 feet of the Bluestone is mostly light-gray shale with a little red shale. Except for the coal beds, the Lee Formation does not cave badly so it is believed that the samples of the lower 40 feet of the Lee in the McRae well are essentially representative of the interval penetrated. In the United Producing 2-1466

Yukon-Pocahontas well about 4 miles west of the McRae well, the interval between the massive Lee sandstone and the varicolored Bluestone shale is occupied by 63 feet of light-greenish gray, light-gray, and white siltstone interbedded with very little light-gray to light-greenish gray shale. This interval has affinities with both the Lee and the Bluestone, but was placed in the Lee by the writer. Correlation with the McRae well indicates little difference in thickness between the Pocahontas No. 3 coal and the top of the Bluestone red shale and thus implies that the siltstone interval in the 2-1466 Yukon-Pocahontas well is probably equivalent to the lower portion of the massive Lee sandstone in the McRae well. Huddle, Jacobsen, and Williamson (1956, p. 552) placed the bottom of the Lee within but near the top of the siltstone interval. The section penetrated in the 2-1466 Yukon-Pocahontas well and the McRae well demonstrates that, locally at least, in southeastern Buchanan County the contact of the Lee and Bluestone Formations is indistinct. The 2-1466 Yukon-Pocahontas well in particular may indicate a transitional contact, but it is uncertain whether the transitional appearance is due to continuous deposition between Bluestone and Lee time or reworking of Bluestone sediment during Lee deposition. The abruptness of the contact in the other wells in the county lends support to the concept of local reworking during Lee time. One other well, the United Producing 1-1601 Matney in central Buchanan County, encountered an indistinct contact between the Lee and the Bluestone. Below the massive sandstone of the Lee and above the red shale of the Bluestone in this well is an interval 39 feet thick which consists of interbedded light-gray

siltstone, very light gray sandstone, and dusky-red siltstone. The dusky-red siltstone occurs near the middle of the interval and the writer placed the top of the Bluestone at the top of this bed because the light-gray siltstone above it does not display Bluestone coloration. Huddle, Jacobsen, and Williamson (1956, p. 554), however, placed the contact at the base of the massive sandstone. The varicolored shale at the top of the Bluestone in the 1-1601 Matney well is abnormally thin as compared to nearby wells. This feature in addition to the abruptness of the Bluestone-Lee contact in nearby wells suggests probable post-Bluestone erosion and local reworking of Bluestone sediments during initial Lee deposition in the vicinity of the 1-1601 Matney well.

### Upper Member

General remarks. - The term upper member is used informally in this report to designate that portion of the Lee Formation above the lower member. The upper member of the Lee Formation may be equivalent to that portion of the Lee above the Bald Rock Conglomerate Member of Eby (1923, p. 65), and it is probably the equivalent of most of the New River Group of the West Virginia Geological Survey (Hennen, 1915, p. 171-214).

Lithology. - The upper member of the Lee Formation is a sequence of interbedded sandstone, siltstone, shale, and coal (Plate III, stratigraphic section of the Lee). The sandstone is generally light in color, fine- to medium-grained, and quartzose. Most of the sandstone is characterized by an assemblage of accessory minerals which

includes mica, chlorite, and glauconite as well as unidentified green, red, and dark minerals. In addition, many of the sandstones are somewhat feldspathic. Discontinuous orthoquartzites are scattered randomly throughout the member, but comprise a very minor portion of the unit except in the most northwestern part of Buchanan County. Conglomerate and conglomeratic sandstone consisting of milky-white pebbles of vein quartz occur locally, but represent little of the unit except in the most northwestern part of the county. Shale present in the upper member ranges in color generally from light to dark gray. Some of the shale beds are carbonaceous. Fragments of fossil plants are rather common and, in conjunction with the coal beds present, indicate the continental environment of deposition of the upper member. Siltstone is a common constituent of the unit and has lithologic attributes of both the sandstone and shale. Rare red and green siltstone is present, but does not display a Bluestone-type lithology and does not persist laterally. Several coal beds are incorporated in the member, but only two, the Middle Seaboard coal and the Lower Seaboard coal, were tentatively recognized with enough assurance to warrant name assignment. These two coal beds are tentatively recognized on the basis of comparison of well logs with the log of the Seng Camp core hole (Hinds, 1918, p. 13-16) by the fairly constant interval maintained between the two coals, and by their stratigraphic position. The following somewhat condensed section illustrates in general the character of the upper member:

Pipe Line Construction and Drilling Co. 2-A Curtis Well
Buchanan County, Virginia
Located 1.57 miles west of 82° 00',
0.40 miles north of 37° 20'

Post-Lee Formation beds
Upper member of the Lee Formation (875 feet thick)

| | | Feet |
|---|---|---|
| 1016-1028 | Sandstone, light-gray, fine-grained, micaceous | 12 |
| 1028-1038 | Sandstone, same as above, but grading to medium-grained; some light-gray shale | 10 |
| 1038-1045 | Sandstone, same as above, but becoming coarse-grained; some light-gray siltstone and some light-to dark-gray shale | 7 |
| 1045-1086 | Sandstone, white, coarse- to medium-grained, micaceous, chloritic, green grains | 41 |
| 1086-1093 | Shale, dark-gray, silty | 7 |
| 1093-1127 | Sandstone, light-reddish gray, fine-grained, micaceous, hematitic | 34 |
| 1127-1163 | Sandstone, light-gray, fine- to very fine grained, at the base a little coaly and argillaceous material | 36 |
| 1163-1177 | Shale, dark-gray, sandy | 14 |
| 1177-1185 | No sample | 8 |
| 1185-1192 | Shale, dark-gray, slightly silty | 7 |
| 1192-1200 | Shale, same as above; some coal and light-gray underclay | 8 |
| 1200-1227 | Sandstone, white, fine-grained grading downward to coarse-grained, micaceous, chloritic, green grains; at 1206-1213 interbedded with gray, argillaceous siltstone | 27 |
| 1227-1235 | Shale, gray, silty, micaceous | 8 |
| 1235-1238 | Sandstone, light-gray, fine- to very fine grained, slightly feldspathic, micaceous | 3 |

| | | |
|---|---|---|
| 1238-1321 | Shale, dark-gray, finely micaceous; at 1311-1321 some siltstone | 83 |
| 1321-1335 | Siltstone, very light tan, micaceous and sideritic in upper part but becoming cleaner toward base | 14 |
| 1335-1344 | No sample | 9 |
| 1344-1382 | Sandstone, light-gray to white, very fine grained, occasional small amount of interlaminated coaly material, nearly clean, at the base micaceous | 38 |
| 1382-1400 | Shale, gray, micaceous; and gray siltstone | 18 |
| 1400-1441 | Shale, dark-gray, carbonaceous, slightly silty; at 1436-1441 a little coal (Middle Seaboard (?) coal) | 41 |
| 1441-1484 | Sandstone, light-gray to white, fine- to very fine grained, slightly feldspathic; at 1451-1455 interbedded with gray shale | 43 |
| 1484-1492 | Sandstone, [illegible] fine-grained to silt, clean; and gray, silty, micaceous shale | 8 |
| 1492-1509 | Shale, same as above; and gray siltstone; at 1500-1509 some coal (Lower Seaboard (?) coal) | 17 |
| 1509-1545 | Sandstone, white, medium- to fine-grained grading downward to medium-grained, micaceous, green grains, dark grains | 36 |
| 1545-1554 | Shale, gray to dark-gray, in part carbonaceous, some coaly plant fossils | 9 |
| 1554-1578 | Sandstone, light-gray, very fine grained to silt, slightly feldspathic, micaceous, at top argillaceous | 24 |
| 1578-1593 | Shale, gray, silty | 15 |
| 1593-1597 | No sample | 4 |
| 1597-1630 | Shale, dark-gray, silty, carbonaceous | 33 |

| | | |
|---|---|---|
| 1630-1635 | Shale, gray, micaceous, silty; some very light gray, fine- to very fine grained, micaceous sandstone . . . . . | 5 |
| 1635-1775 | Sandstone, white, fine-grained grading downward to medium-grained, feldspathic, micaceous, chloritic, at base one pebble fragment . . . . . | 140 |
| 1775-1782 | Shale, dark-gray, carbonaceous, slightly micaceous; a little coal . . . . . | 7 |
| 1782-1808 | Siltstone, light-gray grading downward to gray, micaceous, argillaceous . . . . . | 26 |
| 1808-1891 | Shale, gray, silty, micaceous; interbedded in the lower two-thirds with some light-tannish gray, very fine-grained, very slightly feldspathic and micaceous sandstone . . | 83 |

Lower member

The thickness of the upper member differs greatly. Although the member is about 820 feet thick in southeastern Buchanan County and about 875 feet thick northwest of the Grapevine Branch Anticline, it is only 450 to 560 feet thick along the northwestern border of the county and about 760 feet thick on the crest of the Grapevine Branch Anticline.

Upper contact. - The contact of the upper member of the Lee Formation with the overlying Norton Formation is obscure because the two formations are lithologically similar. The following remarks will explain the basis for recognition of the contact in this study. Identification of the top of the Lee Formation in the wells is based largely on comparison with the Lee section encountered in the Pocahontas Mining Seng Camp core hole (Hinds, 1918, p. 13-16). Correlation of the Lee Formation in the Seng Camp core hole with the surface exposures of the formation in Tazewell County to the southeast and east apparently was

made by T. K. Harnsberger (Hinds, 1918, p. 13) who mapped the coal-bearing portion of Tazewell County (Harnsberger, 1919).

The top bed of the Lee in the Seng Camp core hole is a sandstone 61 feet thick encountered at a depth of 150.5 feet. The sandstone is similar, in general, to overlying sandstones in the Norton Formation and underlying sandstones in the upper member of the Lee, but its recognition throughout the county rests on the following criteria: (1) in most places it is 60 to 150 feet thick, (2) the grain size tends to decrease downward, (3) in general, it is underlain by a shaly to silty sequence 150 to 200 feet thick, and (4) it is 300 to 400 feet above the Middle Seaboard (?) coal. The above criteria are not absolute, but their use aids in recognition of the sandstone, and consequently, recognition of the top of the Lee Formation.

Lower contact. - The uppermost bed of the lower member throughout much of Buchanan County is a conglomeratic orthoquartzite which contrasts strikingly with the "dirty" sandstone and shale of the overlying upper member. Therefore, if the bed is present, recognition of the lower contact is greatly facilitated. However, in extreme southeastern Buchanan County the conglomeratic and orthoquartzitic bed is absent and the other sandstones of the lower member assume the characteristics of the "dirty" sandstones of the upper member. Placement of the lower contact in southeastern Buchanan County is thus made difficult, and becomes dependent upon the correlation from well to well of local lithologic features near the contact. Recognition of the

Pocahontas No. 3 coal in this area aids in establishing the correlation and placing the contact.

In contrast, the lower contact becomes obscure in extreme northwestern Buchanan County because the "dirty" sandstones of the upper member grade laterally into an orthoquartzitic and conglomeratic sequence and become indistinguishable from similar beds in the lower member. However, the lower member in this area is essentially one massive sandstone, and, by correlating adjacent wells, can be differentiated with a reasonable degree of certainty from the upper member which has more intervening shale beds.

## Thickness

The Lee Formation thins northwestward across Buchanan County from a thickness of slightly more than 1700 feet in the southeast to a little more than 800 in the northwest (Plate VI, isopach map of the Lee Formation). Except in central Buchanan County, the formation displays a nearly uniform rate of thinning of about 50 feet per mile. The formation is anomalously thin in the vicinity of the Grapevine Branch Anticline in central Buchanan County where a thickness as little as 1190 feet was encountered in the Pipe Line 1 Buston well. The area of thinning is accentuated by an area of anomalous thickening probably associated with the northwestern branch of the Middlesboro Syncline just to the northwest. Northwest of that branch of the Middlesboro Syncline, the formation resumes a rate of thinning of about 50 feet per mile which is maintained across the balance of the county.

## Sandstone Distribution

Sandstone and shale. - The gross distribution of sandstone in the Lee Formation is illustrated in Plate VII (sand/shale ratio map) in which the ratio of sandstone to non-sandstone rocks (grouped here under the term "shale", but including coal and siltstone) has been contoured. The sand/shale ratio map primarily indicates the northwestward increase of sandstone relative to shale across Buchanan County, although the total volume of sandstone remains about the same. For example, in southeastern Buchanan County, the total thickness of sandstone in the formation is about the same as the total combined thickness of shale, siltstone, and coal. However, in northwestern Buchanan County the total thickness of sandstone in the formation is 6 to 13 times greater than the total combined thickness of shale, siltstone, and coal. This change in lithology of the Lee Formation results from the northwestward pinch-out of the non-sandstone beds.

The northwestward decrease of non-sandstone beds is rather slight and regular across the southeastern portion of the county, but in the northwest, as inferred from Plate VII, these beds decrease abruptly. It can be inferred from Plate III (stratigraphic section of the Lee) that the non-sandstone beds of the lower member are essentially absent northwest of the Grapevine Branch Anticline, and that the non-sandstone beds of the upper member pinch-out approximately along the northwestern border of Buchanan County.

Orthoquartzite and "dirty" sandstone. - The sandstone in the Lee may be classified into two types: a "clean" sandstone or

orthoquartzite and a "dirty" sandstone characterized by an assemblage of accessory minerals and/or incorporated coaly or argillaceous material. Plate VIII (isopach of orthoquartzite) indicates the general distribution of orthoquartzite although control is scanty.

Plate VIII indicates that the thickness of orthoquartzite in southeastern Buchanan County ranges from less than 100 feet to about 200 feet. Northwest of the Grapevine Branch Anticline the thickness of orthoquartzite abruptly increases from 200 feet to over 600 feet. Viewed in another manner, orthoquartzite represents less than 10 per cent of the formation in southeastern Buchanan County as contrasted with 25 to 70 per cent of the formation in northwestern Buchanan County.

The vertical distribution of orthoquartzite is illustrated by Plate III (stratigraphic section of the Lee) which shows that orthoquartzite is predominant in the lower member throughout much of Buchanan County. However, in the southeastern portion of the county the orthoquartzites of the lower member grade laterally into "dirty" sandstone and interbedded shale, siltstone, and coal. In contrast, the upper member is predominantly "dirty" sandstone, siltstone, shale, and coal throughout most of Buchanan County, although thin and apparently discontinuous beds of orthoquartzite constitute a minor portion of the member. However, in northwestern Buchanan County along the Kentucky border, orthoquartzite becomes dominant in the upper member.

Consequently, it appears that the relationship of the orthoquartzite (with little interbedded shale, siltstone, and coal) to the

"dirty" sandstone (with considerable interbedded shale, siltstone, and coal) is basically a relationship of two facies. The orthoquartzite represents a western facies which tends to occur low in the section and geographically to the northwest. The "dirty" sandstone and associated beds represent an eastern facies which occurs to the southeast, but which tends to rise in the section toward the northwest.

Conglomerate. - Conglomerate and conglomeratic sandstone comprised of pebbles of vein quartz constitute a generally minor, but significant, portion of the Lee Formation. Plate IX (isopach of conglomerate and conglomeratic sandstone of the Lee) although based on insufficient control shows the general distribution of the conglomerate and conglomeratic sandstone of the Lee. The maximum thickness (550 feet) of the conglomerate and conglomeratic sandstone is attained in extreme northwestern Buchanan County, but the rock thins toward the southeast and appears to pinch-out entirely a short distance southeast of the Grapevine Branch Anticline. A slight, but anomalous, increase of conglomerate and conglomeratic sandstone to a thickness of more than 100 feet coincident with the Grapevine Branch Anticline is suggested in that vicinity (see Plate IX). The northwestward thickening of conglomerate and conglomeratic sandstone is accompanied by an increase in the number of such beds.

Most of the conglomerate and conglomeratic sandstone is

associated with orthoquartzite, and consequently, the bulk of it is included in the lower member. That conglomerate and conglomeratic sandstone which is present in the upper member tends to be less continuous and more randomly distributed than that of the lower member.

## Environment of Deposition

The rocks of the Lee Formation, with the exception of the orthoquartzite, appear to have been deposited in a non-marine, and, periodically, continental environment. This is indicated by the numerous coal beds, coaly laminations, and plant fossils incorporated in the formation. Additional corroboration is suggested by the fact that no marine fossils were observed in the rocks. The local discontinuity and erratic nature of the beds is more characteristic of non-marine sediments than otherwise.

The numerous coal beds in the Lee suggest that the depositional surface during Lee time was frequently slightly above sea level and remained so for periods long enough to allow the creation of coal-forming swamps. Only a slight rise in sea level would be required to destroy a coal-forming swamp, and during the inter-paludal periods a non-marine environment probably prevailed much of the time.

The orthoquartzites, however, are strikingly different from the non-marine rocks which comprise the balance of the Lee Formation. Despite the apparent absence of marine invertebrate fossils, the orthoquartzites have certain marine aspects. The rock is composed essentially of quartz, and the clean appearance suggests the winnowed and reworked aspect commonly observed in marine sandstones. In

addition, the sand grains which comprise the orthoquartzites seem to be better sorted and more rounded than those in the "dirty" sandstones of the Lee. Therefore, it is believed that the orthoquartzites may have been deposited along or near strand-lines in a seaward direction (northwest) from the swampy, coastal plain environment represented by the coal, shale, and "dirty" sandstone of the Lee.

## Source Area

A number of features of the Lee Formation indicate that the source of the sediments deposited during Lee time was probably the Blue Ridge area to the southeast. The gross aspect of the Lee thickening toward the southeast with a continental phase in that direction and a marine phase to the northwest suggests that the source area lay to the southeast. The relative abundance of pebbles implies that the source area was not too distant. The pebbles appear to be derived from vein quartz, and the only terrain with numerous quartz veins which lies near Buchanan County is the Blue Ridge.

# DEPOSITION OF THE LEE FORMATION

## General Statement

Tectonism contemporaneous with deposition is inferred from the isopach maps of the Lee Formation and its parts. In addition to the isopach map of the total Lee Formation (Plate IV), the formation was divided into two parts by using a time-marker, the top of the Pocahontas No. 3 coal, as the dividing surface, and separate isopach maps of these two portions of the Lee were prepared (Plate X, isopach map from the base of the Lee to the top of the Pocahontas No. 3 coal; and Plate XI, isopach map from the top of the Pocahontas No. 3 coal to the top of the Lee).

The area of Buchanan County just prior to Lee time has been pictured as an area with very gentle relief of probably 150 to 200 feet. A basin-like topographic depression occupied much of southeastern Buchanan County and was separated from a similar depression in northwestern Buchanan County by a low, northeast-southwest trending ridge in central Buchanan County. The ridge coincided with the present-day axis of the Grapevine Branch Anticline. The initial slope of the post-Mississippian surface may have been toward the north, but by early Lee time, the surface sloped toward the southeast.

Any hiatus between Mississippian and Pennsylvanian deposition in Buchanan County was brief as indicated by the fact that the very Early Pennsylvanian Lee Formation rests on the very Late Mississippian Bluestone Formation. It is known that the duration of

the hiatus increases toward the northwest (Weller, 1948, chart 5). The presence in the lower member of the Lee in southeastern Buchanan County of two thin beds of Bluestone-type lithology, the Alpha and Beta colored zones, which seem to thicken toward the southeast, suggests that the duration of the hiatus may decrease in that direction.

The fundamental cause of the initiation of Lee deposition is not known. However, if the duration of the hiatus between Mississippian and Pennsylvanian time does decrease toward the southeast, as suggested above, it seems likely that Mississippian and Pennsylvanian tectonism was essentially continuous. However, throughout most of Buchanan County there appears to the writer that there is little doubt but that post-Mississippian pre-Lee time was a time of emergence and erosion.

The coal beds incorporated in the Lee indicate that from time to time periods occurred during which the surface of the area remained above sea level. During these periods coal-forming vegetation grew in the near-sea level swamps which developed.

These subaerial environments were created by either a slight lowering of sea level or a slight excess in the rate of sedimentation as compared to the rate of subsidence. As the swamps were apparently repeatedly created and destroyed it seems unlikely that a process which occurred so frequently could be attributed to climate. The more plausible explanation is that from time to time sediment influx exceeded basin subsidence to produce a subaerial surface. It

is not clear as to whether subsidence slowed or ceased periodically so as to allow deposition to slightly over-fill the basin, or whether deposition simply increased enough periodically to over-fill the basin despite continued subsidence.

Lower Member

The rising metamorphic and igneous terrain of the Blue Ridge southeast of Buchanan County probably supplied the sediment deposited in Buchanan County during Lee time. Contemporaneous subsidence in the Buchanan County area prior to deposition of the Pocahontas No. 3 coal, and probably throughout lower member time, was of a two-fold nature: southeastern Buchanan County acted as a hinged block in that extreme southeastern Buchanan County subsided more than central Buchanan County. Consequently, by the end of Pocahontas No. 3 coal time a distinct slope toward the southeast of about 17 feet per mile had been developed on the pre-Lee surface of southeastern Buchanan County (see Plate X). The hinge line of the southeastern block coincided with the present-day Grapevine Branch Anticline. In contrast, northwestern Buchanan County foundered nearly vertically, and by the end of Pocahontas No. 3 coal time a southeastern slope of only 3 to 7 feet per mile had been developed on the pre-Lee surface in that area (see Plate X).

Apparently as a result of subsidence, the sea in early Lee time transgressed from northwest of the area southeastward at least as far as central Buchanan County as inferred by the distribution in the lower member of the probable marine orthoquartzite (see

Plate III). Very likely, farther southeastward marine transgression was halted by the low barrier of the central Buchanan County pre-Lee topographic ridge (see Plate IV). Throughout lower member time, the southeastern margin of the sea seems to have remained essentially in this position with the exception of relatively minor oscillations (see Plate III). As subsidence continued, more extensive marine advances toward the southeast may have been prevented by the rapid accumulation of sediment deposited under continental conditions in the differentially subsiding southeastern area.

In northwestern Buchanan County, a nearly stable, marine shelf environment is believed to have developed as a result of the slow and nearly vertical subsidence which took place in that area. It was in this environment that the winnowing and sorting processes of the sea produced the clean sands now represented by the extensive orthoquartzite.

The same environment probably concentrated the vein-quartz pebbles now represented by conglomerate and conglomeratic sandstone. It is not entirely clear, however, how the pebbles were transported across the continental deposits of southeastern Buchanan County to be deposited in a locale more distant from the source area. A likely explanation is that the pebbles were not transported continuously, but were delivered periodically (as suggested by the absence of appreciable quantities of pebbles in the continental beds) to the sea where they were subsequently sorted and distributed as blanket deposits by submarine currents. Periodic removal of the pebble material from the

source area may have resulted from accelerated uplift or accelerated erosion. Accelerated uplift of the source area may have been accompanied by accelerated subsidence in the Buchanan County area and a consequent southeastward transgression of the sea. Thus the distance across the continental deposits to the sea would have been shortened. That this may have taken place is suggested by the extension southeast of central Buchanan County of some of the orthoquartzitic conglomerate beds (see Plate III). Transport of the pebbles across the continental deposits in stream channels would have restricted widespread deposition of the pebbles until arrival at the sea. Finer fractions transported with the pebbles were probably eventually winnowed out by marine processes.

The "dirty" sandstone, siltstone, shale and coal of southeastern Buchanan County were deposited in a continental environment which apparently resulted because subsidence was more than equaled by deposition. Continued subsidence, however, generally prevented the rapidly deposited continental sediments from overwhelming the marine environment of northwestern Buchanan County. It seems probable that brief marine regressions and transgressions resulted from variations in the rate of subsidence and rate of deposition rather than changes in absolute sea level caused by the addition or removal of water because invocation of the latter process seems unnecessary in an area of rapid deposition and subsidence.

The Alpha and Beta colored zones infer the brief return at two separate times of a Bluestone environment. It is not clear,

though, whether these beds represent the northwestern feather-edge of a possible gradational contact of Mississippian and Pennsylvanian rocks to the southeast, a brief return of a Bluestone environment unrelated to Mississippian deposition, or possible reworking and redeposition of Bluestone sediments.

### Upper Member

In southeastern Buchanan County, lower member time appears to have passed imperceptably into upper member time as continental deposition continued. In northwestern Buchanan County, the change from lower member time to upper member time was marked by the overwhelming of the marine environment by continental deposition, or in effect, a major northwest regression of the sea in Lee time.

The immediate cause of the marine regression seems to have been the inauguration of differential subsidence in the northwestern area analogous to that which had been underway during lower member time in southeastern Buchanan County. The end of stable shelf conditions in northwestern Buchanan County appears to have resulted from failure of the central Buchanan County hinge line, and subsequent activation of a new hinge line to the northwest. The new hinge line probably was located along the Kentucky border, as suggested by the southeastern extent of orthoquartzite in the upper member (Plate III). Subsequently, during upper member time, Buchanan County subsidence proceeded differentially in that the southeastern portion foundered more than the northwestern area and by the close of Lee time the

Pocahontas No. 3 coal had developed a southeastward dip of about 30 feet per mile (Plate XI).

The central Buchanan County hinge-line, which had functioned during lower member time, was not active as such during upper member time, as indicated by the relatively uniform rate of northwest thinning exhibited by the interval overlying the Pocahontas No. 3 coal (Plate XI). However, local interruption in central Buchanan County of the uniform rate of thinning infers that the feature continued to exert an influence upon sedimentation during deposition of the post-Pocahontas No. 3 coal beds. Very likely, this activity was a residual hinge-line action which, although influencing sedimentation, did not profoundly affect it as during lower member time.

As a result of the subtle change in tectonic emphasis, the environment of deposition experienced a northwestward shift. Most of Buchanan County became the theater for continental deposition which during lower member time had been restricted to southeastern Buchanan County, and relatively stable marine shelf conditions during upper member time probably prevailed in Kentucky and the extreme northwestern Buchanan County area.

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# APPENDIX

## Explanation of Data

Well-cuttings descriptions. - This appendix includes the well-cuttings descriptions made by the writer, the cuttings description of the United Fuel 74-8295 Kentland Coal and Coke Company well, and the driller's logs used in the investigation. The following discussion briefly explains certain aspects of the writer's descriptions.

Introductory data given for each well include the name of the operator, name of the lease, well number, location in miles from longitude and latitude lines, ground elevation, total depth, dates drilling was commenced and completed, and casing record. Water, gas, and oil zones are given only for that portion of the well which penetrated the section pertinent to the investigation, that is, from the ground surface to the top of the Princeton Sandstone. Abbreviations used in the heading in reference to water, gas, and oil include the following:

| | |
|---|---|
| BPH . . . . . | bailers per hour |
| HFW . . . . . | hole full of water |
| MCF . . . . . | thousand cubic feet (of gas per day). |

During the drilling of a well, the driller periodically measures the depth of the hole with a steel measuring tape which is manufactured in such a manner as to allow for stretching caused by its own weight. In this way, the driller may correct for small depth errors which accumulate during the drilling operation. The depth corrections

Table 2. Tabulated Summary of Well Data

| Well | Surface Elevation | Depth of Formation Top: Lee Formation | Pocahontas No. 3 Coal | Bluestone Formation | Gray Shale Member of Bluestone Formation | Thickness of Sandstone | Thickness of Orthoquartzite | Thickness of Conglomerate and Conglomeratic Sandstone | Source of Data |
|---|---|---|---|---|---|---|---|---|---|
| United Producing 1-1454 Yukon-Poca. | 1206 | 98 | 1105 | 1334 | 1597 | 770 | 120 | 82 | Bowen |
| United Producing 2-1466 Yukon-Poca. | 1751 | 558 | 1697 | 2000 | 2205 | 845 | 192 | 0 | Bowen |
| United Producing 5-1647 Yukon-Poca. | 1826 | 669 | 1763 | 2082 | 2244 | 640 | 181 | 40 | Bowen |
| United Producing 6-1671 Yukon-Poca. | 1781 | 528 | 1624 | 1922 | 2158 | 865 | 101 | 14 | Bowen |
| United Producing 7-1672 Yukon-Poca. | 2228 | 945 | 2056 | 2375 | 2593 | 925 | 72 | 0 | Bowen |
| United Producing 8-1673 Yukon-Poca. | 1648 | 165 | 1305 | 1646 | 1785 | 760 | 45 | 0 | Bowen |
| United Producing 9-1674 Yukon-Poca. | 1473 | 347* | 1450* | 1779 | - | - | - | - | VDMR |
| United Producing 12-1812 Yukon-Poca. | 1306 | 163* | 1241* | 1527* | 1741 | - | - | - | VDMR |
| United Producing 14-1907 Yukon-Poca. | 1544 | 425* | - | 1784* | 1970 | - | - | - | VDMR |
| United Producing 15-1930 Yukon-Poca. | 1673 | 553* | 1521* | 1760* | 2011* | - | - | - | VDMR |
| United Producing 17-1952 Yukon-Poca. | 1561 | - | 1532* | 1840* | 2071* | - | - | - | VDMR |
| United Producing 2-1539 Slocum Land | 1934 | 738* | 1835* | 2126* | 2287* | - | - | - | VDMR |
| United Producing 1-1601 Matney | 1770 | 494 | 1603 | 1869 | 2085 | 905 | 495 | 43 | USGS |
| United Producing 2-1725 Matney | 1502 | 515* | 1460* | 1710* | 2027* | - | - | - | VDMR |

Note: (*) indicates driller's log data, VDMR is Virginia Division of Mineral Resources, USGS is Huddle, Jacobsen, Williamson and others (1955)

Table 2. - Continued

| Well | Surface Elevation | Depth of Formation Top: Lee Formation | Pocahontas No. 3 Coal | Bluestone Formation | Gray Shale Member of Bluestone Formation | Thickness of Sandstone | Thickness of Orthoquartzite | Thickness of Conglomerate and Conglomeratic Sandstone | Source of Data |
|---|---|---|---|---|---|---|---|---|---|
| United Producing 1-1724 McNeil | 1833 | 110* | 1330* | 1670 | 1840 | - | - | - | Bowen |
| United Producing 1-2177 Combs & Pobst | 1453 | 521* | 1525* | 1742* | 2046* | - | - | - | VDMR |
| United Producing 10-2381 Rogers | 2344 | 740* | 1870* | 2199* | - | - | - | - | VDMR |
| United Producing 11-2487 Rogers | 2003 | 516* | 1562* | 1900* | 2076* | - | - | - | VDMR |
| United Producing 4-2632 Clinchfield | 1940 | 628* | 1777 | 1986 | 2277* | 885± | 196? | 6? | Bowen |
| United Producing 1-1784 Poca. Mining | 2519 | 600* | - | 2210* | 2455* | - | - | - | VDMR |
| United Fuel 2-5810 National Shawmut | 1263 | 228 | - | 1438 | 1662 | 665 | 138 | 129 | Bowen |
| United Fuel 1-6416 National Shawmut | 1157 | 711 | 1425? | 1564 | 1772? | 793 | 545 | 114 | Bowen |
| United Fuel 8415 National Shawmut | 1354 | 888* | - | 1802 | 1975 | 705 | 307? | 203? | Bowen |
| United Fuel 74-8295 Kentland | 1242 | 780 | 1528 | 1723 | 1867 | 810 | 649 | 553 | United Fuel |
| United Fuel 1-6431 McRae | 1799 | 240* | 1408 | 1752 | 1887 | 1015 | 156 | 0 | Bowen |
| United Fuel 6705 New River-Poca. | 2894 | 800 | 2121 | 2559 | 2793 | 990 | 157 | 0 | Bowen |
| Clinchfield 102 Clinchfield | 1373 | 487 | 1445 | 1642 | 2027 | 620 | 103 | 52 | USGS |
| Clinchfield 154 Deel | 1515 | 693* | - | 1738* | 2150* | - | - | - | VDMR |
| Clinchfield 172 Big Sandy | 1554 | 998* | - | 1809* | 2150* | - | - | - | VDMR |
| Clinchfield 181 Big Sandy | 1614 | 1020* | - | 1846* | 2200* | - | - | - | VDMR |

Table 2. - Continued

| Well | Surface Elevation | Depth of Formation Top: Lee Formation | Pocahontas No. 3 Coal | Bluestone Formation | Gray Shale Member of Bluestone Formation | Thickness of Sandstone | Thickness of Orthoquartzite | Thickness of Conglomerate and Conglomeratic Sandstone | Source of Data |
|---|---|---|---|---|---|---|---|---|---|
| Clinchfield 186 Big Sandy | 1670 | 1060* | - | 1884* | 2185* | - | - | - | VDMR |
| Pipe Line 1 Buston | 1910 | 830* | 1798* | 2020* | 2290* | - | - | - | VDMR |
| Pipe Line 1 Carlson | 2123 | 808 | 1900 | 2209 | 2306 | 750 | 105 | 111 | USGS |
| Pipe Line 1-B Curtis | 1209 | 196 | 1276 | 1504 | 1700 | 550+ | 210? | 76? | Bowen |
| Pipe Line 2-A Curtis | 2010 | 1016 | 2055 | 2274 | 2457 | 760 | 311 | 99 | Bowen |
| Pipe Line 1 Fugate | 2288 | 728* | 1872* | 2217* | 2360* | - | - | - | VDMR |
| Poca. Mining Seng Camp Core Hole | 2260+ | 150 | 1544 | 1890 | - | - | - | - | Hinds (1918) |
| Cabot 1-851 National Shawmut | 1100± | 350* | - | 1410* | 1645* | - | - | - | Tucker (1936) |
| Penn-Ohio 1-272 Clinchfield | 2071 | 782 | 1785 | 1965 | 2365 | 850 | - | 0 | Martens (1943) |

are noted if available, and in some wells, if the correction is significantly large and near a stratigraphic boundary, the depth to the nearby formation top has been corrected by the writer. These corrected depths have been incorporated in the maps and are included in Table 2 (tabulated summary of well data), but the corrected depths are not used in the cuttings descriptions.

Most of the samples taken by the drillers represent intervals of five to ten feet. Where possible, the descriptions of these smaller intervals have been grouped into stratigraphic units and are presented in that fashion. Basically, the descriptions are interpretative, The approximate amount in the sample of each rock type described is indicated as follows:

and . . . . . 40 to 60 per cent

some . . . . . 20 to 40 per cent

a little . . . . . less than 20 per cent.

The term "dirty" as used by the writer in reference to sandstone generally indicates the presence of accessory minerals and/or argillaceous content.

Driller's logs. - The descriptive terminology of the driller is very general, and in this report the driller's rock descriptions have been placed in quotation marks. The following list explains most of the rock terms used by the driller:

sand . . . . . sandstone

slate . . . . . shale

| | |
|---|---|
| slate and shells . . . . | thin-bedded shale and sandstone/siltstone |
| broken sand . . . . . | sandstone with some interbedded shale |
| lime . . . . . | siltstone (in the Pennsylvanian formations and the Bluestone Formation) |
| gritty lime . . . . . | sandy siltstone |
| brown or black slate or shale . . . . . | carbonaceous shale. |
| red rock . . . . . | red shale |

## UNITED PRODUCING COMPANY

## 1-1454 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 1.79 miles east of 82° 05',
0.99 miles south of 37° 15'
Ground elevation: 1206 Total depth: 6271
Drilling commenced: June 20, 1947
Drilling completed: March 19, 1948
Water: 75, HFW; 644-526, 1105
Gas: 653, show; 748, show
Oil: None
Casing record: 13 3/8 at 44, 10 3/4 at 511, 7 at 3085
Depth corrections: None
Samples examined by David G. Bowen, 1958

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

0 - 42 "Soil and gravel"

42 - 50 "Sand"

50 - 90 "Shale"

90 - 95 Coal

### TOP LEE FORMATION 98

95 - 100 Shale, dark-gray, carbonaceous; some sandstone, white, medium-grained, subangular to subrounded, quartzose, slightly chloritic

100 - 110 Sandstone, same as above

110 - 115 Sandstone, same as above; some sandstone, same as above, but gray, dirty, carbonaceous, coal grains

115 - 120 Sandstone, same as 100-110

120 - 132 No sample

132 - 141 Sandstone, gray, medium-to fine-grained, subangular, quartzose, feldspathic, moderately micaceous, slightly chloritic, small amount of carbonaceous material

141 - 157 Sandstone, same as above, but mostly fine-grained, at 152-157 some coaly laminations

157 - 220 Shale, gray, at 190-200 slightly pyritic (at 177-183 20% of the sample is a dense, dark-reddish brown, hard rock)

220 - 226 Shale, gray, slightly pyritic; and shale, dull-red, silty

226 - 232 Siltstone, light-gray with a faint pinkish cast, siderite nodules

232 - 237 Siltstone, light-gray, laminated

237 - 249 Shale, gray, slightly silty at the bottom

249 - 256 Sandstone, light-gray to gray, fine-grained to silt, subangular, quartzose, feldspathic, slightly micaceous, small amount of carbonaceous material

256 - 268 Siltstone, gray, laminated, quartzose, feldspathic, slightly micaceous

268 - 286 Sandstone, light-gray, fine-grained to silt, subangular, quartzose, feldspathic, slightly micaceous and chloritic, at 274-286 faintly laminated

286 - 293 Siltstone, grayish-brown, quartzose, feldspathic, moderately micaceous, a little carbonaceous material

293 - 298 Sandstone, same as 268-286, but not laminated

298 - 306 Shale, gray to dark-gray, silty in part, moderately micaceous

306 - 322 Shale, dark-gray, very silty, carbonaceous

322 - 330 Shale, same as above; some shale, gray

330 - 336 No sample

336 - 402 Sandstone, light-gray, in the upper portion in part white, fine-grained, subangular, quartzose, very slightly feldspathic, chloritic, moderately micaceous, at 345-397 small amount of carbonaceous material, at 397-402 a little sandstone is brown with much argillaceous material

402 - 410 Shale, gray, silty; and coal

410 - 415 Shale, gray, in part silty, micaceous

415 - 420 Siltstone, light-gray to gray, quartzose, argillaceous, micaceous

420 - 479 Sandstone, white, medium- to fine-grained, subangular, quartzose, micaceous, slightly chloritic, at 455-457 a little coal, at 468-479 moderate amount of carbonaceous material

479 - 493 Sandstone, same as above, but mostly fine-grained, no carbonaceous material; at 485-490 a little coal

493 - 544 Sandstone, same as above, but medium- to fine-grained

544 - 546 Shale, dark-gray, slightly silty, slightly micaceous

546 - 548 No sample

548 - 551 Shale, same as 544-546 above; and sandstone, same as 493-544 above, but mostly medium-grained

551 - 566 Sandstone, same as above

566 - 572 Sandstone, same as above; and shale, gray, micaceous; a little chert, cream

572 - 577 No sample

577 - 579 Sandstone, same as 566-572 above

579 - 585 Siltstone, light-gray to light-tan, quartzose, moderately micaceous

585 - 589 No sample

589 - 595 Siltstone, same as 579-585 above

595 - 606 Siltstone, same as above; and shale, gray; some unidentified rock, reddish-brown, dense, amorphous, hard

606 - 616 Shale, light-gray, siderite nodules

616 - 625 Siltstone, light-gray to gray, quartzose; some shale, gray to light-gray

625 - 640 Sandstone, white, fine-grained with some medium grains, subangular, quartzose, very slightly feldspathic, micaceous, slightly chloritic; at 630-635 a little coal and a little underclay, dark-gray

640 - 648 Shale, gray to dark-gray and carbonaceous

648 - 653 Sandstone, light-tan, fine-grained, subangular, quartzose, feldspathic; some coal and shale, probably at the top

653 - 665 Shale, dark-gray, at the top silty, at the bottom carbonaceous

665 - 670 Sandstone, gray, fine-grained to silt, subangular, quartzose, slightly feldspathic, very micaceous, considerable carbonaceous material

670 - 700 Sandstone, white, medium-to fine-grained, subangular, quartzose, very slightly feldspathic, moderately micaceous and chloritic, at 690-700 slightly pyritic

700 - 715 Sandstone, same as above, but light-tan to brown with carbonaceous material, no pyrite

715 - 723 Sandstone, same as 670-700 above, no pyrite

723 - 744 Sandstone, same as above, but light-tan, small amount of carbonaceous material, at 730-744 mostly fine-grained

744 - 762 Sandstone, same as above, but light-gray, mostly fine-grained, no carbonaceous material, at 752-758 in part banded

762 - 768 Sandstone, same as above, but light-gray to brown with much carbonaceous material

768 - 814 Shale, gray, at 768-778 silty, at the top and bottom in part dark-gray, at the bottom in part carbonaceous

814 - 824 Shale, gray, in part silty; a little siltstone, gray, quartzose

824 - 834 Shale, light-gray, silty; some siltstone, light-gray, quartzose

834 - 844 Siltstone, gray to light-gray, quartzose, slightly feldspathic

844 - 848 Shale, gray, in part silty; a little siltstone, same as above; a little sandstone, white, fine-grained, quartzose

848 - 855 Shale, gray, silty

855 - 864 Shale, gray to light-gray; and sandstone, white, medium-to fine-grained, subangular, quartzose, in part very slightly feldspathic

864 - 880 Sandstone, same as above, but clean and not feldspathic

880 - 900 Sandstone, same as above, but mostly medium-grained, some pebble fragments of milky-white quartz

900 - 911 Sandstone, same as 864-880 above

911 - 925 Sandstone, same as 880-900 above

925 - 934 Sandstone, same as above, but almost entirely pebble fragments

934 - 939 Sandstone, same as 911-925 above

939 - 958 Sandstone, same as 925-934 above

958 - 962 Sandstone, same as 934-939 above

962 - 973 Sandstone, white, medium-to coarse-grained, subangular to subrounded, quartzose, a very small amount of pebble fragments

973 - 983 Sandstone, white, medium-to fine-grained, a few coarse grains, subangular to subrounded, quartzose

983 - 985 Shale, dark-gray, carbonaceous, moderately pyritic; and coal

985 - 994 Siltstone, gray, quartzose, in part argillaceous; some shale, gray to light-gray

994 -1012 Sandstone, light-gray, medium-to fine-grained, subangular, quartzose, very slightly feldspathic, moderately micaceous and chloritic

1012-1035 Sandstone, same as above, but mostly medium-grained, some fine grains, a few coarse grains

1035-1041 Sandstone, same as above, but medium-to fine-grained, no coarse grains

1041-1050 Siltstone, gray, quartzose; a little coal

1050-1070 Sandstone, same as 1035-1041 above, but only very slightly micaceous and chloritic

1070-1075 Sandstone, same as above, but mostly medium-grained, moderately micaceous and chloritic

1075-1099 Sandstone, same as above, but fine-grained, at 1085-1094 white

1099-1105 Sandstone, same as lower portion above; some shale, gray

1105-1115 Coal; and shale, gray, carbonaceous, greasy

1115-1124 Shale, same as above; and siltstone, gray, quartzose, micaceous

1124-1144 Shale, gray, at 1124-1134 micaceous

1144-1151 Shale, gray; and siltstone, gray, quartzose, slightly micaceous

1151-1185 Sandstone, light-gray, fine-grained, some medium grains, subangular, quartzose, moderately feldspathic and micaceous, slightly chloritic

1185-1252 Sandstone, white, fine-grained, subangular, quartzose, nearly clean, at 1227-1236 some interlaminated carbonaceous to argillaceous material

1252-1255 Sandstone, same as above, but with a few coarse grains; and siltstone, light-greenish gray, quartzose, very micaceous

1255-1267 Siltstone, gray to light-gray, quartzose, slightly micaceous

1267-1290 Shale, light-tannish gray to gray, in part with black nodules, at 1282-1290 becoming in part dark-gray and carbonaceous

1290-1320 Sandstone, white, mostly fine-grained, a few medium grains, subangular, quartzose, slightly micaceous and chloritic

1320-1334 Sandstone, same as above, but medium-to fine-grained

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1334

1334-1359 Siltstone, light-green, quartzose; interbedded with shale, light-green, at the top in part containing orange siderite nodules

1359-1372 Sandstone, white with a faint green cast, fine-grained, subangular, quartzose, slightly micaceous, moderately chloritic, slightly calcareous, at 1366-1372 feldspathic

1372-1384 Shale, rusty-red and greenish-gray, soft, calcareous

1384-1397 Siltstone, green to light-gray with a small amount rusty-red, quartzose, finely micaceous, calcareous

1397-1408 Sandstone, greenish-gray, very fine grained to silt, subangular, quartzose, slightly feldspathic and micaceous, slightly calcareous

1408-1414 Siltstone, gray, quartzose, moderately micaceous, slightly calcareous; some shale, gray, slightly calcareous

1414-1420 Limestone, yellowish-tan to light-gray, fine-crystalline

1420-1434 Shale, pale-red with a little pale-green, very slightly calcareous

1434-1444 Siltstone and very fine grained sandstone, very light green to green, slightly micaceous, chloritic, very slightly calcareous; some shale, same as above; a little limestone, light-gray, fine-crystalline

1444-1462 Shale, dark-grayish green to gray, in part micaceous, in part with coaly specks, hard

1462-1470 Shale, gray with a little maroon, contains fine subrounded floating quartz grains, slightly pyritic, soft

1470-1488 Shale, gray to pale-green and maroon, soft, slightly calcareous; and interbedded limestone, gray to dark-gray, argillaceous, fossiliferous, silty, rare floating medium to coarse grains of quartz

1488-1497 Shale, brick-red with a little gray and pale-green, in part slightly calcareous, floating very fine quartz grains; a little sandstone, light-green, very fine grained, quartzose

1497-1503 Sandstone, cream to greenish-gray, very fine grained, quartzose, argillaceous, siderite nodules

1503-1506 Sandstone, green, fine-grained, subangular, quartzose, some is white and cemented with calcite

1506-1522 Sandstone, pale-green, fine-to very fine grained, subangular, quartzose, slightly micaceous, at 1517-1522 coaly laminations, slightly feldspathic, and very slightly calcareous

1522-1567 Sandstone, white to light-gray, fine-to very fine grained, subangular, quartzose, slightly feldspathic, slightly micaceous, very slightly calcareous

1567-1572 Sandstone, same as above, but light-gray to gray, calcareous; some shale, gray, unctuous

1572-1575 Sandstone, same as above, but dirty with coal and mica, not calcareous

1575-1582 Sandstone, white, fine-grained, subangular to subrounded, quartzose, clean, at 1580-1582 in part light-gray with a few coaly laminations

1582-1586 No sample

1586-1597 Sandstone, white to light-gray, fine-grained, subangular to subrounded, quartzose, slightly calcareous, at 1588-1597 feldspathic and slightly micaceous

1597-1695 Shale, dark-gray, moderately soft, at 1597-1664 micaceous, at 1620-1631 and 1685-1695 slightly silty

1695-1705 Siltstone, pale-green to white, quartzose, slightly feldspathic, finely micaceous, very slightly calcareous, at 1700-1705 in part sandstone, very fine grained

1705-1712 Siltstone, light-green, quartzose, siderite nodules

1712-1719 Sandstone, light-green, very fine grained to silt, quartzose

1719-1729 Shale, dark-gray, silty, hard; a little limestone, gray

1729-1750 Shale, same as above, but gray

1750-1758 Siltstone, light-gray, quartzose, very argillaceous, small amount of coaly material

1758-1765 Shale, light-gray, very silty, micaceous

1765-1774 Siltstone, light-gray, quartzose

1774-1783 Siltstone, same as above, but slightly darker, very micaceous, slightly calcareous

1783-1794 Siltstone, light-gray, quartzose, slightly calcareous; and shale, gray

1794-1800 Siltstone, same as above, but pyritic; and shale, same as above; some sandstone, white to light-gray, fine-to very fine grained, subangular, quartzose, slightly feldspathic and micaceous, slightly calcareous

1800-1810 Shale, gray, soft, small amount of coaly material; some sandstone, same as above, but with a faint greenish cast

TOP PRINCETON SANDSTONE 1810

## UNITED PRODUCING COMPANY

## 2-1466 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 1.94 miles west of 82° 00',
0.33 miles south of 37° 10'
Ground elevation: 1751 Total depth: 5100
Drilling commenced: November 13, 1947
Drilling completed: July 4, 1948
Water: 20, small show; 55, HFW; 484, 3 BPD; 1310, salt, 2 BPD
Gas: 1585, show
Oil: 1086, small show
Casing record: 16 at 14, 13 3/8 at 150, 10 3/4 at 867, 8 5/8 at 2456
Depth corrections: None
Samples examined by David G. Bowen, 1958

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 79 | No sample |
| 79 - 83 | Sandstone, white, medium-grained, subangular, quartzose, slightly glauconitic and chloritic, moderate amount of carbonaceous material |
| 83 - 89 | Shale, dark-gray, silty; some sandstone, same as above |
| 89 - 94 | Sandstone, white to yellow, medium-to fine-grained, subrounded to subangular, quartzose, moderately micaceous; some shale, same as above |
| 94 - 100 | Sandstone, same as above, but all white and fine-grained |
| 100 - 105 | Shale, gray, silty |
| 105 - 110 | Sandstone, gray, very fine grained, subangular, quartzose, many accessory minerals |
| 110 - 138 | Sandstone, white, medium-to fine-grained, subangular, quartzose, moderately micaceous, moderately glauconitic and chloritic |
| 138 - 145 | Shale, gray to brown |
| 145 - 150 | Sandstone, white, fine-grained, subangular, quartzose, moderately micaceous |

150 - 155 Shale, gray; some sandstone, white, medium-to fine-grained, subangular, quartzose, moderately micaceous, moderately chloritic and glauconitic, moderate amount of siderite (?) nodules

155 - 174 Sandstone, same as above

174 - 179 Sandstone, white, medium-grained, subangular, quartzose, moderately chloritic and glauconitic, slightly micaceous, moderate amount of carbonaceous material

179 - 200 No sample

200 - 283 Sandstone, white, medium-to fine-grained, subangular, quartzose, moderately chloritic and glauconitic, slightly micaceous

283 - 292 Sandstone, same as above; and sandstone, dark-gray, fine-grained, quartzose, much dark mineral, carbonaceous material on bedding surfaces

292 - 300 Shale, dark-gray, carbonaceous

300 - 309 Sandstone, same as dark-gray type at 283-292 above

309 - 332 Shale, dark-gray, at 309-318 silty

332 - 340 Sandstone, white, medium-to fine-grained, subangular, quartzose, moderately glauconitic and micaceous

340 - 346 Shale, dark-gray

346 - 424 Sandstone, white, medium-to fine-grained, subangular, quartzose, slightly glauconitic and micaceous, at 374-380 some interstitial carbonaceous material, at 380-390 some shale, dark-gray to gray, siderite nodules

424 - 435 Shale, dark-gray; some sandstone, white, medium-to coarse-grained, subangular, quartzose

435 - 445 Shale, dark-gray, slightly pyritic

445 - 455 Shale, dark-gray to gray to brown, in part silty

455 - 467 Shale, gray; and sandstone, gray, fine-grained, subangular, quartzose, slightly micaceous

467 - 506 Sandstone, white, fine-to medium-grained, subangular,

quartzose, slightly chloritic and glauconitic, slightly micaceous, at 484-492 very micaceous

506 - 525 Shale, dark-gray, a little brown, in part silty

525 - 533 Shale, same as above, but no brown; and sandstone, gray to dark-gray, fine-grained, quartzose, dirty

533 - 558 Shale, dark-gray, a little brown, very silty

TOP LEE FORMATION 558

558 - 574 Sandstone, gray, very fine grained, quartzose, dirty; probably interbedded with shale, dark-gray, silty

574 - 581 Shale, dark-gray to brown

581 - 620 Sandstone, white, medium-to fine-grained, subangular, quartzose, slightly micaceous, slightly chloritic and glauconitic

620 - 632 Shale, dark-gray to gray to light-brown, rather carbonaceous, pyritic

632 - 650 Sandstone, white to dark-gray, medium-to fine-grained, subangular, quartzose, moderately micaceous, moderately chloritic and glauconitic, carbonaceous material on bedding surfaces

650 - 670 Sandstone, gray, fine-grained, subangular, quartzose, carbonaceous material on bedding surfaces; interbedded with some shale, dark-gray

670 - 709 Shale, dark-gray

709 - 726 Sandstone, gray, fine-grained, subangular, quartzose, moderately micaceous, dirty

726 - 750 Sandstone, gray, medium-to fine-grained, subangular, quartzose, slightly micaceous and chloritic, carbonaceous material

750 - 756 Sandstone, same as above; some shale, dark-gray, plant fossils, coaly

756 - 775 Sandstone, same as above, but no mica or chlorite

775 - 783 Sandstone, same as above; and shale, dark-gray

783 - 796 Shale, dark-gray

796 - 806 Shale, dark-gray to light-gray and tan to brown, silty in part

806 - 827 Sandstone, dark-gray to gray, fine-grained, subangular, quartzose, much carbonaceous material

827 - 852 Sandstone, same as above, but all dark-gray

852 - 863 Sandstone, same as above, 75%; coal, 15%; shale, dark-gray, 10%

863 - 866 No sample

866 - 874 Sandstone, same as 852-863 above; some shale, dark-gray, silty

874 - 890 Sandstone, same as above

890 - 914 Sandstone, white, medium-to fine-grained, subangular, quartzose, moderately micaceous and chloritic, moderate amount of dark mineral, at 904-914 some carbonaceous material

914 - 924 Sandstone, same as above; some shale, dark-gray, silty, micaceous, carbonaceous

924 - 933 Sandstone, gray to dark-gray, fine-grained, subangular, quartzose, carbonaceous laminations

933 - 942 Sandstone, same as above; and shale, dark-gray, silty, micaceous

942 - 948 Shale, same as above

948 - 957 Shale, dark-gray

957 - 963 Coal, 80%; shale, gray, plant fossils, 20%

963 - 971 Shale, gray, 60%; coal, 40%

971 - 979 Coal, 100%

979 - 985 Shale, gray to brown, carbonaceous laminations

985 -1014 Sandstone, gray, medium-to fine-grained, subangular, quartzose, rather dirty, much carbonaceous material; interbedded in lower two-thirds with some shale, dark-gray

1014-1027 Sandstone, gray, fine-grained, subangular, quartzose, rather dirty, some coal (?) grains, at 1022-1027 moderately micaceous and glauconitic

1027-1036 Sandstone, white, medium-grained, subangular to subrounded, quartzose, slightly chloritic and glauconitic

1036-1045 Sandstone, same as above; and shale, gray, very silty

1045-1048 Sandstone, same as above

1048-1054 Sandstone, white and gray, fine-grained, subangular, quartzose, slightly micaceous

1054-1119 Sandstone, white, medium-to fine-grained, subangular to subrounded, quartzose, at 1054-1065 slightly micaceous and glauconitic, at 1082-1119 micaceous and chloritic, at 1102-1119 glauconitic

1119-1125 Shale, dark-gray; a little coal, pyritic

1125-1147 Shale, gray to brown, silty, micaceous

1147-1155 Shale, dark-gray to gray, in part micaceous and extremely silty; a little coal

1155-1162 Shale, gray, very silty, micaceous; and sandstone, white, medium-to fine-grained, subangular, quartzose, slightly micaceous and chloritic

1162-1175 Sandstone, same as above, but at 1171-1175 slightly glauconitic

1175-1183 Sandstone, same as 1171-1175 above; and sandstone, brown, medium-to fine-grained, subangular to subrounded, quartzose, carbonaceous material on bedding surfaces

1183-1190 Sandstone, same as 1171-1175 above

1190-1214 Shale, gray, at 1207-1214 in part silty

1214-1220 Coal, 40%; sandstone, white, medium-grained, subangular, quartzose, and sandstone, brown, fine-grained, subangular, quartzose, carbonaceous, 30%; shale, gray to dark-gray, 30%

1220-1234 Shale, gray, silty; apparently interbedded with sandstone, brown to gray, fine-grained, subangular, quartzose, carbonaceous

1234-1241 Sandstone, light-tan to gray, fine-grained, subrounded, quartzose, carbonaceous laminations

1241-1252 Sandstone, same as above; and interbedded shale, gray, silty

1252-1269 Shale, dark-gray, small amount is brown; at 1258-1263 a little coal

1269-1280 Shale, light-gray, silty, micaceous; some sandstone, light-gray, fine-grained, subangular, quartzose, few coal grains

1280-1287 Sandstone, white, fine-grained, subangular, quartzose, slightly micaceous and chloritic, slightly glauconitic, 70%; coal, 30%

1287-1353 Sandstone, light-gray, medium- to fine-grained, subangular, quartzose, moderately micaceous, slightly chloritic, at 1298-1325 and 1339-1353 a few coal (?) grains, at 1325-1339 carbonaceous, at 1349-1353 mostly fine-grained

1353-1363 Sandstone, same as 1349-1353 above; some shale, light-tan

1363-1373 Shale, gray with a little brown, extremely silty

1373-1383 Shale, gray to dark-gray, in part very silty; a little coal

1383-1402 Sandstone, light-tan, very fine grained, subangular, quartzose; some interbedded shale, dark-gray to gray, pyritic

1402-1450 Sandstone, white, medium- to fine-grained, probably subangular, quartzose

1450-1463 Sandstone, white, fine-grained, subangular to subrounded, quartzose, few dark grains

1463-1475 Shale, gray to dark-gray, siderite nodules

1475-1484 Shale, dark-gray

1484-1492 Shale, dark-gray to gray, in part silty, in part micaceous

1492-1501 Shale, gray, extremely silty

1501-1517 Sandstone, white, fine-grained, subangular, quartzose; possibly some interbedded shale, gray, silty, micaceous

1517-1534 Sandstone, white, medium- to fine-grained, subangular, quartzose

1534-1543 Shale, light-tan to gray, extremely silty; a little coal

1543-1553 Shale, same as above, but with siderite nodules; a little sandstone, gray, very fine grained, subangular, quartzose

1553-1563 Shale, gray; and sandstone, same as above

1563-1572 Shale, gray to dark-gray; a little coal

1572-1627 Sandstone, white to gray, medium-to fine-grained, subangular, quartzose, slightly micaceous, moderately chloritic, a few coal (?) grains, at 1581-1627 slightly glauconitic, at 1594-1627 in part subrounded, at 1609-1627 carbonaceous

1627-1637 Sandstone, gray, medium-grained, subrounded to rounded, quartzose, moderately micaceous and glauconitic, carbonaceous

1637-1647 Shale, gray, in part silty, slightly micaceous; a little coal

1647-1658 Shale, gray, in part extremely silty; some interbedded coal

1658-1680 Siltstone, gray, quartzose, slightly micaceous, at 1668-1680 poorly developed siderite nodules

1680-1692 Shale, gray; some siltstone, gray, quartzose

1692-1700 Shale, gray to dark-gray, 60%; coal, 40%

1700-1706 Coal, 80%; siltstone, gray, 20%

1706-1734 Siltstone, gray, quartzose; some interbedded shale, gray

1734-1750 Shale, gray with a little brown, moderate amount of coaly material; interbedded with a little siltstone, gray

1750-1760 Siltstone, gray; some shale, gray to dark-gray; trace of shale, dark-maroon, silty

1760-1819 Sandstone, dark-gray to gray, medium-to fine-grained, subangular, quartzose, much carbonaceous material; interbedded with a little siltstone, dark-gray, quartzose

1819-1830 Sandstone, white, medium-to fine-grained, subangular, quartzose; a little interbedded shale, dark-gray

1830-1842 Sandstone, light-gray, medium-to fine-grained, subangular, quartzose, carbonaceous material on bedding surfaces, at 1835-1842 slightly micaceous; a little interbedded shale, dark-gray

1842-1883 Sandstone, white, medium-to fine-grained, subangular, quartzose, carbonaceous material on bedding surfaces

1883-1887 Sandstone, same as above, 70%; coal, 30%

1887-1893 Sandstone, same as above, 50%; coal, 50%

1893-1937 Sandstone, light-gray, medium-to fine-grained, subangular, quartzose, at 1927-1937 coal (?) grains

1937-1967 Siltstone, light-gray to white, quartzose, at 1958-1967 trace of shale, light-greenish gray and orange-red

1967-1975 Siltstone, light-greenish gray to white, quartzose, micaceous, 70%; shale, light-gray, 20%; sandstone, white, medium-to fine-grained, subangular, quartzose, coal grains, 10%

1975-1985 Same as above

1985-1995 Siltstone, light-greenish gray to gray to white, quartzose, in part with siderite nodules

1995-2000 Siltstone, light-greenish gray, a little white, quartzose, 75%; shale, light-greenish gray to light-gray, 25%

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 2000

2000-2017 Shale, mostly maroon, some light-green, a little light-gray, slightly micaceous

2017-2026 Shale, maroon and green, slightly micaceous; some siltstone, light-green, quartzose

2026-2031 Shale, light-green to maroon to gray; a little siltstone, same as above

2031-2041 Shale, bright-red

2041-2050 Shale, same as above; a little sandstone, green, fine-grained, subangular, quartzose

2050-2055 Shale, red to maroon, a little gray; a little sandstone, same as above

2055-2060 Shale, red, light-gray, light-green, in part with floating fine quartz grains; and sandstone, light-green with dark specks, fine-grained to silt, subangular, quartzose, very slightly feldspathic

2060-2074 Sandstone, light-green to white, fine-grained to silt, subangular, quartzose, very slightly feldspathic

2074-2083 Siltstone, light-green to light-gray, quartzose, very slightly feldspathic

2083-2097 Siltstone, same as above; some interbedded shale, olive-green to gray to light-gray

2097-2104 Sandstone, light-gray to light-greenish gray, fine-grained, to silt, subangular, quartzose

2104-2110 Sandstone, same as above, but a little white; some shale, gray to light-gray, somewhat silty and micaceous

2110-2205 Sandstone, white, fine-grained, subangular, quartzose, essentially clean, at 2185-2192 slightly micaceous, at 2128-2139 and 2154-2169 laminations of coaly material

2205-2212 Shale, dark-gray, slightly silty and micaceous

2212-2250 Shale, same as above; and interbedded sandstone, gray to light-gray, fine-grained, subangular, quartzose, moderately feldspathic, moderately pyritic, some carbonaceous material

2250-2275 Sandstone, same as above, but gray; interbedded with a little shale, same as above

2275-2300 Shale, dark-gray to some chocolate-brown, carbonaceous, slightly pyritic

2300-2320 Siltstone, gray, quartzose, in the lower part argillaceous

2320-2336 Shale, dark-gray to gray, in part carbonaceous and pyritic, in part silty and micaceous

2336-2345 Shale, dark-brownish gray, carbonaceous

2345-2362 Shale, dark-gray, in part pyritic

2362-2371 Shale, gray

2371-2387 Sandstone, light-gray, in the lower part with a faint greenish cast, fine-grained, subangular, quartzose, in the upper part much argillaceous cement; and interbedded shale, gray to light-gray, floating quartz grains, in the upper part pyritic

2387-2414 Shale, light-gray, in part silty; some interbedded sandstone, same as lower portion above

2414-2425 Sandstone, same as above, but light-greenish gray, very slightly feldspathic; some shale, light-greenish gray to light-gray

2425-2432 Limestone, cream to yellowish-brown, sandy; and sandstone, yellowish-brown, fine-grained, subrounded, quartzose, calcareous, 70%; sandstone and shale, same as above, but both light-green, 30%

TOP PRINCETON SANDSTONE 2432

## UNITED PRODUCING COMPANY

## 5-1647 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 1.65 miles east of 82° 00',
2.06 miles south of 37° 15'
Ground elevation: 1826.4 Total depth: 4358
Drilling commenced: September 1, 1949
Drilling completed: January 11, 1950
Water: 94, 1 BPH; 173, 2 BPH; 250, HFW; 1260, 1/6 BPH
Gas: 1767, show
Oil: None
Casing record: 13 3/8 at 23, 10 3/4 at 436, 8 5/8 at 2231, 7 at 3824
Depth corrections: None
Samples examined by David G. Bowen, 1958

### POST-LEE FORMATION BEDS UNDIVIDED (PENNSYLVANIAN)

| | | |
|---|---|---|
| 0 - | 10 | Siltstone, gray, quartzose; some sandstone, gray, medium- to fine-grained, subangular, quartzose, micaceous |
| 10 - | 20 | Sandstone, same as above; some siltstone, dark-gray, quartzose |
| 20 - | 26 | Sandstone, yellowish, coarse-to medium-to fine-grained, angular to subangular, quartzose, micaceous, chloritic; and siltstone, dark-gray, quartzose, argillaceous |
| 26 - | 40 | Shale, gray, slightly silty, micaceous |
| 40 - | 48 | Siltstone, dark-gray, quartzose; some interbedded shale, same as above, but dark-gray and silty |
| 48 - | 56 | Shale, same as above; a little siltstone, white, quartzose |
| 56 - | 61 | Siltstone, dark-gray, quartzose |
| 61 - | 68 | Siltstone, same as above; and interbedded shale, same as above |
| 68 - | 77 | Siltstone, dark-gray, quartzose, moderately micaceous, much carbonaceous and coaly material |
| 77 - | 82 | Siltstone, same as above; and shale, dark-gray, plant fossils |
| 82 - | 99 | Siltstone, grayish-brown, quartzose, moderately micaceous and chloritic; and interbedded shale, gray |

99 - 108 Sandstone, white, medium-to fine-grained, subangular, quartzose, moderately chloritic and micaceous, moderately glauconitic; a little coal; a little shale, gray to dark-gray

108 - 172 Sandstone, same as above, but at 151-156 some grains are rounded, at 116-122 and 138-172 carbonaceous material on some bedding surfaces, at 116-128 some included coal grains

172 - 178 Shale, dark-gray

178 - 190 Siltstone, gray, quartzose, micaceous; and interbedded shale, gray to dark-gray; at 184-190 a little coal

190 - 200 Sandstone, gray, fine-grained, subangular, quartzose, moderately micaceous and chloritic, moderately glauconitic

200 - 210 Sandstone, same as above, but fine-grained to silt

210 - 289 Sandstone, white, medium-to fine-grained, subangular, quartzose, moderately chloritic and micaceous, moderately glauconitic, at 243-248 moderate amount of interstitial carbonaceous material

289 - 295 Sandstone, same as above, but moderate amount of interstitial carbonaceous material; some shale, dark-gray to gray, moderately micaceous; a little coal

295 - 311 Sandstone, grayish-white, medium-to fine-grained, angular to subangular, quartzose, moderately micaceous and glauconitic, at 307-311 moderate amount of carbonaceous material and a moderate amount of milky-white pebble fragments of vein quartz

311 - 319 Sandstone, white, fine-grained, subangular, quartzose, moderately micaceous and chloritic

319 - 327 Siltstone, gray, quartzose, micaceous, carbonaceous laminations

327 - 342 Shale, dark-gray

342 - 353 Siltstone, light-gray, quartzose, micaceous; a little interbedded shale, dark-gray to gray, moderately micaceous

353 - 359 Siltstone, same as above, but in part grading to sandstone, very fine grained, few included coal grains

359 - 361 Siltstone, gray, quartzose, micaceous

361 - 381 Shale, dark-gray to gray; interbedded with a little siltstone, same as above

381 - 405 Shale, gray, at 400-405 moderately micaceous

405 - 415 Shale, same as lower part above; some interbedded siltstone, gray, quartzose

415 - 433 Siltstone, gray to dark-gray, quartzose; some interbedded shale, gray to dark-gray

433 - 458 Sandstone, white, medium-to fine-grained, subangular, quartzose, micaceous, chloritic, glauconitic, few coal grains

458 - 463 Shale, gray, a few chips are dark-gray and contain angular medium grains of quartz; some siltstone, gray, quartzose, micaceous

463 - 471 Shale, same as above

471 - 478 Sandstone, light-tan, medium-to fine-grained, subangular, quartzose, moderately micaceous

478 - 500 Sandstone, same as above, but white, at 495-500 slightly glauconitic; at 488-500 some apparently interbedded shale, dark-gray, slightly micaceous

500 - 507 No sample

507 - 510 Coal

510 - 521 Siltstone, gray, quartzose, micaceous, moderate amount of carbonaceous material

521 - 562 Siltstone, gray to dark-gray, quartzose, micaceous, chloritic; at 547-562 some interbedded shale, gray to dark-gray

562 - 595 Sandstone, white, medium-to fine-grained, subangular, quartzose, moderately micaceous and glauconitic, slightly chloritic, few coal grains, small amount of carbonaceous material

595 - 650 Siltstone, gray to dark-gray, quartzose, moderately micaceous

and chloritic, moderate amount of carbonaceous material; at 605-623 interbedded with a little shale, gray, micaceous

650 - 669 Shale, dark-gray

TOP LEE FORMATION 669

669 - 722 Sandstone, white, medium-to fine-grained, subangular, quartzose, micaceous, chloritic, glauconitic, coal grains, at 688-722 considerable carbonaceous material

722 - 738 Sandstone, gray, fine-grained, subangular, quartzose, moderately micaceous, carbonaceous material on bedding surfaces

738 - 830 Shale, dark-gray

830 - 847 Siltstone, light-gray to brown, quartzose, moderately micaceous, slightly chloritic, small amount of carbonaceous material

847 - 859 No sample

859 - 865 Sandstone, light-gray, fine-grained, subangular, quartzose, moderately micaceous, slightly chloritic and glauconitic, moderate amount of carbonaceous material

865 - 883 Sandstone, same as above, but no carbonaceous material; interbedded apparently with shale, dark-gray

883 - 900 Sandstone, same as above, but dirtier; and shale, same as above, but in part brown

900 - 912 Sandstone, same as above, but with a moderate amount of carbonaceous material, siderite nodules

912 - 932 Sandstone, same as above, but no siderite; a little interbedded shale, gray to dark-gray

932 - 937 Sandstone, same as above, but with coal grains

937 - 993 Siltstone, dark-gray, quartzose, at 960-980 suggestion of siderite nodules

993 -1001 Shale, dark-gray to reddish-brown, slightly silty

1001-1011 Siltstone, gray, quartzose, micaceous; a little shale, gray

1011-1019 Sandstone, white to light-tan, medium-to fine-grained, subangular, quartzose, slightly micaceous and chloritic; a little shale, gray, micaceous

1019-1033 Shale, gray, 40%; coal, 40%, sandstone, same as above, and siltstone, gray, quartzose, 20%

1033-1054 Shale, dark-gray to gray, silty, micaceous; and interbedded siltstone, gray to dark-gray, quartzose, micaceous

1054-1071 Sandstone, white to light-tan, medium-to fine-grained, subangular, quartzose, moderately micaceous and chloritic, slightly glauconitic, becomes rather dirty toward the base

1071-1109 Siltstone, white to light-gray, quartzose, moderately micaceous, very chloritic, at 1071-1082 in part with a faint greenish cast

1109-1119 Shale, dark-gray

1119-1134 Shale, dark-gray, silty; some interbedded siltstone, gray, quartzose, moderately chloritic

1134-1187 Shale, dark-gray, silty; at 1145-1176 interbedded with a little siltstone, light-gray, quartzose

1187-1197 Shale, dark-gray to brown, slightly pyritic, in part with floating mica flakes and floating clear to milky, fine to coarse, angular to subrounded, quartz grains, 70%; sandstone, gray to dark-gray, medium-to fine-grained, subangular, quartzose, slightly micaceous and chloritic, in part cemented with dark argillaceous material, 30%

1197-1203 Sandstone, same as above, but in part grading to siltstone

1203-1219 Coal, 80%; sandstone, white, medium-to fine-grained, subangular, quartzose, 20%

1219-1229 No sample

1229-1231 Siltstone, light-tan to gray, quartzose, micaceous; and shale, gray, micaceous

1231-1245 Sandstone, white, fine-grained, quartzose, micaceous, chloritic; and interbedded siltstone, gray, quartzose, micaceous, chloritic

1245-1252 Sandstone, white, fine-grained, subangular, quartzose, moderately micaceous and chloritic, moderately glauconitic, small amount of carbonaceous material

1252-1272 Sandstone, same as above, but medium-to fine-grained, moderate amount of coaly material; at 1257-1272 some interbedded shale, light-gray to dark-gray, in part silty, in part very micaceous

1272-1281 Shale, gray, silty, micaceous; some siltstone, gray to light-gray, quartzose, micaceous

1281-1291 Siltstone, same as above; and shale, dark-gray to gray

1291-1299 Sandstone, white with a little gray, fine-grained to silt, subangular, quartzose, moderately micaceous and chloritic, moderately glauconitic, moderate amount of carbonaceous material

1299-1340 Sandstone, white, fine-grained, subangular, quartzose, moderately micaceous, moderate amount of carbonaceous material, at 1324-1330 a few chips are dark-brown

1340-1350 Shale, gray

1350-1360 Shale, gray, slightly silty, moderately micaceous

1360-1383 Shale, same as above; and interbedded shale, dark-gray, carbonaceous

1383-1391 No sample

1391-1405 Sandstone, white, medium-to fine-grained, subangular, quartzose, micaceous, chloritic; some interbedded shale, gray, locally with a carbonaceous film

1405-1417 Siltstone, light-gray to gray, quartzose, feldspathic, interstitial carbonaceous material; and interbedded shale, same as above

1417-1430 Siltstone, same as above, but at 1425-1430 moderately micaceous

1430-1440 No sample

1440-1454 Shale, gray, silty, micaceous; interbedded in the top half with some siltstone, same as lower part of 1417-1430

1454-1485 Shale, gray to grayish-tan, slightly silty, at 1475-1485 plant fossils

1485-1492 Shale, gray to dark-gray, in part micaceous, in part carbonaceous; some siltstone, gray, quartzose

1492-1513 Sandstone, white, fine-grained, subangular, quartzose, slightly feldspathic, slightly chloritic; locally grading to siltstone, same as above; and interbedded with shale, gray, silty, micaceous

1513-1539 Sandstone, white, medium-to fine-grained, subangular, quartzose, at 1527-1533 one coaly plant fossil

1539-1551 Sandstone, white, coarse-to fine-grained, subangular to rounded, moderate amount of pebble fragments of white quartz

1551-1555 Siltstone, white, quartzose

1555-1565 Sandstone, white, coarse-to fine-grained, subangular, quartzose

1565-1570 Sandstone, same as above, but medium-to fine-grained

1570-1581 Sandstone, same as above, but fine-grained

1581-1584 No sample

1584-1591 Sandstone, same as 1570-1581, but medium-to fine-grained

1591-1594 Sandstone, same as above, but coarse-to fine-grained

1594-1597 Sandstone, same as above, but medium-to fine-grained

1597-1608 Sandstone, same as above, but coarse-to fine-grained

1608-1616 Conglomerate, milky-white, pebble fragments of vein quartz

1616-1621 Conglomerate, same as above, matrix of clear, medium to fine, angular, quartz grains, considerable interstitial carbonaceous material

1621-1636 Conglomerate, same as above, but at 1621-1626 apparently a little reddish-brown siderite (?) cement; some interbedded shale, dark-gray to gray to light-tannish gray, in part micaceous, siderite nodules

1636-1650 Sandstone, white, in part brown, medium-to fine-grained,

subangular, quartzose, very slightly feldspathic, micaceous, chloritic

1650-1662 Sandstone, same as above, but no brown, not feldspathic

1662-1679 Siltstone, gray, quartzose; and interbedded shale, gray, silty, micaceous

1679-1687 Sandstone, white, medium-to fine-grained, subangular, quartzose, micaceous, chloritic, coal grains, small amount of interstitial carbonaceous material; and siltstone, same as above

1687-1697 Sandstone, same as above; some siltstone, in part same as above, but mostly light-tannish gray

1697-1704 Sandstone, same as above; and shale, gray to dark-gray, very silty, very micaceous, considerable carbonaceous material

1704-1717 Sandstone, same as above, but below 1709 decrease of accessory minerals

1717-1722 Shale, gray, a little is dark-gray and light-tannish gray, in part silty

1722-1730 Shale, mostly greenish-gray, some is dark-gray to gray to light-tannish gray, in part with siderite nodules

1730-1739 Shale, same as above, but predominantly gray

1739-1746 Sandstone, gray, some is white, fine-grained, subangular, quartzose, micaceous, chloritic, moderate amount of carbonaceous material on bedding surfaces; some shale, same as above

1746-1755 Sandstone, same as above, but white

1755-1763 Siltstone, gray, quartzose, micaceous; some sandstone, same as above

1763-1773 Coal

1773-1783 Coal, 70%; siltstone, same as above, but a small amount is brown, 30%

1783-1790 No sample

1790-1800 Sandstone, white to light-tan, medium-to fine-grained, subangular, quartzose, moderately micaceous and chloritic

1800-1816 Shale, gray to dark-gray, in part silty, some siderite (?) lenses or beds

1816-1840 Shale, gray to light-gray, at 1816-1824 siderite nodules; interbedded with a little siltstone, light-greenish gray, quartzose

1840-1854 Sandstone, grayish-brown, medium-to fine-grained, subangular, quartzose, moderately micaceous, slightly glauconitic, considerable interstitial carbonaceous material, at 1846-1854 coal grains

1854-1864 Siltstone, dark-gray, a little is light-gray, quartzose

1864-1873 Siltstone, dark-gray, quartzose; and shale, gray

1873-1883 Siltstone, dark-gray, quartzose, micaceous, 45%; shale, gray to greenish-gray, 45%; sandstone, brown, fine-grained, subangular, quartzose, 10%

1883-1885 Sandstone, white to light-gray, medium-to fine-grained, subangular, quartzose, slightly feldspathic, moderately micaceous and chloritic, 50%; siltstone, gray, quartzose, 20%; shale, gray, 20%; coal, 10%

1885-1889 Sandstone and siltstone, both same as above, 70%; shale, gray, very micaceous, 20%; coal, moderately pyritic, 10%

1889-1896 Sandstone, same as above, but in part with a greenish cast, 50%; shale, gray to dark-gray, silty, very micaceous, trace of red and light-green

1896-1941 Sandstone, white, medium-to fine-grained, subangular, quartzose, moderately micaceous and chloritic, moderately glauconitic, few coal grains, at 1909-1932 mostly fine-grained and very slightly feldspathic; at 1932-1941 some shale, dark-gray, moderately micaceous

1941-1957 Sandstone, white, medium-grained, subangular, quartzose, at 1950-1957 medium-to fine-grained

1957-1969 Sandstone, same as lower part above, but moderately micaceous and chloritic, moderately glauconitic

1969-2014 Sandstone, same as above, but in part light-gray, at 1978-2014 some carbonaceous material on bedding surfaces

2014-2024 Sandstone, same as above, but decrease of accessory minerals and carbonaceous material

2024-2034 Shale, gray, in part silty and micaceous; and sandstone, same as above, but increase of accessory minerals

2034-2053 Sandstone, same as above; a little interbedded shale, gray to light-gray

2053-2058 Sandstone, same as above, but considerable carbonaceous material; a little shale, gray, much coaly material

2058-2063 Sandstone, same as above, but much less carbonaceous material

2063-2070 Sandstone, same as above; some shale, gray, micaceous

2070-2082 Sandstone, same as above, but decrease of accessory minerals

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 2082

2082-2099 Shale, light-green to red; at 2092-2099 a little siltstone, greenish-gray, quartzose

2099-2104 Shale, red with some green

2104-2112 Shale, red, a little is green

2112-2122 Sandstone, brown, medium-to fine-grained, subangular, quartzose, slightly feldspathic, moderately micaceous, carbonaceous material

2122-2127 Siltstone, light-green, quartzose, feldspathic, micaceous; a little shale, greenish-gray to gray

2127-2140 Siltstone, same as above, but slightly feldspathic

2140-2150 Shale, brick-red, to maroon to light-green to light-gray, silty; some siltstone, same as above

2150-2159 Siltstone, olive, quartzose, feldspathic, micaceous

2159-2169 Sandstone, brown, fine-grained, subangular, quartzose, slightly feldspathic, slightly micaceous; and siltstone, same as above, but gray; a little shale, gray, silty

2169-2179 Siltstone, dark-brownish gray, quartzose, slightly feldspathic; a little shale, light-gray to light-brownish gray, unctuous, carbonaceous material

2179-2188 Siltstone to sandstone, very fine grained, same as above

2188-2198 Siltstone, same as above, but pyritic, small amount of coaly material

2198-2209 Siltstone, same as above, but more feldspathic; a little sandstone, gray, very fine grained, subangular, quartzose, feldspathic; a little shale, dark-brownish gray, silty, carbonaceous

2209-2227 Sandstone, same as above; laminated with siltstone, same as above

2227-2231 No sample

2231-2244 Sandstone, same as 2209-2227

2244-2252 Shale, dark-brownish gray, silty, carbonaceous

2252-2313 Shale, same as above; and interbedded siltstone to sandstone, very fine grained, dark-brownish gray, quartzose, slightly feldspathic, at 2261-2313 slightly pyritic

2313-2361 Shale, same as above, but at 2351-2361 not silty

2361-2371 Shale, same as above, but pyritic, some chips contain fine to silt-size subangular grains of quartz; a little sandstone, white, fine-grained to silt, subangular, quartzose, slightly feldspathic, a very small amount of chlorite and accessory minerals, nearly clean

2371-2387 Sandstone, same as above

2387-2404 Sandstone, same as above; some interbedded siltstone, light-gray, quartzose, feldspathic, very micaceous

2404-2421 Siltstone, same as above, at 2416-2421 considerable coaly material scattered throughout

2421-2431 Shale, gray, silty, slightly micaceous

2431-2440 Shale, same as above; some sandstone, same as 2387-2404, but gray with a little white

2440-2449 Shale, same as above, but pyritic

2449-2458 Sandstone, same as above, but gray, faintly laminated with coaly to argillaceous material; some shale, same as above

2458-2472 Shale, gray, slightly silty, slightly pyritic, small amount of coaly to argillaceous material

2472-2482 Shale, gray with a faint greenish cast; and shale, light-gray, contains medium-to fine, subangular grains of clear quartz; a little limestone, yellowish-tan to brown and white, fine-crystalline, in part indistinctly oolitic, argillaceous

2482-2492 Shale, light-greenish gray to gray to dark-brown; some sandstone, light-greenish gray, fine-grained, subangular, quartzose, slightly micaceous; a little limestone, same as above

TOP PRINCETON SANDSTONE 2492

## UNITED PRODUCING COMPANY

## 6-1671 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 1.95 miles west of 81° 55',
1.24 miles south of 37° 15'
Ground elevation: 1781 Total depth: 4536
Drilling commenced: November 7, 1949
Drilling completed: April 13, 1950
Water: 50, HFW
Gas: 934, show; 1555-1558, show; 1611-1616, show
Oil: 347, show
Casing record: 13 3/8 at 23, 10 3/4 at 555, 8 5/8 at 2249, 7 at 3764
Depth corrections: None
Samples examined by David G. Bowen, 1958

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

0 - 102 No sample

102 - 108 Sandstone, white, medium-to fine-grained, subangular to subrounded, quartzose, slightly micaceous, small amount of green mineral and dark mineral, slightly calcareous

108 - 115 Sandstone, same as above, but coarse-grained, moderate amount of pebble fragments of milky-white quartz

115 - 153 Sandstone, same as above, but medium-to fine-grained, moderate amount of coarse grains, slightly chloritic, not calcareous, no pebble fragments, at 115-130 a little coaly material

153 - 158 Sandstone, same as lower part above; and shale, gray, silty, micaceous, slightly pyritic, hard

158 - 163 Sandstone, same as above; some shale, same as above

163 - 169 Sandstone, light-gray, very fine grained to silt, quartzose, feldspathic, micaceous, argillaceous laminations

169 - 188 Siltstone, gray, quartzose, feldspathic, micaceous, laminated, argillaceous; at 184-188 some shale, dark-brownish gray, silty, carbonaceous

188 - 193 Siltstone, same as above, but tan, calcite cement,

not argillaceous

193 - 199 Siltstone, light-gray, similar to 169-188, but not laminated, not argillaceous; and siltstone, same as above

199 - 216 Shale, dark-gray, silty, micaceous; laminated with siltstone, same as 188-193

216 - 223 Shale, gray, finely micaceous, moderately hard; a little siltstone, same as above, but in part clean

223 - 229 Siltstone laminated with some shale, both same as 199-216

229 - 299 Shale, dark-gray, finely micaceous, locally silty, locally carbonaceous; locally laminated to interbedded with a little siltstone, gray, quartzose

299 - 314 Siltstone, grading downward to in part very fine grained sandstone, light-gray, quartzose, feldspathic, micaceous, slightly argillaceous, dirty, at the base a little coaly material and slightly calcareous

314 - 321 Shale, tan, unctuous, soft; a little siltstone, same as above

321 - 326 Shale, gray, silty, finely micaceous; a little siltstone, same as above

326 - 338 Sandstone, white, mostly medium-grained, some coarse grains and fine grains, subangular to subrounded, quartzose, slightly micaceous and chloritic, small amount of green mineral and hematite (?)

338 - 340 No sample

340 - 350 Sandstone, same as 326-338

350 - 355 Sandstone, same as above, but medium-to coarse-grained, a few very coarse grains

355 - 360 Sandstone, same as above, but medium-to fine-grained, occasional coarse to very coarse grains

360 - 371 Sandstone, same as above, but medium-grained with some coarse grains

371 - 377 Shale, black to dark-gray

377 - 385 Shale, dark-gray, silty, micaceous

385 - 392 Shale, gray, finely micaceous

392 - 409 Sandstone, white, fine-grained, subangular to subrounded, quartzose, slightly micaceous and chloritic, small amount of green mineral and hematite (?)

409 - 439 Sandstone, same as above, but medium-to fine-grained, occasional coarse grain, cleaner, no hematite (?), at 416-421 a little coaly material

439 - 444 Sandstone, same as above, but fine-grained, slightly calcareous

444 - 454 Sandstone, same as above, but a few medium grains

454 - 462 Shale, gray, silty, micaceous

462 - 528 Shale, same as above; laminated with a little siltstone, gray, quartzose; at 471-504 both types slightly calcareous; at 471-504 shale is rather dark-gray; at 487-492 and 517-528 siltstone becomes in part sandy, feldspathic, and chloritic

TOP LEE FORMATION 528

528 - 533 Sandstone, white, medium-to fine-grained, subangular to subrounded, quartzose, slightly micaceous and chloritic, small amount of dark mineral and green mineral, nearly clean

533 - 560 Sandstone, same as above, but with some coarse grains and occasional very coarse grains, at 541-545 some fragments of clear to milky quartz pebbles, at 550-560 occasional pebble fragment, at 541-545 cemented in part with tan calcite, at 545-560 increase of accessory minerals

560 - 564 Sandstone, same as lower portion above, but medium-to coarse-grained, some fine grains, no pebble fragments, decrease of accessory minerals

564 - 570 Sandstone, same as above, but light-gray, mostly fine-to very fine grained, dirty with coaly material

570 - 588 Sandstone, same as above, but very fine grained to silt, at 580-582 slightly calcareous

588 - 600 Sandstone, same as lower portion above; and interbedded shale, gray, micaceous

600 - 654 Shale, dark-gray, rather carbonaceous, moderately hard, at 637-654 in part sandy with many fine quartz grains; at 618-622 and 646-654 a little interbedded siltstone, gray, quartzose

654 - 669 Shale, same as above; and interbedded siltstone, same as above

669 - 704 Sandstone, light-gray, very fine grained to silt, quartzose, slightly feldspathic, slightly micaceous; at 669-689 a little interbedded shale, gray, and a trace of coal; at 689-704 banded with gray argillaceous material

704 - 718 Shale, dark-gray, carbonaceous, finely micaceous

718 - 728 Siltstone, gray, quartzose; laminated with shale, gray, micaceous

728 - 738 Shale, dark-gray

738 - 756 Sandstone, light-gray, very fine grained, subangular, quartzose, feldspathic, micaceous, dark mineral, at 746-756 in part fine-grained; at 746-756 a little interbedded shale, gray

756 - 762 Shale, gray, micaceous

762 - 768 Shale, same as above; and sandstone, same as lower portion of 738-756

768 - 776 Sandstone, same as above, but all very fine grained; some interbedded shale, same as above, and siltstone, gray, quartzose

776 - 794 Sandstone, same as above; at 783-794 some shale, dark-gray, silty, carbonaceous

794 - 806 Siltstone, gray, quartzose, feldspathic; and interbedded shale, dark-gray, silty, in part carbonaceous

806 - 813 Siltstone, same as above; some interbedded shale, gray, micaceous

813 - 828 Sandstone, light-gray, very fine grained to silt, quartzose,

feldspathic, micaceous, slightly chloritic, at 822-828 almost white

828 - 850 Sandstone, same as above, but tan, coaly to argillaceous laminations

850 - 857 Sandstone, same as above; and shale, dark-gray

857 - 864 Shale, gray, greasy; and shale, dark-gray, in part micaceous, in part carbonaceous

864 - 896 Sandstone, white, fine-grained, a few medium grains, angular, quartzose, trace of mica and dark mineral, at 864-875 in part slightly dirty with coaly material

896 - 902 Sandstone, same as lower part above, but medium-to fine-grained

902 - 914 Sandstone, same as above, but mostly medium-grained, an occasional coarse grain, subangular to subrounded

914 - 927 Sandstone, same as above, but medium-to fine-grained

927 - 932 No sample

932 - 955 Sandstone, essentially same as 914-927, but very fine to fine-grained, dirty; and interbedded siltstone, tannish-gray, quartzose, dirty; and interbedded shale, gray, silty, micaceous

955 - 961 Sandstone, same as above; and shale, gray, micaceous

961 - 973 Sandstone, light-gray, very fine grained, quartzose, feldspathic, slightly micaceous and dirty, laminated with a little gray argillaceous material

973 - 983 Sandstone, same as above, but very fine grained to silt; laminated with some shale, gray, micaceous

983 - 990 Shale, gray, finely micaceous; some siltstone, light-gray, quartzose, feldspathic, slightly micaceous and dirty

990 -1039 Shale, gray, finely micaceous; at 1037-1039 a little sandstone, white, very fine to fine-grained, quartzose, slightly micaceous, calcareous

1039-1047 Shale, gray to tan, silty; some siltstone, tan, feldspathic;

and some sandstone, same as above, but not calcareous

1047-1055 Siltstone, tan, feldspathic; and shale, gray to tan, silty; a little coal

1055-1063 Siltstone, same as above; a little shale, light-gray, greasy

1063-1071 Siltstone, light-gray, quartzose, sandy, micaceous, gray argillaceous laminations

1071-1108 Sandstone, white, medium-to fine-grained, angular to sub-angular, quartzose, slightly micaceous, small amount of green mineral and dark mineral, nearly clean, at 1086-1091 a small amount of coaly material, at 1096-1108 somewhat dirtier

1108-1117 Sandstone, same as above, but light-tan; a little shale, gray, finely micaceous

1117-1124 Siltstone, gray, quartzose, feldspathic; laminated with shale, gray, silty, micaceous

1124-1128 Sandstone, light-gray, very fine to fine-grained, quartzose, slightly feldspathic, micaceous, slightly chloritic

1128-1134 Shale, gray, finely micaceous; a little sandstone, same as above, but cemented with tan calcite

1134-1161 Sandstone, white, very fine grained, quartzose, few tan grains, clean, at 1156-1161 slightly calcareous

1161-1181 Siltstone, gray, quartzose, feldspathic, very argillaceous, at 1171-1181 coaly laminations

1181-1200 Siltstone, gray, quartzose, feldspathic, argillaceous laminations, at 1191-1200 somewhat carbonaceous

1200-1249 Sandstone, light-gray, very fine to fine-grained, quartzose, very slightly feldspathic, micaceous, chloritic, at 1200-1206 a few medium grains, at 1213-1221 and 1237-1242 a few gray argillaceous laminations; at 1200-1206 a little shale, dark-gray, silty

1249-1258 Shale, gray to dark-gray, in part silty and micaceous; a little siltstone, tan, quartzose, dirty

1258-1283 Siltstone, gray to tan, quartzose, feldspathic, argillaceous;

at 1266-1275 a little shale, gray, silty

1283-1293 Shale, gray, finely micaceous; some siltstone, same as above

1293-1309 Siltstone, gray, quartzose, feldspathic, argillaceous

1309-1321 Sandstone, white, very fine grained to silt, quartzose, feldspathic, clean, at 1314-1321 slightly calcareous

1321-1340 Shale, gray, occasional silty lamination

1340-1353 Shale, gray, claystone

1353-1369 Shale, gray, silty, silty laminations

1369-1374 Shale, same as above; and sandstone, light-tan, very fine grained to silt, quartzose, slightly feldspathic, few dark grains

1374-1377 Sandstone, same as above, but in part white, some fine grains, occasional light-colored quartz pebble fragment

1377-1395 Sandstone, white, very fine to fine-grained, quartzose, clean, at 1384-1395 a few light-colored quartz pebble fragments, at 1389-1395 a few medium grains

1395-1401 Shale, gray, very silty; and siltstone, gray, quartzose

1401-1406 Shale, same as above; and sandstone, same as lower part of 1377-1395

1406-1411 Shale, same as above; and sandstone, same as above; and siltstone, gray, quartzose

1411-1416 Shale, same as above; and siltstone, same as above

1416-1420 Siltstone, same as above; and sandstone, same as 1406-1411

1420-1425 Sandstone, white, medium-to fine-grained, occasional coarse grain, subangular to subrounded, quartzose, clean, some fragments of milky-white quartz pebbles

1425-1430 Conglomerate, represented by pebble fragments same as above; some sandstone, same as above, mostly cemented with tan calcite

1430-1435 Sandstone, same as above, but only a few pebble fragments

1435-1442 Sandstone, same as above, but slightly micaceous and chloritic, small amount of green mineral, white calcite cement, no pebble fragments

1442-1468 Sandstone, same as above, but no coarse grains, no accessory minerals, at 1442-1446 white to tan calcite cement, at 1446-1450 slightly calcareous

1468-1476 Siltstone, light-gray, quartzose, dirty; and shale, light-gray, greasy, poorly developed siderite nodules; some coal

1476-1497 Sandstone, light-gray, fine-grained to silt, quartzose, micaceous, chloritic, dirty, slightly calcareous

1497-1505 Sandstone, same as above; some shale, gray, greasy, plant fossils, a little is dark-gray and carbonaceous

1505-1512 Shale, gray, finely micaceous; some sandstone, same as above, but gray, very fine grained to silt, slightly feldspathic, not calcareous

1512-1516 Sandstone, same as above

1516-1526 Sandstone, same as above, but in part medium-to fine-grained and somewhat cleaner

1526-1547 Sandstone, light-gray, medium-to fine-grained, some very fine grains, quartzose, slightly feldspathic, micaceous, chloritic, at 1536-1547 decrease of accessory minerals

1547-1563 Shale, gray, micaceous; laminated with siltstone, gray, quartzose

1563-1569 Shale, gray, silty, micaceous

1569-1585 Siltstone, gray, quartzose, micaceous, dirty, argillaceous

1585-1606 Siltstone, same as above; and interbedded shale, gray, silty, micaceous

1606-1631 Shale, gray, finely micaceous; at 1624-1631 a little coal

1631-1638 Shale, same as above; and siltstone, gray, quartzose, micaceous, argillaceous

1638-1641 Sandstone, grayish-brown, very fine grained to silt, few

fine grains, quartzose, dirty, slightly calcareous

1641-1657 Shale, gray, finely micaceous; and interbedded siltstone, gray, quartzose, micaceous, argillaceous, at 1649-1657 in part with a light-greenish cast

1657-1665 Shale, light-gray, silty, micaceous; and siltstone, light-gray to white, quartzose, in part argillaceous

1665-1691 Sandstone, white, medium-to fine-grained, subangular to subrounded, quartzose, slightly feldspathic, micaceous, slightly chloritic, at 1673-1691 moderate amount of dark mineral and not feldspathic, at 1676-1683 cemented with tan calcite

1691-1708 Sandstone, same as basal part above; and interbedded shale, dark-gray, silty

1708-1714 Sandstone, same as above, but light-gray, medium-to very fine grained; some interbedded shale, gray, finely micaceous

1714-1729 Sandstone, same as above; at 1721-1729 some interbedded shale, gray, silty, micaceous

1729-1744 Sandstone, same as above, but slightly laminated, at 1736-1744 calcareous

1744-1758 Sandstone, same as above, but not laminated, at 1750-1758 not calcareous, at 1754-1758 mostly fine-grained

1758-1781 Sandstone, same as lower part above, but medium-to fine-grained, at 1769-1781 essentially clean

1781-1855 Sandstone, same as lower part above, but mostly fine-grained, at 1788-1817 few accessory minerals, at 1781-1788 slightly calcareous; at 1817-1832 a little interbedded shale, very light gray, underclay; at 1841-1847 a little interbedded shale, gray, micaceous

1855-1896 Sandstone, same as above, but medium-to fine-grained, an occasional coarse grain, at 1881-1889 slightly calcareous

1896-1900 No sample

1900-1922 Sandstone, same as above, but light-gray, at 1908-1914 increase in amount of coarse grains, at 1904-1908 some

laminations of coaly material; at 1908-1916 some interbedded shale, gray, micaceous

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1922

1922-1928 Shale, gray, in part finely micaceous, moderately hard

1928-1933 Shale, gray, a little pale-green, in part very silty; some limestone, light-tan, earthy, argillaceous

1933-1938 Shale, brick-red and pale-green; and sandstone, pale-green, very fine to fine-grained, angular to subangular, quartzose

1938-1942 Shale, brick-red; and sandstone, same as above, but slightly calcareous

1942-1950 Shale, brick-red to maroon

1950-1958 Shale, same as above, and pale-green; some limestone, light-tan, earthy, in part silty

1958-1963 Shale, same as above; and limestone, same as above; and sandstone, light-gray, very fine grained to silt, slightly calcareous

1963-1970 Shale, light-gray, silty, slightly calcareous

1970-1988 Siltstone, light-gray grading downward to gray, quartzose, very argillaceous, slightly calcareous grading downward to very calcareous; a little interbedded shale, maroon

1988-1995 Siltstone, same as above, but slightly calcareous

1995-2010 Siltstone, same as above, but calcareous; and interbedded sandstone, light-tan to white, fine-grained, quartzose, calcareous

2010-2020 Siltstone, same as above

2020-2027 Siltstone, same as above, but very argillaceous, slightly calcareous; a little shale, gray

2027-2034 Shale, gray to dark-gray and carbonaceous

2034-2046 Shale, dark-gray, slightly silty, carbonaceous

2046-2048 Sandstone, white, very fine grained, quartzose, clean, slightly calcareous

2048-2108 Siltstone, light-gray, quartzose, feldspathic; laminated with shale, gray, silty

2108-2111 Siltstone, tan to brown, quartzose, feldspathic, tan to brown calcite cement

2111-2123 Siltstone, same as 2048-2108, but only slightly laminated

2123-2141 No sample

2141-2158 Siltstone, same as 2111-2123, but somewhat lighter, not laminated, at 2141-2145 slightly calcareous

2158-2183 Shale, dark-gray, silty; laminated with siltstone, gray, quartzose, feldspathic, slightly calcareous

2183-2201 Shale, same as above, a few silty laminations

2201-2230 Shale, same as above, in part very slightly silty, not laminated

2230-2238 Shale, same as above; some sandstone, white, fine-to very fine grained, angular to subangular, quartzose, few dark specks, clean, calcareous

2238-2273 Sandstone, same as above, but very fine grained, not calcareous, at 2247-2255 very slightly micaceous

2273-2280 Sandstone, same as above, but gray; and interbedded shale, dark-gray, micaceous

2280-2289 Shale, same as above; a little sandstone, gray, fine-grained, angular to subangular, quartzose, cemented with gray calcareous and argillaceous material

2289-2295 Shale, dark-gray, coaly plant fossils; some sandstone, same as above, interstitial pyrite

2295-2301 Sandstone, gray, fine-grained to silt, angular to subangular, quartzose, dirty; some shale, gray, silty, micaceous

2301-2308 Siltstone, light-gray, quartzose; laminated with a little shale, same as above

2308-2315 Shale, light-olive gray, moderately hard

2315-2321 Shale, light-gray, in part silty and micaceous, in part calcareous

2321-2330 Shale, dark-gray, in part silty, finely micaceous

2330-2349 Shale, same as above, but gray

2349-2370 Shale, light-gray, pasty, floating quartz grains, few earthy coal inclusions

2370-2383 Shale, very light greenish gray, silty, in part very calcareous; grades downward to siltstone, white, quartzose, sandy, argillaceous, calcareous

TOP PRINCETON SANDSTONE 2383

UNITED PRODUCING COMPANY

7-1672 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 2.04 miles west of 81° 55',
1.71 miles south of 37° 15'
Ground elevation: 2228.21 Total depth: 5360
Drilling commenced: December 4, 1949
Drilling completed: August 5, 1950
Water: 9, fresh
Gas: 1120, show
Oil: None
Casing record: 13 3/8 at 16, 10 3/4 at 393, 8 5/8 at 2694, 7 at 4231
Depth corrections: None
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | | |
|---|---|---|
| 0 | - 23 | No sample |
| 23 | - 30 | Sandstone, white, medium-grained, subangular to subrounded, quartzose, slightly micaceous, a few green grains |
| 30 | - 40 | Sandstone, same as above, but coarse-grained and angular to subrounded |
| 40 | - 82 | Sandstone, same as above, but medium-to coarse-grained, in lower two-thirds calcareous |
| 82 | - 90 | Sandstone, same as above, but not calcareous; some siltstone, gray, quartzose, argillaceous, micaceous |
| 90 | - 94 | Sandstone, same as above, but mostly medium-grained; a little siltstone, same as above |
| 94 | - 106 | Shale, gray, extremely silty, micaceous |
| 106 | - 119 | Shale, same as above; and siltstone, gray, quartzose, argillaceous, micaceous |
| 119 | - 145 | Shale, gray, silty, micaceous; and sandstone, gray, very fine grained, quartzose, argillaceous, dirty, slightly calcareous at top |
| 145 | - 156 | Sandstone, same as above, but not calcareous |

156 - 169 Sandstone, very light gray, fine-grained, angular to subangular, quartzose, slightly micaceous; interbedded in lower portion with some shale, brownish-gray, highly silty, micaceous

169 - 180 Sandstone, same as above, but white, occasional medium grain, a few green grains

180 - 190 Sandstone, same as above, but medium-grained with some coarse grains

190 - 197 Sandstone, same as above, but medium-to fine-grained, with some coarse grains

197 - 210 Sandstone, same as above, but light-grayish brown, fine-to medium-grained; at 197-203 a little coal

210 - 230 Shale, gray, finely micaceous; and siltstone, gray, quartzose

230 - 242 Sandstone, light-gray, fine-to very fine grained, angular to subangular, quartzose, micaceous, slightly chloritic, very slightly calcareous

242 - 250 Sandstone, same as above; and shale, gray, finely micaceous

250 - 260 Shale, same as above

260 - 280 Shale, same as above to dark-gray and not micaceous; a little interbedded siltstone, gray, siderite nodules

280 - 292 Sandstone, light-gray, fine-to very fine grained, angular to subangular, quartzose, micaceous, slightly chloritic, calcareous; and interbedded siltstone, grayish-brown, quartzose, argillaceous, micaceous, calcareous, at 280-286 coaly material

292 - 330 Siltstone, same as above, but very argillaceous

330 - 345 Siltstone, same as above; and interbedded shale, gray, smooth, finely micaceous

345 - 350 Shale, same as above, but slightly silty

350 - 357 Shale, same as above, but some is dark-gray and slightly carbonaceous

357 - 375 Shale, same as 345-350; at 357-367 a little siltstone, gray, quartzose, argillaceous, micaceous

375 - 391 Sandstone, white, medium-to fine-grained, occasional coarse grain, angular to subangular, quartzose, slightly micaceous, small amount of green mineral and dark mineral, nearly clean

391 - 428 Sandstone, same as above, but medium-to coarse-grained, at 410-415 subangular to subrounded; at 393-398 coal, 25%; at 403-410 coal, 50%

428 - 440 Sandstone, same as above, but coarse-to very coarse grained

440 - 445 Sandstone, same as above, but medium-to fine-grained

445 - 451 Sandstone, same as 428-440; and shale, gray, finely micaceous

451 - 464 Shale, same as above, moderately silty

464 - 472 Shale, dark-gray, silty, micaceous

472 - 486 Sandstone, light-gray, fine-grained, angular to subangular, quartzose, micaceous, glauconitic

486 - 508 Sandstone, same as above, but white, medium-to fine-grained, angular to subrounded, not glauconitic, nearly clean

508 - 518 Sandstone, same as above, but coarse-grained, occasional very coarse grain

518 - 552 Sandstone, same as above, but medium-to coarse-grained

552 - 570 Sandstone, same as above, but mostly medium-grained, some coarse grains, some fragments of white quartz pebbles

570 - 575 Shale, dark-gray, silty, micaceous; and siltstone, gray, quartzose, argillaceous, micaceous

575 - 586 Sandstone, gray, fine-grained, occasional medium grain, angular to subangular, quartzose, argillaceous, micaceous; possibly a little interbedded shale, gray, micaceous

586 - 630 Siltstone to sandstone, very fine grained, rather dark-gray, quartzose, argillaceous, micaceous; and interbedded shale, rather dark-gray, silty, micaceous

630 - 635 Siltstone, same as above, but gray, slightly argillaceous, slightly calcareous

635 - 652 Siltstone, same as above, but calcareous; some interbedded shale, dark-gray, slightly silty, micaceous

652 - 658 Shale, dark-gray, carbonaceous

658 - 670 Shale, dark-gray, slightly silty, slightly micaceous

670 - 707 Shale, same as above, but with a few laminations of gray siltstone; at 690-700 about equal amounts of each

707 - 715 Sandstone, light-gray, very fine grained, angular to subangular, quartzose, slightly feldspathic, micaceous

715 - 739 Sandstone, light-gray, fine-grained, angular to subrounded, quartzose, slightly micaceous, nearly clean, at 720-730 calcareous to slightly calcareous; at 734-739 a little shale, dark-gray, silty, micaceous

739 - 748 Sandstone, same as above, but tan; a little shale, same as above

748 - 760 Sandstone, same as above, but light-gray, fine-to very fine grained

760 - 771 Sandstone, same as above, but white, medium-grained, some coarse grains, occasional very coarse grain, subangular to subrounded

771 - 781 Sandstone, same as above, but coarse-grained, occasional very coarse grain, at 771-777 angular to subangular, at 777-781 angular to subrounded, at 771-777 "dead" oil; at 777-781 some shale, black, carbonaceous

781 - 787 Shale, dark-gray, very silty, micaceous, coaly

787 - 791 Sandstone, light-gray, fine-grained, angular to subangular, quartzose, argillaceous, very micaceous; some shale, dark-gray, in part finely micaceous

791 - 815 Shale, dark-gray, carbonaceous; a little shale, gray

815 - 874 Sandstone, white, medium-to fine-grained, angular to subrounded, quartzose, very slightly micaceous and chloritic, very small amount of green mineral, at 835-848 predominantly medium-grained, at 856-871 occasional coarse grain, at 871-874 mostly fine-grained, at 823-841 very slightly calcareous, at 841-848 and 871-874 calcareous

874 - 883 Siltstone to sandstone, very fine grained, dark-gray, quartzose, very argillaceous, micaceous, argillaceous laminations

883 - 897 Shale, dark-gray, very silty grading downward to slightly silty, micaceous, very slightly calcareous

897 - 921 Shale, same as lower portion above; some interbedded sandstone, gray, fine-grained, quartzose, dirty, very slightly calcareous

921 - 945 Shale, dark-gray, very finely micaceous, very slightly calcareous

TOP LEE FORMATION 945

945 - 962 Sandstone, white, medium-to fine-grained, angular to subangular, quartzose, very slightly micaceous, very small amount of green mineral, nearly clean

962 - 970 Sandstone, same as above, but coarse-grained

970 - 978 Sandstone, same as above, but medium-to coarse-grained

978 - 991 Sandstone, same as above, but mostly coarse-grained

991 -1000 Sandstone, same as above, but medium-to fine-grained, occasional coarse grain

1000-1010 Sandstone, same as above, but mostly fine-grained to silt, slightly dirty, calcareous

1010-1015 Sandstone, same as above, but not calcareous; some siltstone, gray, quartzose, argillaceous laminations

1015-1023 Siltstone, same as above, but slightly feldspathic; and interbedded shale, dark-gray, slightly silty, micaceous

1023-1087 Shale, dark-gray, finely micaceous, hard, at 1072-1087 a few silty laminations

1087-1121 Sandstone, gray, fine-grained, angular, quartzose, very argillaceous, slightly micaceous, at 1087-1110 very slightly calcareous; some interbedded shale, same as above, but at 1110 becomes micaceous, silty, coaly

1121-1127 Sandstone, same as above, but light-gray to light-tan, slightly argillaceous, slightly calcareous

1127-1138 Sandstone, same as above, but light-gray, fine-to very fine grained, angular to subangular, nearly clean

1138-1153 Shale, dark-gray, very finely micaceous, becoming carbonaceous toward the base

1153-1158 Shale, same as lower portion above; and sandstone, light-gray, fine-grained, occasional medium grain, angular to subangular, quartzose, slightly argillaceous, slightly micaceous and chloritic

1158-1170 Sandstone, same as above, but in part white; and shale, gray, micaceous

1170-1179 Sandstone, tan to white, very fine grained, angular to subangular, quartzose, slightly micaceous and chloritic, cemented with tan calcite

1179-1209 Sandstone, white, very fine grained, angular to subangular, quartzose, slightly micaceous and chloritic, at 1179-1187 a few coaly laminations, at 1187-1209 a few argillaceous laminations

1209-1223 Sandstone, same as above, but gray, very fine grained to silt, slightly feldspathic; laminated with shale, gray, micaceous

1223-1241 Shale, same as above; laminated with siltstone, gray, quartzose, slightly feldspathic, slightly micaceous and chloritic

1241-1247 Sandstone, light-gray, very fine to fine-grained, angular to subangular, quartzose, slightly dirty, occasional argillaceous lamination

1247-1263 Sandstone, same as above, but light-tan, fine-grained

1263-1275 Sandstone, same as above, but white

1275-1295 Sandstone, same as above, but light-gray, fine-grained to silt, increase of laminations; at 1286-1295 a little coal and a little shale, black

1295-1316 Sandstone, white, fine-grained, angular to subangular, quartzose, toward the base slightly micaceous and chloritic and a little green mineral, nearly clean

1316-1321 Sandstone, same as above, but medium-grained

1321-1356 Sandstone, same as above, but medium-to coarse-grained, at 1337-1356 decrease of accessory minerals

1356-1363 Sandstone, same as above, but mostly medium-grained, increase of accessory minerals

1363-1382 Sandstone, same as above, but medium-to fine-grained; at 1363-1372 some shale, dark-gray, slightly silty, micaceous

1382-1400 Sandstone, same as above, but grading downward to all fine-grained, micaceous, chloritic, moderate amount of green mineral

1400-1412 Shale, dark-gray, very silty, micaceous

1412-1417 Shale, same as above; and sandstone, light-gray to light-tan, fine-grained, angular to subangular, quartzose, very slightly feldspathic, slightly micaceous, slightly calcareous

1417-1425 Shale, same as above

1425-1435 Shale and sandstone, both same as 1412-1417

1435-1456 Shale, dark-gray, in part slightly carbonaceous, in part finely micaceous

1456-1467 Sandstone, white, medium-grained with a few fine grains, subangular to subrounded, quartzose, clean

1467-1475 Sandstone, same as above, but medium-to coarse-grained

1475-1480 Sandstone, same as above, but coarse-grained; a little shale, in part gray and micaceous, in part very light gray with siderite nodules

1480-1490 Siltstone to sandstone, very fine grained, light-gray to gray, quartzose, slightly feldspathic, micaceous; and coal

1490-1495 Sandstone, light-gray, fine-to very fine grained, angular to subangular, quartzose, very micaceous and chloritic; a little shale, gray, silty, micaceous

1495-1508 Sandstone, same as above, but in part light-tan because of

brown interstitial material; apparently a little interbedded coal

1508-1536 Sandstone, light-gray to white, fine-to medium-grained, angular to subangular, quartzose, slightly micaceous and chloritic, a few argillaceous laminations

1536-1548 Sandstone, same as above, but mostly fine-grained, in part argillaceous

1548-1557 Sandstone, same as above, but all fine-grained, great increase of accessory minerals, not argillaceous, in part cemented with light-tan calcite

1557-1567 Sandstone, same as above, but no calcite cement; and shale, black, carbonaceous

1567-1580 Shale, gray, in part silty and micaceous

1580-1596 Sandstone, very light tan to white, fine-grained, angular to subangular, quartzose, clean except for an occasional coaly lamination

1596-1607 Sandstone, same as above; some shale, gray, very hard

1607-1684 Sandstone, white, medium-to fine-grained, subangular to subrounded, quartzose, slightly micaceous and chloritic, at 1674-1684 in part gray with coaly to argillaceous laminations

1684-1696 Sandstone, same as above, but all white, not laminated; some shale, gray, silty, micaceous

1696-1726 Sandstone, same as above, but light-gray to tan, argillaceous, increase of accessory minerals, coaly to argillaceous laminations

1726-1740 Sandstone, same as above, but white, grading downward to fine-grained, decrease of accessory minerals; interbedded in an increasing amount toward the base with shale, gray, silty, micaceous

1740-1751 Siltstone, gray, quartzose, very slightly feldspathic; laminated with shale, same as above

1751-1769 Shale, gray, hard

1769-1790 Shale, same as above, but becoming silty toward the base;

laminated with siltstone, gray, quartzose

1790-1808 Shale, same as above, but light-gray, becoming very silty toward the base

1808-1820 Shale, same as above; and siltstone, light-gray, quartzose

1820-1832 Shale, dark-gray, slightly silty, rather carbonaceous

1832-1860 Sandstone, tannish-gray, fine-grained, angular to subangular, quartzose, very slightly feldspathic, slightly micaceous, in the upper two-thirds a few coaly laminations

1860-1872 Sandstone, same as lower portion above, but in part very fine-grained; a little coal; a little shale, dark-gray, micaceous

1872-1880 Sandstone, same as above; some coal

1880-1893 Sandstone, white, medium-grained, subangular to subrounded, quartzose, clean

1893-1908 Sandstone, same as above, but medium-to fine-grained, at the base an occasional coarse grain

1908-1920 Siltstone to sandstone, light-gray, very fine grained, quartzose; and shale, gray, hard

1920-1936 Siltstone to sandstone, gray, very fine grained, quartzose, argillaceous, micaceous laminations

1936-1942 Shale, gray, smooth, moderately hard; some sandstone, white, medium-grained, subangular to subrounded, quartzose, very slightly feldspathic, slightly micaceous and chloritic, small amount of green mineral, nearly clean

1942-1957 Sandstone, same as above, but medium-to fine-grained grading downward to mostly fine-grained

1957-1966 No sample

1966-1971 Sandstone, same as lower part of 1942-1957

1971-1980 Shale, gray, smooth, in part very finely micaceous

1980-1990 Sandstone, same as 1966-1971, but medium-to coarse-grained

1990-1998 Sandstone, same as above, but light-tan to dark-grayish brown, 60%; coal and shale, black, carbonaceous, 40%

1998-2009 Sandstone, same as 1980-1990

2009-2023 Shale, greenish-gray, smooth, moderately hard

2023-2028 No sample

2028-2039 Siltstone, gray, quartzose, argillaceous; and shale, gray, silty

2039-2056 Siltstone, same as above, but toward the base becoming very argillaceous and micaceous

2056-2065 Shale, gray, silty; a little coal

2065-2079 Shale, gray, finely micaceous

2079-2100 Shale, same as above; and interbedded sandstone, light-gray, very fine grained to silt, quartzose

2100-2108 Shale, light-green to a minor amount of light-gray, very finely micaceous, in part with siderite nodules, moderately hard; and siltstone, light-olive green, quartzose

2108-2116 Shale, gray to light-gray, very finely micaceous, moderately hard; some siltstone, same as above

2116-2125 Shale, same as above; and shale, gray, silty, micaceous

2125-2150 Sandstone, white, fine-grained, angular to subangular, quartzose, slightly micaceous, small amount of dark mineral, at 2134-2150 slightly chloritic and slightly calcareous to calcareous

2150-2157 Shale, dark-gray, slightly silty, slightly carbonaceous

2157-2166 Shale, gray, very finely micaceous

2166-2175 Shale, dark-gray, slightly silty

2175-2183 Siltstone, gray, quartzose, argillaceous, micaceous

2183-2186 Sandstone, white, medium-to fine-grained, angular to sub-angular, quartzose, slightly calcareous, nearly clean

2186-2194 No sample

2194-2217 Sandstone, same as 2183-2186, but at the base mostly fine-grained, slightly micaceous and chloritic, not calcareous

2217-2224 Sandstone, same as lower part above; a little shale, pale-greenish gray

2224-2229 Shale, very pale gray

2229-2234 Shale, same as above; and sandstone, very light green, very fine grained to silt, quartzose, slightly micaceous and chloritic

2234-2250 Sandstone, white, fine-grained, quartzose, slightly micaceous and chloritic, at 2244-2250 slightly calcareous, at 2239-2244 slight greenish cast

2250-2280 Sandstone, same as above, but medium-to fine-grained, angular to subrounded, not calcareous, at 2250-2260 slight greenish cast, below 2268 increase of accessory minerals

2280-2309 Sandstone, same as lower part above, but mostly medium-grained, below 2291 slightly calcareous

2309-2349 Sandstone, same as above, but medium-to coarse-grained, decrease of accessory minerals, not calcareous

2349-2366 Sandstone, same as above, but mostly medium-grained

2366-2375 Sandstone, same as above, but coarse-grained

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 2375

2375-2382 Limestone, light-gray, earthy, very argillaceous; and siltstone, light-gray, quartzose, slightly calcareous

2382-2391 Shale, dusty-red and pale-green, smooth; a little siltstone, very light tan, quartzose, calcareous

2391-2404 Shale, same as above, but mostly dusty-red; a little limestone, very light gray, fine-crystalline, fossiliferous, ostracods

2404-2411 Shale, red and pale-green

2411-2416 Shale, gray to light-gray; a little limestone, light-gray,

argillaceous, slightly fossiliferous

2416-2452 Siltstone, light-gray, quartzose, argillaceous, calcareous; a little interbedded shale, light-gray, slightly silty

2452-2488 Sandstone, white, very fine grained, angular to subangular, quartzose, clean, at 2480-2488 very pale green to light-gray

2488-2506 Sandstone, same as above, but gray, laminated with argillaceous and micaceous material

2506-2526 Sandstone, same as above, but light-gray, slightly specked, only a few laminations, at the base slightly calcareous

2526-2550 Sandstone, same as above, but many laminations

2550-2583 Sandstone, same as above, but moderately laminated

2583-2593 Sandstone, same as above, but not laminated

2593-2602 Shale, dark-gray, sandy to silty, few sandy laminations

2602-2614 Shale, same as above; laminated with sandstone, same as 2583-2593, but light-gray to gray

2614-2627 Shale, same as above, but not laminated

2627-2640 Shale, same as above, but with a few gray sandy laminations

2640-2655 Shale, same as above, with nearly an equal amount of gray sandy laminations

2655-2661 Shale, same as above, but only a few sandy laminations

2661-2678 Shale, dark-gray, nearly black, smooth, carbonaceous, in the lower part finely pyritic

2678-2685 Shale, same as lower part above, but not carbonaceous; and sandstone, light-gray, very fine grained to silt, angular to subangular, quartzose, very slightly feldspathic

2685-2689 Sandstone, white, fine-grained, angular to subangular, quartzose, clean

2689-2706 Siltstone, light-gray, quartzose, feldspathic, slightly

specked, slightly micaceous; at 2703-2706 becoming in part sandstone, very fine grained

2706-2709 Sandstone, same as 2685-2689; and siltstone, same as above

2709-2716 Shale, black, carbonaceous, very finely pyritic

2716-2727 Shale, dark-gray, slightly carbonaceous, slightly pyritic, coaly plant fossils

2727-2730 Sandstone, very light gray, very fine-grained to silt, angular to subangular, quartzose, very slightly feldspathic and micaceous

2730-2732 No sample

2732-2735 Sandstone, same as 2727-2730

2735-2765 Shale, light-gray to gray, faint greenish cast, in part micaceous; interbedded toward the base with some siltstone, light-gray to gray, faint greenish cast, quartzose

2765-2772 Shale, dark-gray, micaceous, slightly pyritic, a little is black and carbonaceous

2772-2790 Shale, gray, slightly silty, slightly micaceous

2790-2800 Siltstone, very pale green, quartzose, slightly feldspathic; and shale, very pale green, micaceous; a little limestone, yellowish-tan to cream, earthy, argillaceous

2800-2804 Siltstone to sandstone, very fine grained, same as above, but slightly calcareous

TOP PRINCETON SANDSTONE 2804

UNITED PRODUCING COMPANY

8-1673 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 1.23 miles west of 81° 55',
2.70 miles north of 37° 10'
Derrick floor elevation: 1648 Total depth: 4793
Drilling commenced: November 19, 1949
Drilling completed: April 8, 1950
Water: 40, 1 BPH; 70, 5 BPH; 80, HFW; 590, 1/2 BPH; 1307
Gas: 310, show; 1045, show; 1307, show
Oil: None
Casing record: 13 3/8 at 35, 10 3/4 at 507, 8 5/8 at 1979, 7 at 3545
Depth corrections: 1959 = 1976
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

0 - 46 No sample

46 - 95 Sandstone, white, medium-to fine-grained, subangular, quartzose, moderately chloritic and micaceous

95 - 147 Siltstone, brownish-gray, quartzose, argillaceous, micaceous

147 - 158 Shale, dark-gray, pyritic

158 - 165 Sandstone, white, medium-to fine-grained, subangular, quartzose, slightly chloritic and micaceous; and shale, gray, micaceous; a little coal

TOP LEE FORMATION 165

165 - 175 Sandstone, white, medium-to fine-grained, subangular, quartzose, slightly chloritic and micaceous, some pieces with much carbonaceous material; some shale, gray, in part sandy to silty, micaceous

175 - 211 Sandstone, white, medium-to fine-grained, subangular, quartzose, slightly chloritic and micaceous; a little siltstone, gray, quartzose, highly micaceous

211 - 246 Sandstone, white, fine-grained, subangular, quartzose, slightly chloritic and micaceous; a little siltstone, gray, quartzose, very micaceous; a little shale, gray

246 - 270 Sandstone, gray to tan, fine-grained, subangular, quartzose, moderately chloritic and micaceous; and siltstone, gray to light-gray, quartzose, micaceous, carbonaceous material; a little shale, gray, micaceous

270 - 300 Shale, gray; at the top and bottom some siltstone, gray to dark-gray, quartzose

300 - 306 Sandstone, white to light-gray, medium-to fine-grained, subangular, quartzose, moderately chloritic and micaceous; some shale, gray; some siltstone, gray, quartzose, carbonaceous material

306 - 316 Siltstone and fine-grained sandstone, both light-to dark-gray, quartzose, chloritic, micaceous; some shale, gray

316 - 336 Sandstone, gray, fine-grained, subangular, quartzose, slightly micaceous, in part much carbonaceous material; and siltstone, gray to brown, quartzose, micaceous, much carbonaceous and argillaceous material; a little shale, gray, at the top silty

336 - 350 Sandstone, gray, medium-to fine-grained, subangular, quartzose, much mica and carbonaceous material on bedding planes

350 - 370 Siltstone, light-to dark-gray, quartzose, micaceous, argillaceous, carbonaceous

370 - 377 Siltstone, same as above; and shale, gray, moderately micaceous

377 - 390 Shale, dark-gray, slightly pyritic; a little siltstone, same as above

390 - 395 Shale, same as above; and sandstone, gray, medium-to fine-grained, subangular, quartzose, finely pyritic, very chloritic and micaceous, much argillaceous to carbonaceous material

395 - 401 Sandstone and siltstone, both same as sandstone above, but containing a great amount of argillaceous to carbonaceous material

401 - 412 Shale, gray, slightly silty

412 - 422 Shale, same as above; and siltstone, light-gray, quartzose, very micaceous and chloritic

422 - 430 Sandstone, light-gray, medium-to fine-grained, subangular, quartzose, very micaceous and chloritic, moderate amount of carbonaceous material and coal (?) grains

430 - 437 Shale, dark-to very light gray, in part very silty and micaceous, 60%; coal, 40%

437 - 453 Sandstone, white, fine-grained to silt, subangular to subrounded, quartzose, slightly micaceous and chloritic, some carbonaceous material on bedding planes

453 - 487 Shale, gray to dark-gray, in part silty, micaceous, and carbonaceous; a little siltstone, gray, quartzose, micaceous

487 - 521 Sandstone, white to brownish, fine-grained to silt, subrounded to subangular, quartzose, moderately micaceous and chloritic, some carbonaceous material on bedding surfaces

521 - 530 Shale, gray, very micaceous and silty

530 - 542 Siltstone, white to light-gray, quartzose, micaceous; some shale, light-gray, micaceous; some coal

542 - 558 Sandstone, white with a little brown, fine-grained to silt, subangular to subrounded, quartzose, moderately chloritic and micaceous, much carbonaceous material in part

558 - 575 Sandstone, white, medium-to fine-grained, subangular, quartzose, clear grains, slightly micaceous and chloritic

575 - 580 Sandstone, white, medium-grained, subangular, quartzose, slightly micaceous and chloritic, a few green grains

580 - 587 Sandstone, same as above, but in part light-gray and fine-grained to silt; a little shale, dark-to light-gray, moderately micaceous; a little coal

587 - 600 Siltstone, light-gray, quartzose, moderately micaceous and chloritic

600 - 630 Siltstone, light-gray to gray, quartzose, micaceous, in part chloritic; some shale, gray to dark-gray, silty, micaceous

630 - 638 Sandstone, gray, mostly fine-grained to silt, a little medium-grained, subangular, quartzose, micaceous,

considerable argillaceous to carbonaceous material; and shale, dark-gray, in part very silty

638 - 649 Sandstone, light-gray, medium-to fine-grained, subangular, quartzose, micaceous, a little carbonaceous material; a little siltstone, gray, quartzose, carbonaceous material on bedding surfaces; some shale, same as above

649 - 684 Siltstone, same as above

684 - 712 Shale, dark-gray, slightly pyritic and micaceous, occasional floating grains of clear, medium-to fine-grained, subangular, quartz

712 - 723 Sandstone, white, medium-to fine-grained, subangular, quartzose, slightly micaceous, many bright-reddish orange grains

723 - 733 Siltstone, gray, quartzose, micaceous, slightly chloritic; a little shale, light-gray, siderite nodules

733 - 745 Shale, gray, coal on bedding surfaces

745 - 750 Siltstone, gray, quartzose, red grains, chloritic, very micaceous; and shale, gray, silty, very micaceous

750 - 756 Shale, gray, a little brown, in part very micaceous and silty

756 - 762 Shale, gray, a little dark-gray, carbonaceous in part; some sandstone, light-gray, medium-to fine-grained, subangular, quartzose, chloritic, micaceous in part, some carbonaceous material on bedding surfaces

762 - 800 Sandstone, white, medium-to fine-grained, subangular to subrounded, quartzose, slightly micaceous and chloritic; at 783-794 a bed of siltstone, gray to brown, quartzose, argillaceous, very micaceous, coaly laminations

800 - 805 Sandstone, same as above, 80%; coal, cannel, 20%

805 - 824 Shale, gray to dark-gray, micaceous and silty in part; some siltstone, gray, quartzose, a few red grains, coaly laminations

824 - 870 Sandstone, white (at 860-870 light-gray with coaly laminations) fine-grained, subangular, quartzose, clean

870 - 884 Siltstone, gray to dark-gray, quartzose, argillaceous to carbonaceous laminations

884 - 893 Shale, gray, micaceous and silty in part; some siltstone, same as above

893 - 906 Shale, same as above

906 - 915 Shale, gray, micaceous, silty; and sandstone, light-gray, fine-grained to silt, subangular, quartzose, red grains, micaceous in part, small amount of coaly material

915 - 934 Shale, gray to light-gray, micaceous, slightly silty in part

934 - 943 Sandstone, light-gray, fine-grained to silt, subangular, quartzose, some red grains, slightly micaceous; and shale, light-to dark-gray

943 - 951 Shale, gray, micaceous, silty in part

951 - 961 Shale, same as above; a little siltstone, gray; a little sandstone, white, medium-grained

961 - 989 Siltstone, gray, quartzose, micaceous, with some coaly laminations in the lower two-thirds

989 - 995 Shale, gray to dark-gray, very micaceous, very silty

995 -1054 Sandstone, white to light-gray, fine-grained to silt, subangular, quartzose, micaceous, in upper part slightly pyritic, coaly laminations locally throughout

1054-1080 Shale, gray to light-gray, micaceous and silty in part, at 1068-1074 siderite nodules; some interbedded siltstone, gray, quartzose, coaly laminations; at 1060-1068 coal comprises 10% of the sample

1080-1118 Shale, dark-gray, slightly pyritic in part

1118-1125 Shale, same as above, but in part tan, 80%; sandstone, light-tan to dark-gray, medium-to fine-grained, subrounded, quartzose, slightly micaceous and pyritic, a little carbonaceous material, 10%; coal with pyritized plant fossils, 10%

1125-1142 Sandstone, light-greenish gray, at the top some light-tan, fine-grained with a few medium grains at the top and

rather silty toward the bottom, subangular to subrounded, quartzose, scattered mica and chlorite, a little carbonaceous material at the top

1142-1147 Shale, gray to light-gray, micaceous, very silty

1147-1167 Siltstone, gray, quartzose, micaceous, argillaceous; and shale, gray to light-gray, micaceous, silty, at the bottom becoming darker with coaly plant impressions

1167-1230 Sandstone, light-gray to white, medium-grained, in the upper part some is fine-grained to silt, subangular, quartzose, moderately micaceous and chloritic, at 1190-1200 much carbonaceous material; at 1217-1222 a bed of shale, gray to light-gray, carbonized leaf and stem impressions

1230-1268 Shale, gray to light-gray, faint greenish cast at bottom, micaceous and silty with coaly impressions toward the top, numerous siderite nodules

1268-1277 Siltstone, gray, quartzose, rather argillaceous; some shale, gray, rather silty

1277-1290 Sandstone, light-gray, fine-grained, subangular to subrounded, quartzose, moderately micaceous and chloritic, a little carbonaceous material in lower part

1290-1305 Siltstone, gray, quartzose, argillaceous; and shale, gray, micaceous, silty

1305-1315 Coal, 50%; shale, light-gray to light-tan, scattered carbonaceous material, 50%

1315-1325 Shale, light-gray, micaceous in part

1325-1340 Siltstone, gray to light-gray, trace of light-maroon, quartzose, in part micaceous

1340-1357 Shale, gray to light-gray, in part micaceous, coaly plant fossils; and siltstone, gray to light-gray to brown, quartzose, micaceous

1357-1370 Sandstone, white, medium-to fine-grained, subangular to subrounded, quartzose, slightly micaceous and chloritic, 50%; siltstone, light-greenish gray, quartzose, micaceous, moderately chloritic, 35%; shale, light-gray to light-greenish gray, 15%

1370-1410 Sandstone, same as above, but at 1390-1405 with some red grains; at 1382-1405 a little interbedded shale, light-gray to light-tan, siderite nodules

1410-1417 Shale, gray with a little brown, silty; some sandstone, same as 1357-1370

1417-1422 Sandstone, dark-gray, fine-grained to silt, subangular, quartzose, slightly micaceous

1422-1432 Shale, gray, in part silty and micaceous

1432-1472 Sandstone, white, medium-to fine-grained, subangular to subrounded, quartzose, moderately chloritic, slightly micaceous, at 1459-1465 some is brown with coaly material

1472-1477 Shale, light-tan to dark-gray and carbonaceous

1477-1486 Sandstone, white, fine-grained to silt, subangular, quartzose, red spots

1486-1498 Shale, light-greenish gray to light-gray, siderite nodules

1498-1527 Sandstone, very light green with some light-tan toward the bottom, fine-to medium-grained, subangular, quartzose, slightly micaceous, some red spots

1527-1534 Sandstone, white with some very light green, fine-to medium-grained, subangular, quartzose, slightly micaceous, some red spots

1534-1605 Sandstone, white with some gray to light-gray, medium-to fine-grained, subangular to subrounded, quartzose, moderately micaceous, small amount of chlorite, occasional carbonaceous material on bedding surfaces; at 1575-1593 some shale, gray to light-gray, in part silty, micaceous, and pyritic

1605-1614 Shale, gray, micaceous in part, some chips contain floating quartz grains as in sandstone above; some sandstone, same as above

1614-1620 Sandstone, same as above; some shale, same as above

1620-1631 Sandstone, same as above; and sandstone, gray, fine-grained, quartzose, dirty

1631-1646 Sandstone, white, medium-grained, subangular, quartzose,

extremely small amount of accessory minerals

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1646

1646-1660 Shale, very light greenish gray to light-yellowish tan, a little is light-gray

1660-1665 Shale, same as above; and sandstone, light-greenish gray, fine-grained to silt, subangular, quartzose, moderately chloritic, slightly micaceous

1665-1704 Shale, red to light-green, silty at top and bottom, micaceous at bottom

1704-1714 Siltstone, green, quartzose, micaceous, in part calcareous

1714-1747 Siltstone to very fine grained sandstone, green grading downward to pale-green, quartzose; at 1726-1731 interbedded with shale, gray to olive to pale-green

1747-1765 Siltstone, light-gray, quartzose, in part slightly calcareous, laminated with coaly to argillaceous material

1765-1778 Sandstone, light-gray, very fine grained, quartzose, laminated with coaly to argillaceous material

1778-1785 Sandstone, light-gray, very fine grained to silt, quartzose; laminated with shale, gray

1785-1803 Shale, dark-gray, hard, slightly silty at bottom

1803-1820 Shale, dark-gray, hard, slightly silty; laminated with a little siltstone, gray, quartzose, very slightly calcareous

1820-1834 Shale, dark-gray, hard, slightly silty in lower half

1834-1855 Shale, dark-gray, hard; laminated with some siltstone, same as 1803-1820; at 1849-1855 siltstone content increases to 50%

1855-1905 Shale, dark-gray, hard, slightly silty toward bottom

1905-1912 Shale, dark-gray, hard; some shale, variegated purple to white, very slightly calcareous (cavings ?)

1912-1941 Shale, dark-gray, hard, finely micaceous

1941-1950 Shale, same as above; and sandstone, light-tannish gray,

fine-grained, angular to subangular, quartzose, very calcareous; a little limestone, yellowish-tan, argillaceous

1950-1955 Sandstone, same as above

1955-1959 Sandstone, white, fine-grained, subangular to subrounded, quartzose, clean except for a few dark specks

1959=1976 Depth correction

1976-1981 Sandstone, same as 1955-1959

1981-1985 Sandstone, light-gray, very fine grained to silt; and shale, dark-gray

1985-2002 Shale, gray, grading downward to dark-gray and silty

2002-2007 Shale, gray to dark-gray, silty; a little interbedded sandstone, white, fine-grained, subangular to subrounded, quartzose

2007-2013 Shale, gray, silty, finely micaceous; and sandstone, olive to white, very fine grained to silt, quartzose, calcareous

2013-2028 Shale, olive at top grading downward to gray to light-gray, soft, finely micaceous, in part slightly silty, in part calcareous

2028-2035 Sandstone, gray, very fine grained, subangular, quartzose; and shale, gray, finely micaceous

2035-2043 Shale, same as above, but sandy

2043-2053 Shale, same as above; a little limestone, light-tan, fine-crystalline, sparsely fossiliferous

2053-2063 Shale, light-green, finely micaceous, in part sandy; and limestone, same as above

2063-2087 Shale, same as above, but grading downward to light-gray and becoming silty rather than sandy; a little siltstone throughout, grading from green at top to olive at bottom

2087-2096 Siltstone, olive, quartzose, very slightly argillaceous; interbedded at the top with a little siltstone,

gray, argillaceous

TOP PRINCETON SANDSTONE 2096

## UNITED PRODUCING COMPANY

## 9-1674 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 0.72 miles east of 82° 00',
1.37 miles north of 37° 10'
Ground elevation: 1472.9 Total depth: 4802
Drilling commenced: Not known
Drilling completed: Not known
Water: 65, 3 bailers; 127, HFW; 961
Gas: 923, show
Oil: None
Casing record: Not known
Depth correction: None

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 20 | "Top soil" |
| 20 - 55 | "Sand rock" |
| 55 - 93 | "Slate" |
| 93 - 168 | "Sand" |
| 168 - 205 | "Slate and shells" |
| 205 - 220 | "Lime" |
| 220 - 271 | "Sand" |
| 271 - 347 | "Slate" |

### TOP LEE FORMATION 347

| | |
|---|---|
| 347 - 412 | "Sand" |
| 412 - 557 | "Slate" |
| 557 - 563 | "Sand" |
| 563 - 575 | "Sand" |
| 575 - 587 | "Slate and shells" |
| 587 - 600 | "Lime, gritty" |

600 - 651 "Slate and shells"

651 - 671 "Lime, gritty"

671 - 687 "Slate and shells"

687 - 692 "Lime"

692 - 756 "Sand"

756 - 766 "Lime"

766 - 786 "Sand"

786 - 858 "Slate and shells"

858 - 878 "Lime, sandy"

878 - 879 "Coal"

879 - 892 "Slate and shells"

892 - 942 "Sand"

942 - 961 "Lime, gritty"

961 - 963 "Coal"

963 -1013 "Sand"

1013-1015 "Lime"

1015-1032 "Slate and shells"

1032-1115 "Sand"

1115-1118 "Coal"

1118-1186 "Sand"

1186-1203 "Lime"

1203-1218 "Slate and shells"

1218-1301 "Sand"

1301-1315 "Slate and shells"

1315-1384 "Sand"

1384-1403 "Lime"

1403-1407 "Slate and shells"

1407-1450 "Lime"

1450-1452 "Coal"

1452-1500 "Sand"

1500-1522 "Slate and shells"

1522-1549 "Sand"

1549-1559 "Slate and shells"

1559-1575 "Lime"

1575-1752 "Sand"

1752-1754 "Lime"

1754-1779 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1779

1779-1800 "Lime"

1800-1810 "Pink rock"

1810-1813 "Lime"

1813-1828 "Red and blue rock"

1828-1869 "Lime, hard and gritty"

1869-1882 "Shale, black"

1882-1926 "Lime, gritty"

1926-2103 "Slate and shells"

2103-2105 "Shale, black"

2105-2122 "Sand"

2122-2125 "Slate"

2125-2155 "Lime"

2155-2195 "Slate and shells"

2195-2211 "Lime, gritty"

2211-2244 "Slate and shells"

2244-2246 "Lime"

TOP PRINCETON SANDSTONE 2246

## UNITED PRODUCING COMPANY

## 12-1812 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 0.52 miles west of 82° 00',
1.14 miles south of 37° 15'
Ground elevation: 1305.6 Total depth: 6112
Drilling commenced: May 28, 1951
Drilling completed: November 5, 1951
Water: 58, HFW; 642, 1/2 BPH
Gas: 610, show; 978, show; 1241, show
Oil: None
Casing record: 16 at 16, 13 3/8 at 93, 10 3/4 at 436, 8 5/8 at 1908, 7 at 3335
Depth corrections: 1871 = 1860
Samples examined by David G. Bowen, 1958

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 42 | "Clay" |
| 42 - 47 | "Slate" |
| 47 - 87 | "Sand" |
| 87 - 163 | "Slate and shells" |

### TOP LEE FORMATION 163

| | |
|---|---|
| 163 - 228 | "Sand" |
| 228 - 321 | "Slate" |
| 321 - 323 | "Coal" |
| 323 - 334 | "Shale" |
| 334 - 348 | "Sand" |
| 348 - 375 | "Slate" |
| 375 - 385 | "Sand" |
| 385 - 401 | "Slate and shells" |
| 401 - 404 | "Coal" |

404 - 446 "Slate"

446 - 462 "Sand"

462 - 507 "Slate and shells"

507 - 642 "Sand"

642 - 644 "Coal"

644 - 672 "Slate and shells"

672 - 679 "Sand"

679 - 680 "Coal"

680 - 713 "Slate and shells"

713 - 740 "Sand"

740 - 760 "Slate and shells"

760 - 813 "Sand"

813 - 818 "Slate"

818 - 862 "Sand"

862 - 963 "Slate and shells"

963 -1100 "Sand"

1100-1122 "Slate and shells"

1122-1124 "Coal"

1124-1187 "Sand"

1187-1188 "Coal"

1188-1241 "Slate and shells"

1241-1245 "Coal"

1245-1366 "Slate and shells"

1366-1438 "Sand"

1438-1451 "Slate and shells"

1451-1527 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1527

1527-1564 "Slate and shells"

1564-1579 "Sand"

1579-1603 "Slate and shells"

1603-1616 "Sand"

1616-1621 "Slate"

1621-1642 "Red rock"

1642-1651 Sandstone, light-green, fine- to very fine grained, angular to subangular, quartzose, slightly micaceous

1651-1659 Sandstone, same as above, but in part gray, slightly argillaceous

1659-1670 Sandstone, same as above, but mostly gray to light-gray

1670-1684 Sandstone, white to light-gray, fine- to very fine grained, angular to subangular, quartzose, slightly micaceous, grades downward to mostly white and mostly very fine grained

1684-1725 Sandstone, same as lower part above, but white to light-gray; laminated with a little shale, dark-gray, silty

1725-1741 Sandstone, same as above; interbedded to laminated with some shale, dark-gray, silty, micaceous, rather carbonaceous

1741-1752 Shale, same as above; laminated with some sandstone, same as above, but grading downward to nearly white, fine- to very fine grained

1752-1800 Shale, dark-gray, very silty near the top but becoming less silty toward the bottom; a little interbedded siltstone, gray, quartzose

1800-1842 Shale, dark-gray

1842-1850 Shale, very dark gray, somewhat carbonaceous

1850-1853 Shale, black, slightly pyritic, carbonaceous, in part calcareous; a little sandstone, white, fine-grained,

angular to subangular, quartzose, clean, calcareous

1853-1856 Sandstone, same as above, but not calcareous

1856-1864 Shale, dark-gray, slightly micaceous

1864-1868 Limestone, creamy-tan, coarse-crystalline, occasional fossil; and shale, bright-green, soft

1868-1872 Shale, dark-gray, moderately hard (sample bag probably should be marked 1868-1871)

1871=1860 Depth correction

1860-1868 No sample (?)

1868-1875 Shale, bright-green to gray, soft; some limestone, creamy-tan, coarse-crystalline, fossiliferous

1875-1889 Limestone, same as above; possibly interbedded with shale, gray with a faint greenish cast, soft

1889-1895 Shale, same as above; some limestone, same as above

1895-1903 Shale, dark-gray

1903-1926 Sandstone, very light green grading downward to white, very fine grained, angular to subangular, quartzose, clean except near the top

1926-1933 Shale, gray to light-gray, in part slightly silty; some siltstone, olive-green, quartzose; a little sandstone, clear to white, fine-grained, quartzose (also many loose, subrounded, medium to coarse, quartz grains)

1933-1938 Shale, light-gray, silty; and siltstone, light-gray, very argillaceous

1938-1949 Siltstone, to very fine grained sandstone, pale-olive green, argillaceous, in part micaceous; a little interbedded shale, same as above

1949-1956 Shale, gray, silty, finely micaceous; some siltstone to very fine grained sandstone, same as above

1956-1965 Shale, same as above; and shale, dark-gray, slightly carbonaceous, in part slightly fossiliferous and calcareous

1965-1984 Shale, same as both types above; a little interbedded siltstone, white to gray, quartzose

TOP PRINCETON SANDSTONE 1984

UNITED PRODUCING COMPANY

14-1907 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 1.53 miles east of 82° 00',
0.69 miles north of 37° 15'
Ground elevation: 1544.2 Total depth: 3910
Drilling commenced: February 18, 1952
Drilling completed: June 22, 1952
Water: 90; 980, 1/3 BPH; 1157
Gas: 1005, show; 1240, show
Oil: None
Casing record: 13 3/8 at 13, 10 3/4 at 591, 8 5/8 at 1962, 7 at 3436
Depth corrections: 1806 = 1819, 2195 = 2197
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 10 | "Drift" |
| 10 - 90 | "Sand" |
| 90 - 99 | "Slate" |
| 99 - 101 | "Coal" |
| 101 - 189 | "Sand" |
| 189 - 232 | "Slate" |
| 232 - 287 | "Sand" |
| 287 - 321 | "Slate" |
| 321 - 363 | "Sand" |
| 363 - 425 | "Slate" |

TOP LEE FORMATION 425

| | |
|---|---|
| 425 - 519 | "Sand" |
| 519 - 579 | "Slate" |
| 579 - 612 | "Sand" |

612 - 623 "Slate"

623 - 677 "Sand"

677 - 679 "Coal"

679 - 756 "Sand"

756 - 757 "Slate"

757 - 767 "Sand"

767 - 790 "Slate and shells"

790 - 813 "Sand"

813 - 837 "Slate and shells"

837 - 955 "Sand"

955 - 980 "Slate"

980 - 983 "Coal"

983 -1039 "Sand"

1039-1048 "Slate"

1048-1081 "Sand"

1081-1207 "Slate and shells"

1207-1336 "Sand"

1336-1366 "Slate and shells"

1366-1465 "Sand"

1465-1514 "Slate and shells"

1514-1531 "Sand"

1531-1567 "Slate and shells"

1567-1771 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1771

1771-1794 "Red rock"

1794-1806 Siltstone, green, quartzose; and shale, green to a little red, very finely micaceous

1806=1819 Depth correction

1819-1834 Shale, green to deep-red to gray; a little sandstone, green, fine- to medium-grained, angular to subangular, quartzose, very slightly calcareous

1834-1844 Shale, dark-red with a little gray; a little limestone, translucent-tan and crystalline to yellowish-tan and argillaceous, ostracods

1844-1863 Siltstone, very pale green to light-green, quartzose, at the top slightly argillaceous and very slightly calcareous; a little shale, dark-red, in lower half very slightly calcareous

1863-1881 Siltstone to very fine grained sandstone, light-olive green, quartzose, in lower half a few gray argillaceous laminations

1881-1887 No sample

1887-1891 Siltstone to very fine grained sandstone, same as lower half of 1863-1881

1891-1900 Siltstone to very fine grained sandstone, light-olive green to light-gray, quartzose

1900-1908 No sample

1908-1917 Siltstone to very fine grained sandstone, light-gray to white, quartzose; and shale, dark-gray, silty, finely micaceous

1917-1948 Siltstone to very fine grained sandstone, gray to white, grading downward to gray, quartzose, banded in upper half; laminated in lower half with some shale, dark-gray, very silty

1948-1952 No sample

1952-1968 Sandstone, off-white, very fine grained, angular to subangular, quartzose, scattered argillaceous material but nearly clean, calcareous, occasional coaly to argillaceous laminations in lower half

1968-2064 Shale, dark-gray to nearly black, at 1968-1978 slightly silty,

at 1968-1978 and 2019-2032 carbonaceous, moderately hard

2064-2090 Sandstone, white, fine-grained, angular to subangular, quartzose, clean, at 2064-2074 slightly calcareous

2090-2110 Shale, dark-gray, very finely micaceous, moderately hard

2110-2134 Shale, same as above; and interbedded sandstone, white to light-gray, fine-grained to silt, angular to subangular, quartzose, clean

2134-2150 Shale, same as above; and sandstone, same as above; and siltstone, light-greenish gray, quartzose

2150-2157 Shale, dark-gray, slightly silty in part, a few coaly plant fossils

2157-2176 Siltstone, gray, quartzose; laminated with shale, gray, silty

2176-2195 Shale, gray, silty in upper half, silty in part in lower half, nearly a mudstone

2195=2197 Depth correction

2197-2200 Shale, gray, silty in part, a few fine, floating quartz grains; some limestone, light-gray, argillaceous; a little siltstone to very fine grained sandstone, light-green, quartzose

2200-2213 Siltstone to very fine grained sandstone, light-greenish gray to light-gray, quartzose, argillaceous; a little shale, same as above; a little limestone, same as above

2213-2215 No sample

TOP PRINCETON SANDSTONE 2215

UNITED PRODUCING COMPANY

15-1930 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 1.00 miles west of 82° 00',
0.29 miles north of 37° 15'
Ground elevation: 1673.4 Total depth: 3858
Drilling commenced: March 18, 1952
Drilling completed: August 18, 1952
Water: 142, HFW; 838-854, 1/2 BPH; 1033-1035; 1238-1241
Gas: 1033-1035, show; 1238-1241, show; 1351-1358, show; 1371-1374, show
Oil: None
Casing record: 13 3/8 at 39, 10 3/4 at 455, 8 5/8 at 2168, 7 at 3384
Depth corrections: None

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 94 | "Unrecorded" |
| 94 - 142 | "Sand" |
| 142 - 146 | "Slate" |
| 146 - 175 | "Sand" |
| 175 - 224 | "Slate and shells" |
| 224 - 232 | "Sand" |
| 232 - 254 | "Slate and shells" |
| 254 - 295 | "Sand" |
| 295 - 300 | "Slate" |
| 300 - 313 | "Lime, gritty" |
| 313 - 377 | "Slate and shells" |
| 377 - 455 | "Sand" |
| 455 - 462 | "Slate" |
| 462 - 469 | "Sand" |
| 469 - 471 | "Coal" |

471 - 553 "Slate and shells"

TOP LEE FORMATION 553

553 - 612 "Sand"

612 - 687 "Slate"

687 - 701 "Lime, gritty"

701 - 733 "Slate"

733 - 742 "Sand"

742 - 753 "Lime, gritty"

753 - 755 "Coal"

755 - 795 "Slate and shells"

795 - 838 "Sand"

838 - 854 "Lime"

854 - 864 "Slate"

864 - 916 "Sand"

916 - 940 "Slate"

940 - 971 "Sand"

971 - 976 "Slate"

976 -1024 "Sand"

1024-1029 "Slate"

1029-1033 "Sand"

1033-1035 "Coal"

1035-1093 "Slate and shells"

1093-1120 "Sand"

1120-1122 "Coal"

1122-1238 "Slate"

1238-1241 "Coal"

1241-1245 "Slate"

1245-1475 "Sand"

1475-1482 "Slate"

1482-1521 "Sand"

1521-1527 "Coal"

1527-1530 "Slate"

1530-1561 "Sand"

1561-1606 "Slate and shells"

1606-1744 "Sand"

1744-1746 "Slate"

1746-1760 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1760

1760-1880 "Red rock"

1880-1902 "Lime"

1902-1933 "Slate and shells"

1933-2011 "Sand"

2011-2133 "Slate"

2133-2153 "Shale, black"

2153-2180 "Sand"

2180-2290 "Slate and shells"

2290-2308 "Lime, black"

2308-2338 "Slate and shells"

2338-2412 "Lime, black"

TOP PRINCETON SANDSTONE 2412

UNITED PRODUCING COMPANY

17-1952 YUKON-POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 0.10 miles west of 82° 00',
1.08 miles north of 37° 10'
Ground elevation: 1560.5 Total depth: 4823
Drilling commenced: Not known
Drilling completed: Not known
Water: 50, 1 BPH
Gas: 984-986, show; 1532, show
Oil: None
Casing record: Not known
Depth corrections: None
Note: Top of Lee Formation not recognized in this well

POST-LEE FORMATION BEDS (PENNSYLVANIAN) AND LEE FORMATION UNDIVIDED

| | |
|---|---|
| 0 - 19 | "Surface" |
| 19 - 50 | "Sand" |
| 50 - 65 | "Slate and shells" |
| 65 - 96 | "Sand" |
| 96 - 162 | "Slate and shells" |
| 162 - 190 | "Lime, gritty" |
| 190 - 238 | "Sand" |
| 238 - 240 | "Coal" |
| 240 - 248 | "Slate and sandy shells" |
| 248 - 253 | "Lime, hard" |
| 253 - 288 | "Sand" |
| 288 - 304 | "Lime, gritty" |
| 304 - 336 | "Slate and shells" |
| 336 - 502 | "Sand" |
| 502 - 647 | "Slate and shells" |

647 - 681 "Lime"

681 - 702 "Slate and shells"

702 - 723 "Sand"

723 - 730 "Slate"

730 - 772 "Sand"

772 - 797 "Slate and shells"

797 - 848 "Sand"

848 - 861 "Slate"

861 - 984 "Sand"

984 - 986 "Coal"

986 -1015 "Slate and shells"

1015-1025 "Sand"

1025-1078 "Slate and shells"

1078-1105 "Sand"

1105-1174 "Slate and shells"

1174-1209 "Sand"

1209-1233 "Slate and shells"

1233-1309 "Lime, gritty"

1309-1397 "Sand"

1397-1419 "Slate and shells"

1419-1478 "Sand"

1478-1510 "Slate and shells"

1510-1532 "Sand"

1532-1534 "Coal"

1534-1573 "Sand"

1573-1603 "Slate and shells"

1603-1640 "Sand"

1640-1647 "Slate and shells"

1647-1696 "Sand"

1696-1736 "Slate and shells"

1736-1840 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1840

1840-1856 "Slate and shells"

1856-1861 "Red rock"

1861-1934 "Lime"

1934-1988 "Sand"

1988-1995 "Slate"

1995-2071 "Sand"

2071-2165 "Shale, black"

2165-2251 "Sand, green"

2251-2291 "Slate and shells"

2291-2319 "Shale, black"

TOP PRINCETON SANDSTONE 2319

UNITED PRODUCING COMPANY

2-1539 SLOCUM LAND CORPORATION WELL

Buchanan County, Virginia
Location: 2.19 miles west of 81° 55',
0.00 miles north of 37° 15'
Ground elevation: 1933.7 Total depth: 4611
Drilling commenced: December 1, 1948
Drilling completed: September 9, 1949
Water: 331; 430; 539, 5 BPH
Gas: 1253, show
Oil: None
Casing record: 13 3/8 at 10, 10 3/4 at 645, 8 5/8 at 2400
Depth corrections: None

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 35 | "Sand" |
| 35 - 45 | "Slate" |
| 45 - 64 | "Sand" |
| 64 - 86 | "Slate and shells" |
| 86 - 115 | "Sand" |
| 115 - 186 | "Slate and shells" |
| 186 - 265 | "Sand" |
| 265 - 285 | "Slate" |
| 285 - 405 | "Sand" |
| 405 - 417 | "Lime" |
| 417 - 420 | "Coal" |
| 420 - 480 | "Sand" |
| 480 - 567 | "Lime" |
| 567 - 582 | "Sand" |
| 582 - 640 | "Slate" |

640 - 688 "Sand"

688 - 738 "Lime"

TOP LEE FORMATION 738

738 - 833 "Sand"

833 - 985 "Slate"

985 - 988 "Coal"

988 -1028 "Slate"

1028-1154 "Lime"

1154-1172 "Slate"

1172-1180 "Lime"

1180-1247 "Sand"

1247-1250 "Coal"

1250-1270 "Sand"

1270-1300 "Slate"

1300-1330 "Sand"

1330-1357 "Slate"

1357-1410 "Sand"

1410-1450 "Lime"

1450-1457 "Sand"

1457-1478 "Lime"

1478-1550 "Slate"

1550-1680 "Sand"

1680-1684 "Coal"

1684-1692 "Slate"

1692-1780 "Sand"

1780-1796 "Slate"

1796-1803 "Sand"

1803-1835 "Slate"

1835-1838 "Coal"

1838-1865 "Lime"

1865-1883 "Slate"

1883-1916 "Sand"

1916-1940 "Slate"

1940-1983 "Sand"

1983-1994 "Slate"

1994-2126 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 2126

2126-2134 "Slate"

2134-2138 "Red rock"

2138-2156 "Slate"

2156-2251 "Lime"

2251-2263 "Sand"

2263-2287 "Lime"

2287-2308 "Slate"

2308-2318 "Lime"

2318-2350 "Slate"

2350-2365 "Shale, brown"

2365-2391 "Slate"

2391-2467 "Sand"

2467-2480 "Slate"

2480-2511 "Sand"

2511-2555 "Slate and shells"

2555-2597 "Lime"

TOP PRINCETON SANDSTONE 2597

UNITED PRODUCING COMPANY

2-1725 W. H. MATNEY WELL

Buchanan County, Virginia
Location: 1.16 miles east of 82° 00',
1.61 miles south of 37° 20'
Ground elevation: 1501.8 Total depth: 6081
Drilling commenced: August 12, 1950
Drilling completed: February 2, 1951
Water: 65, 1 BPH; 240, 8 BPH
Gas: None
Oil: 1353-1358, show
Casing record: 13 3/8 at 53, 10 3/4 at 520, 8 5/8 at 1977, 7 at 3349
Depth corrections: None

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 5 | "Soil" |
| 5 - 20 | "Gravel" |
| 20 - 88 | "Sand" |
| 88 - 100 | "Lime, broken" |
| 100 - 209 | "Sand" |
| 209 - 210 | "Coal" |
| 210 - 255 | "Sand" |
| 255 - 353 | "Lime, broken" |
| 353 - 355 | "Coal" |
| 355 - 375 | "Sand" |
| 375 - 470 | "Lime, sandy" |
| 470 - 515 | "Slate" |

TOP LEE FORMATION 515

| | |
|---|---|
| 515 - 561 | "Sand" |
| 561 - 600 | "Lime" |

600 - 660 "Lime, broken"

660 - 735 "Sand"

735 - 770 "Lime, broken"

770 - 840 "Sand"

840 - 842 "Coal"

842 - 875 "Sand"

875 - 897 "Slate"

897 - 900 "Coal"

900 - 922 "Lime"

922 - 965 "Slate"

965 - 985 "Lime"

985 -1005 "Lime, sandy"

1005-1055 "Sand"

1055-1060 "Coal"

1060-1075 "Lime, sandy"

1075-1140 "Black slate and shells"

1140-1425 "Sand"

1425-1460 "Slate and shells"

1460-1468 "Coal"

1468-1710 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1710

1710-1715 "Red rock"

1715-1910 "Lime"

1910-1931 "Slate and shells"

1931-1940 Not recorded

1940-1960 "Slate and shells"

1960-2027 "Lime, sandy"

2027-2055 "Slate and shells"

2055-2135 "Lime"

TOP PRINCETON SANDSTONE 2135

UNITED PRODUCING COMPANY

1-1724 MARY R. MC NEIL WELL

Buchanan County, Virginia
Location: 1.29 miles west of 81° 50',
1.08 miles south of 37° 15'
Ground elevation: 1832.6 Total depth: 4898
Drilling commenced: July 10, 1950
Drilling completed: November 18, 1950
Water: 90, HFW; 1050, 1/3 bailer; 1356, 3/4 BPH
Gas: 798, show; 1044, show; 1115, 39 MCF
Oil: None
Casing record: 13 3/8 at 65, 10 3/4 at 593, 8 5/8 at 2078, 7 at 3489
Depth corrections: 1777 = 1787, 2072 = 2078
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 10 | "Gravel" |
| 10 - 20 | "Sand" |
| 20 - 65 | "Slate" |
| 65 - 88 | "Sand" |
| 88 - 110 | "Lime, black" |

TOP LEE FORMATION 110

| | |
|---|---|
| 110 - 183 | "Sand, white" |
| 183 - 318 | "Lime, black" |
| 318 - 445 | "Sand" |
| 445 - 447 | "Coal" |
| 447 - 571 | "Sand" |
| 571 - 574 | "Slate" |
| 574 - 604 | "Sand" |
| 604 - 745 | "Shale, black" |
| 745 - 752 | "Coal" |

752 -1056 "Sand"

1056-1058 "Slate"

1058-1091 "Sand"

1091-1149 "Lime, black"

1149-1166 "Sand"

1166-1169 "Coal"

1169-1192 "Lime"

1192-1234 "Sand"

1234-1249 "Lime, black"

1249-1255 "Coal"

1255-1280 "Slate and shells"

1280-1325 Shale, gray, at 1318-1325 some is tan, moderately to slightly micaceous

1325-1331 Siltstone, gray, quartzose, slightly feldspathic, moderately micaceous and chloritic; some coal; a little shale, gray, silty, micaceous

1331-1345 Shale, same as above; some coal; some siltstone, same as above

1345-1360 Sandstone, light-gray, fine-grained to silt, subangular to subrounded, quartzose, moderately feldspathic, moderately micaceous and chloritic, slightly glauconitic; and interbedded shale, dark-gray to gray, in part carbonaceous

1360-1422 Sandstone, same as above, at 1371-1422 medium- to fine-grained, at 1384-1422 only slightly feldspathic and not glauconitic; at 1377-1384 shale, gray, silty, slightly micaceous, 60%; at 1400-1406 some shale, gray, moderately micaceous

1422-1436 Shale, gray, in the lower half very silty

1436-1443 Shale, gray to light-gray, silty, moderately micaceous; some siltstone, gray, quartzose, slightly feldspathic, micaceous

1443-1480 Sandstone, white, fine-grained, subangular to subrounded, quartzose, slightly feldspathic, micaceous, chloritic, coaly material on bedding surfaces, at 1469-1480 medium- to fine-grained, at 1476-1480 coal grains

1480-1490 Shale, dark-gray, unctuous, plant impressions; some sandstone, same as lower part above but brown; a little coal

1490-1500 Shale, same as above; some sandstone, same as above

1500-1510 Shale, light-gray, siderite nodules

1510-1521 Shale, light-greenish gray; and shale, same as above, at 1515-1521 some is faintly pink

1521-1532 Shale, green and red; some siltstone, green, quartzose

1532-1544 Siltstone, green, quartzose, slightly argillaceous, micaceous; and interbedded shale, green to light-greenish gray, in part slightly silty

1544-1555 Siltstone, same as above; a little interbedded shale, green

1555-1571 Sandstone, white with an extremely faint greenish cast, fine-grained, angular to subangular, quartzose, nearly clean, small amount of dark mineral, at 1560-1571 slightly micaceous

1571-1586 Sandstone, white, medium- to fine-grained, angular to subangular, quartzose, nearly clean, small amount of dark mineral, slightly micaceous, at 1575-1580 many coaly laminations

1586-1602 Sandstone, same as lower part above, but at 1586-1594 slightly chloritic and moderate amount of dark mineral, at 1594-1602 medium-grained with scattered coarse grains

1602-1610 Sandstone, same as lower part above, but medium- to coarse-grained, slightly dirtier, occasional coaly to argillaceous lamination

1610-1616 Shale, gray, silty; and sandstone, same as above, but medium-grained with an occasional fine grain

1616-1624 Shale, gray, silty; and siltstone, gray, quartzose, argillaceous

1624-1632 Sandstone, light-gray to gray, fine-grained to silt, angular

to subangular, quartzose; with gray, silty, micaceous, argillaceous laminations

1632-1644 Sandstone, white, medium- to fine-grained grading downward to medium-grained, occasional coarse grain at the top, angular to subangular, quartzose, slightly micaceous, moderate amount of green mineral and dark mineral

1644-1650 Sandstone, same as above, but less accessory minerals and occasional coarse grains; a little shale, gray

1650-1654 Sandstone, same as above, but with some fine grains

1654-1664 Sandstone, same as above, but coarse-grained with some medium grains, nearly clean; some shale, gray, micaceous

1664-1670 Shale, gray, micaceous; some sandstone, same as above, but medium- to fine-grained, some coarse grains, a few milky-white fragments of very coarse quartz grains

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1670

1670-1677 Shale, light-olive green, trace of red

1677-1683 Shale, same as above; a little limestone, yellowish-tan, argillaceous, ostracods

1683-1688 Shale, pale-green to light-red; a little siltstone to sandstone, very fine grained, olive-green, quartzose

1688-1698 Shale, light-red, a little pale-green; and siltstone to very fine grained sandstone, same as above, but in part green; a little limestone, tan

1698-1703 Shale, light-red to pale-green; a little siltstone, same as above

1703-1719 Shale, light-red, a little pale-green; and interbedded siltstone to very fine grained sandstone, olive-green to green, quartzose; at 1711-1719 some limestone, tan to red, argillaceous

1719-1734 Shale, red to light-green, micaceous, in part calcareous; a little interbedded siltstone, light-green, quartzose

1734-1744 Shale, light-olive green grading downward to light-green, slightly silty to silty, slightly calcareous

1744-1760 Shale, light-green to deep-red; a little interbedded limestone, light-tan to reddish-tan

1760-1765 Shale, light-green; a little sandstone, very light green, fine-grained, subangular to subrounded, quartzose, moderate amount of green mineral

1765-1777 Shale, pale-green to pale-olive green, in part silty, occasional siderite nodules

1777=1787 Depth correction

1787-1792 Shale, light-olive gray

1792-1800 Siltstone to very fine grained sandstone, light-olive gray, quartzose, slightly argillaceous

1800-1840 Siltstone to very fine grained sandstone, off-white, quartzose, nearly clean, occasional argillaceous lamination, siltstone content decreases toward the base

1840-1846 Shale, gray, slightly silty; some interbedded sandstone, same as above, but white to light-gray

1846-1910 Shale, dark-gray, slightly silty

1910-1920 Shale, same as above; a little interbedded siltstone, light-gray, quartzose

1920-1946 Shale, same as above, but with an occasional silty lamination

1946-1965 Shale, same as above; laminated with some siltstone, light-gray, quartzose

1965-1978 Shale, same as above, but with an occasional silty lamination

1978-2040 Shale, dark-gray, at 2025-2035 carbonaceous and slightly pyritic

2040-2047 Shale, dark-gray to gray; some siltstone to very fine grained sandstone, light-gray, quartzose

2047-2059 Shale, gray, in part slightly silty; some interbedded siltstone, gray, quartzose

2059-2066 Shale, gray to light-gray, in part with a greenish cast, a little dark-gray, trace of fossils

2066-2072 Limestone, light-tan to white, fine-crystalline, dense

2072=2078 Depth correction

2078-2088 Shale, dark-gray, in part slightly calcareous; some limestone, same as above

TOP PRINCETON SANDSTONE 2088

UNITED PRODUCING COMPANY

1-2177 COMBS AND POBST ET AL WELL

Buchanan County, Virginia
Location: 2.02 miles west of 82° 05',
2.60 miles north of 37° 10'
Ground elevation: 1452.6 Total depth: 4615
Drilling commenced: May 22, 1954
Drilling completed: April 7, 1955
Water: 945
Gas: 1326, show
Oil: None
Casing record: 13 3/8 at 25, 10 3/4 at 521, 8 5/8 at 1869, 7 at 3350
Depth corrections: None

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 20 | "Surface" |
| 20 - 110 | "Sand" |
| 110 - 230 | "Slate and shells" |
| 230 - 310 | "Sand" |
| 310 - 410 | "Slate and shells" |
| 410 - 490 | "Sand" |
| 490 - 521 | "Slate and shells" |

TOP LEE FORMATION 521

| | |
|---|---|
| 521 - 619 | "Lime" |
| 619 - 756 | "Sand" |
| 756 - 784 | "Slate and shells" |
| 784 - 953 | "Sand" |
| 953 - 989 | "Slate and shells" |
| 989 -1118 | "Lime" |
| 1118-1209 | "Slate and shells" |

1209-1287 "Lime"

1287-1525 "Sand"

1525-1533 "Coal"

1533-1574 "Slate and shells"

1574-1595 "Lime"

1595-1742 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1742

1742-1792 "Red rock"

1792-1832 "Slate"

1832-1838 Not recorded

1838-2046 "Sand, broken"

2046-2128 "Slate"

TOP PRINCETON SANDSTONE 2128

UNITED PRODUCING COMPANY

10-2381 LON B. ROGERS ET AL WELL

Buchanan County, Virginia
Location: 1.79 miles east of 81° 55',
1.45 miles north of 37° 15'
Ground elevation: 2343.9 Total depth: 3885
Drilling commenced: February 10, 1956
Drilling completed: June 10, 1956
Water: None
Gas: None
Oil: None
Casing record: 13 3/8 at 33, 10 3/4 at 608, 8 5/8 at 2378, 7 at 3591
Depth corrections: 2358 = 2378

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 3 | "Surface" |
| 3 - 54 | "Sand" |
| 54 - 183 | "Slate and shells" |
| 183 - 200 | "Sand" |
| 200 - 233 | "Slate and shells" |
| 233 - 300 | "Sand" |
| 300 - 310 | "Slate and shells" |
| 310 - 330 | "Sand" |
| 330 - 342 | "Slate and shells" |
| 342 - 425 | "Sand" |
| 425 - 427 | "Coal" |
| 427 - 430 | "Slate and shells" |
| 430 - 466 | "Sand" |
| 466 - 490 | "Slate and shells" |
| 490 - 638 | "Sand" |

638 - 639 "Coal"

639 - 687 "Slate and shells"

687 - 702 "Sand"

702 - 710 "Slate and shells"

710 - 740 "Lime, gritty"

TOP LEE FORMATION 740

740 - 847 "Sand"

847 - 960 "Slate and shells"

960 -1001 "Sand"

1001-1004 "Slate and shells"

1004-1024 "Sand"

1024-1065 "Slate and shells"

1065-1101 "Sand"

1101-1111 "Slate and shells"

1111-1115 "Lime"

1115-1152 "Sand"

1152-1155 "Slate and shells"

1155-1227 "Sand"

1227-1298 "Slate and shells"

1298-1350 "Sand"

1350-1355 "Slate and shells"

1355-1472 "Sand"

1472-1500 "Slate and shells"

1500-1725 "Sand"

1725-1727 "Coal"

1727-1870 "Sand"

1870-1874 "Coal"

1874-1882 "Slate and shells"

1882-2044 "Sand"

2044-2060 "Slate and shells"

2060-2199 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 2199

2199-2217 "Lime"

2217-2228 "Red rock"

2228-2265 "Lime"

2265-2285 "Slate and shells"

2285-2315 "Lime"

2315-2358 "Sand"

2358=2378 Depth correction

2378-2466 "Sand"

2466-2484 "Slate and shells"

2484-2518 "Lime"

2518-2560 "Slate and shells"

2560-2574 "Lime"

2574-2594 "Sand"

2594-2672 "Lime"

2672-2702 "Slate and shells"

2702-2712 "Sand"

2712-2719 "Slate and shells"

TOP PRINCETON SANDSTONE 2719

UNITED PRODUCING COMPANY

11-2487 LON B. ROGERS ET AL WELL

Buchanan County, Virginia
Location: 1.66 miles east of 81° 55',
2.81 miles south of 37° 20'
Ground elevation: 2002.8 Total depth: 4797
Drilling commenced: May 23, 1956
Drilling completed: October 8, 1956
Water: 65, HFW; 925-927, 7 bailers in 36 hours; 1562-1569, 21 bailers in 36 hours
Gas: None
Oil: None
Casing record: 13 3/8 at 38, 10 3/4 at 519, 8 5/8 at 2023, 7 at 3631
Depth correction: None

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 10 | "Soil" |
| 10 - 37 | "Gravel" |
| 37 - 65 | "Slate" |
| 65 - 120 | "Sand" |
| 120 - 121 | "Coal" |
| 121 - 131 | "Sand" |
| 131 - 296 | "Slate and shells" |
| 296 - 323 | "Sand" |
| 323 - 325 | "Coal" |
| 325 - 337 | "Sand" |
| 337 - 342 | "Slate" |
| 342 - 358 | "Sand" |
| 358 - 363 | "Slate and shells" |
| 363 - 410 | "Sand" |

410 - 426 "Slate and shells"

426 - 445 "Sand"

445 - 495 "Slate and shells"

495 - 497 "Coal"

497 - 516 "Slate and shells"

TOP LEE FORMATION 516

516 - 546 "Sand"

546 - 555 "Slate and shells"

555 - 563 "Sand"

563 - 665 "Slate and shells"

665 - 727 "Sand"

727 - 766 "Slate and shells"

766 - 900 "Sand"

900 - 925 "Slate and shells"

925 - 927 "Coal"

927 - 944 "Sand"

944 -1005 "Slate and shells"

1005-1172 "Sand"

1172-1177 "Coal"

1177-1224 "Slate and shells"

1224-1245 "Sand"

1245-1295 "Slate and shells"

1295-1420 "Sand"

1420-1425 "Slate"

1425-1429 "Coal"

1429-1476 "Sand, gray"

1476-1540 "Sand, broken"

1540-1549 "Sand, gray"

1549-1562 "Slate and shells"

1562-1569 "Coal"

1569-1575 "Slate and shells"

1575-1742 "Sand"

1742-1750 "Slate"

1750-1900 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1900

1900-1920 "Slate"

1920-1941 "Red rock"

1941-1986 "Slate and shells"

1986-2076 "Sand"

2076-2168 "Sand, broken"

2168-2384 "Slate and shells"

TOP PRINCETON SANDSTONE 2384

UNITED PRODUCING COMPANY

4-2632 CLINCHFIELD COAL COMPANY WELL

Buchanan County, Virginia
Location: 1.69 miles east of 81° 55',
0.79 miles south of 37° 20'
Ground elevation: 1940.3 Total depth: 4753
Drilling commenced: October 8, 1957
Drilling completed: January 28, 1958
Water: 60, HFW; 1047, 5 BPD; 1760, 9 BPD
Gas: None
Oil: None
Casing record: 13 3/8 at 29, 10 3/4 at 634, 8 5/8 at 2079, 7 at 3558
Depth corrections: None
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 29 | "Surface" |
| 29 - 90 | "Slate" |
| 90 - 330 | "Sand" |
| 330 - 412 | "Slate and shells" |
| 412 - 444 | "Sand" |
| 444 - 446 | "Coal" |
| 446 - 514 | "Sand" |
| 514 - 516 | "Coal" |
| 516 - 565 | "Sand" |
| 565 - 628 | "Slate" |

TOP LEE FORMATION 628

| | |
|---|---|
| 628 - 690 | "Sand" |
| 690 - 760 | "Slate and shells" |
| 760 - 810 | "Sand" |

810 - 815 Sandstone, white, medium-grained, occasional coarse grain, angular to subangular, quartzose, moderately micaceous and chloritic, moderate amount of green mineral

815 - 825 Sandstone, gray, fine-grained, occasional medium grain, angular to subangular, quartzose, very micaceous and chloritic

825 - 830 Sandstone, same as above, but slightly feldspathic, only a trace of mica and chlorite

830 - 838 Sandstone, same as above; and shale, gray, silty, micaceous

838 - 846 Shale, same as above; and shale, gray to dark-gray, underclay, coaly material; and sandstone, brownish-gray, fine-grained to silt, angular to subangular, quartzose, slightly micaceous

846 - 856 Shale, dark-gray, carbonaceous, underclay; a little coal, earthy

856 - 866 Sandstone, white, medium-grained, some fine grains, angular to subrounded, quartzose, very slightly micaceous and chloritic, very small amount of green mineral, nearly clean

866 - 878 Sandstone, same as above, but fine-grained with some medium grains

878 - 890 Sandstone, same as above, but mostly medium-grained, at 884-890 very light gray with a few coaly laminations

890 - 896 Sandstone, very light tan, fine- to very fine grained, angular to subangular, quartzose, slightly feldspathic, trace of mica, few argillaceous laminations

896 - 903 Sandstone, same as above, but light-tan, fine- to medium-grained, scattered coaly material, slightly calcareous

903 - 912 Sandstone, same as 890-896

912 - 930 Sandstone, same as above, but light-tan, mostly fine-grained, occasional medium grain, not feldspathic

930 - 937 Sandstone, gray to light-gray, fine-grained, subangular, quartzose, slightly feldspathic, moderately micaceous, slightly chloritic, few argillaceous laminations

937 - 944 Sandstone, white, medium-grained, subangular to subrounded, quartzose, slightly micaceous, small amount of dark mineral and green mineral; and sandstone, same as above

944 - 956 Sandstone, white, same as above, but with a few coarse grains

956 - 964 Shale, dark-gray, slightly silty, slightly very finely micaceous

964 - 974 Shale, same as above, but a little is carbonaceous; and interbedded sandstone, light-tan, fine-grained, some very fine grains, angular to subangular, quartzose, trace of mica

974 - 984 Shale, dark-gray, carbonaceous

984 -1027 Shale, gray, very silty, micaceous; a little interbedded sandstone, very light gray, very fine grained, quartzose, slightly feldspathic and micaceous, at 1004-1027 becomes gray and argillaceous

1027-1034 Sandstone, same as lower part above, few shaly laminations

1034-1047 Sandstone, light-gray, fine-grained, angular to subangular, quartzose, slightly feldspathic, micaceous, occasional gray argillaceous lamination, at 1041-1047 a light-tan cast and very calcareous

1047-1087 Sandstone, white, fine-grained, angular to subangular, quartzose, slightly micaceous and chloritic, small amount of green mineral, at 1047-1067 slightly feldspathic, at 1057-1067 and 1074-1087 a little coaly material, at 1067-1074 slightly calcareous

1087-1096 Sandstone, white, coarse-grained, angular, quartzose, trace of accessory minerals, a little coaly material, cemented in part with brown calcite

1096-1105 Sandstone, same as above, but medium- to coarse-grained, no coaly material

1105-1113 Sandstone, same as above, but coarse-grained, angular to subangular

1113-1120 Sandstone, same as above, but medium- to coarse-grained, no brown calcite cement

1120-1128 Sandstone, same as 1105-1113, but mostly medium-grained with some coarse grains

1128-1158 Sandstone, same as above, but medium-grained, no calcite cement, at 1137-1146 occasional coarse grain, at 1146-1158 some coarse grains

1158-1196 Sandstone, same as above, but mostly coarse-grained with some medium grains

1196-1206 Sandstone, same as above, but mostly medium-grained

1206-1226 Sandstone, same as above, but coarse- to medium-grained

1226-1234 Sandstone, same as above, but all coarse-grained

1234-1242 Sandstone, light-tan, fine-grained, angular, quartzose, slightly micaceous

1242-1250 Shale, gray, very silty, micaceous; and shale, dark-gray, carbonaceous, smooth

1250-1258 Siltstone, gray, quartzose, micaceous, argillaceous laminations

1258-1268 Siltstone, same as above, but sandy, not laminated; some interbedded shale, gray, micaceous

1268-1278 Shale, dark-gray, slightly silty, slightly very finely micaceous

1278-1304 Siltstone, gray, quartzose, sandy, micaceous; and interbedded shale, gray, micaceous

1304-1308 Shale, dark-gray, in part slightly silty

1308-1312 Shale, same as above; and sandstone, off-white, fine- to very fine grained, quartzose, slightly feldspathic

1312-1354 No sample

1354-1360 Shale, dark-gray, in part slightly silty

1360-1370 Sandstone, off-white, very fine grained, quartzose, very slightly feldspathic, trace of mica; some sandstone, light-gray, very fine grained, quartzose, slightly argillaceous, slightly micaceous

1370-1375 Sandstone, off-white, same as above; laminated with shale, light-gray, silty

1375-1390 No sample

1390-1395 Sandstone, light-gray, fine- to very fine grained, quartzose, very slightly feldspathic, slightly micaceous

1395-1400 Sandstone, same as above, but gray, argillaceous; some interbedded shale, gray, smooth

1400-1405 Sandstone, same as above, but very argillaceous

1405-1426 Sandstone, white, medium- to fine-grained, angular to subangular, quartzose, clean, at 1414-1418 in part cemented with tan material

1426-1436 Sandstone, same as above, but fine-grained

1436-1440 Sandstone, same as above, but medium-grained

1440-1470 Sandstone, same as above, but medium- to fine-grained

1470-1486 Sandstone, same as above, but medium-grained, at 1479-1483 medium- to coarse-grained

1486-1501 Sandstone, same as above, but medium-grained, at 1486-1496 an occasional coarse grain

1501-1507 Sandstone, same as above, but medium- to coarse-grained, an occasional milky quartz pebble fragment

1507-1514 Shale, gray, finely micaceous, hard; some siltstone, gray, quartzose, slightly argillaceous; a little coal

1514-1522 Shale, gray, hard; and siltstone, same as above, but micaceous

1522-1527 No sample

1527-1538 Siltstone, same as 1514-1522, but sandy; some shale, gray, hard

1538-1549 Sandstone, light-gray, fine-grained, angular to subangular, quartzose, micaceous, chloritic, slightly calcareous; some shale, gray, underclay, plant fossils

1549-1559 Sandstone, same as above; some shale, gray, very finely micaceous

1559-1569 Sandstone, brown, fine-grained, occasional coarse and medium grains, subangular to subrounded, quartzose, trace of

mica, brown interstitial material; some shale, gray and smooth to dark-gray and carbonaceous

1569-1592 Sandstone, white, medium- to fine-grained, occasional coarse grain, angular to subangular, quartzose, slightly micaceous

1592-1600 Shale, black, carbonaceous, coaly laminations; and shale, light-tannish gray, underclay

1600-1611 Shale, gray, in part silty and micaceous

1611-1621 Shale, gray, micaceous, in part very silty; some siltstone, gray, quartzose, sandy, argillaceous, micaceous

1621-1630 Shale, same as above; and sandstone, white, coarse-grained, subangular to subrounded, quartzose, trace of green mineral

1630-1662 Sandstone, same as above, but at 1630-1646 and 1654-1662 with some medium grains, at 1638-1646 silty cementing material

1662-1672 Sandstone, same as lower part above; some shale, gray, slightly silty, micaceous; a little shale, dark-gray, carbonaceous

1672-1700 Shale, gray, same as above; and interbedded siltstone, gray, quartzose, argillaceous, micaceous

1700-1709 Shale, gray, slightly silty, very finely micaceous; a little shale, dark-gray, carbonaceous

1709-1719 No sample

1719-1729 Shale, gray, slightly silty, very finely micaceous; and siltstone, gray, quartzose, argillaceous

1729-1742 Sandstone, white, medium-grained, few fine grains, subangular to subrounded, quartzose, moderately micaceous and chloritic, moderate amount of dark mineral and green mineral

1742-1748 Sandstone, same as above, but medium- to fine-grained

1748-1760 Sandstone, same as above, but mostly fine-grained

1760-1770 Shale, tannish-gray, underclay, 50%; sandstone, same as

above, but tan because of argillaceous cement, 40%; coal, 10%

1770-1777 Siltstone, gray, quartzose, slightly micaceous, very argillaceous

1777-1784 Coal

1784-1790 Siltstone, same as 1770-1777, but less argillaceous

1790-1796 Siltstone, same as above; and shale, gray, silty

1796-1815 Shale, light-gray, claystone, poorly developed siderite nodules; at 1808-1815 a little siltstone, light-gray, quartzose

1815-1823 Shale, dark-gray, slightly carbonaceous, underclay, 60%; siltstone, dark-gray, quartzose, argillaceous, 20%; sandstone, tan, medium-grained, few coarse grains, subangular to subrounded, quartzose, 20%

1823-1831 Shale, very pale green to light-greenish gray, claystone, siderite nodules

1831-1847 Shale, gray, claystone; at 1839-1847 a little siltstone, gray, quartzose, dirty

1847-1855 Shale, very pale green to light-greenish gray, claystone, siderite nodules

1855-1860 Sandstone, light-gray, fine-grained, angular to subangular, quartzose, trace of mica

1860-1867 Sandstone, same as above, but medium- to fine-grained, slightly micaceous, small amount of green mineral

1867-1877 Sandstone, same as above, but mostly fine-grained

1877-1886 Shale, gray, silty, slightly micaceous

1886-1891 Sandstone, white, medium-grained, few coarse grains, angular to subangular, quartzose, slightly micaceous, small amount of green mineral; a little shale, same as above, but coaly

1891-1896 Sandstone, same as above, but medium- to fine-grained, small amount of dark mineral, slightly calcareous

1896-1907 Sandstone, same as above, but medium-grained, no dark mineral,

not calcareous, at 1901-1907 occasional coarse grain

1907-1934 No sample

1934-1940 Sandstone, same as lower part of 1896-1907

1940-1946 Sandstone, same as above, but coarse-grained, moderate amount of milky-white quartz pebble fragments

1946-19(?) Sandstone, same as above, but medium- to coarse-grained, no pebble fragments (illegible marking on sample bag but not 1971)

19(?)-1971 No sample

1971-1977 Siltstone, very light gray, quartzose, siderite nodules; some sandstone, white, fine- to coarse-grained, quartzose, occasional quartz pebble fragment

1977-1986 Sandstone, very light gray, fine- to very fine grained, quartzose, small amount of green mineral, slightly argillaceous

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1986

1986-2004 "Slate and shells"

2004-2011 Sandstone, light-gray to light-grayish green, very fine to fine-grained, subangular to subrounded, quartzose, rather dirty, in part calcareous; a little shale, grayish-green, slightly silty

2011-2016 Shale, gray to dark-maroonish gray, smooth, in part slightly silty and slightly calcareous

2016-2043 "Red rock"

2043-2052 Limestone, dark-brownish gray, very argillaceous, ostracods; and shale, brownish-gray

2052-2061 Shale, off-white to pale-grayish green to gray; a little limestone, light-tan, slightly argillaceous, ostracods

2061-2064 Shale, off-white to pale-grayish green, a little brick-red, calcareous; and sandstone, light-green, very fine grained, quartzose; a little limestone, same as above

2064-2067 "Red rock"

2067-2084 "Sand"

2084-2109 "Slate and shells"

2109-2143 "Sand"

2143-2156 Sand, brownish-gray, very fine grained, quartzose, dirty, slightly calcareous; and shale, gray, slightly silty, slightly carbonaceous

2156-2277 "Slate and shells"

2277-2320 "Sand, broken"

TOP PRINCETON SANDSTONE 2320 (?)

UNITED PRODUCING COMPANY

1-1784 POCAHONTAS MINING CORPORATION WELL

Buchanan County, Virginia
Location: 200 feet east of 81° 45'
50 feet south of 37° 15'
Ground elevation: 2519.4 Total depth: 5735
Drilling commenced: September 28, 1951
Drilling completed: October 29, 1951
Water: 100, HFW; 940, 1 bailer in 1.5 hours
Gas: 1500, show
Oil: None
Casing record: 13 3/8 at 41, 10 3/4 at 595, 8 5/8 at 2361, 7 at 3923
Depth correction: 2336 = 2361

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

0 - 123 "No record"

123 - 126 "Sand"

126 - 132 "Coal"

132 - 137 "Slate"

137 - 203 "Sand"

203 - 249 "Slate"

249 - 306 "Sand"

306 - 316 "Lime"

316 - 379 "Sand"

379 - 384 "Slate"

384 - 530 "Lime"

530 - 540 "Slate"

540 - 600 "Lime, dark"

TOP LEE FORMATION 600

600 - 643 "Sand"

643 - 646 "Slate"

646 - 822 "Lime"

822 - 868 "Sand"

868 - 896 "Slate and shells"

896 - 923 "Sand"

923 - 936 "Lime"

936 - 982 "Sand"

982 - 992 "Lime, gritty"

992 -1040 "Slate and shells"

1040-1050 "Lime"

1050-1055 "Slate"

1055-1120 "Lime, gritty"

1120-1269 "Sand, hard"

1269-1320 "Slate and shells"

1320-1322 "Coal"

1322-1416 "Lime, gritty"

1416-1484 "Slate and shells"

1484-1556 "Lime"

1556-1586 "Slate and shells"

1586-1608 "Sand"

1608-1685 "Lime"

1685-1746 "Slate and shells"

1746-1779 "Lime"

1779-1867 "Lime, gritty"

1867-1897 "Slate and shells"

1897-2015 "Lime, gritty"

2015-2025 "Slate and shells"

2025-2035 "Lime, black"

2035-2085 "Lime, gray"

2085-2210 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 2210

2210-2216 "Slate and shells"

2216-2226 "Lime"

2226-2254 "Red rock"

2254-2279 "Lime"

2279-2300 "Red rock"

2300-2330 "Lime, gray"

2330-2336 "Ravencliff sand"

2336=2361 Depth correction

2361-2373 "Ravencliff sand"

2373-2380 "Slate, caving"

2380-2398 "Lime"

2398-2402 "Red rock"

2402-2425 "Lime"

2425-2455 "Sand"

2455-2477 "Lime, black"

2477-2686 "Lime, gray"

TOP PRINCETON SANDSTONE 2686

UNITED FUEL GAS COMPANY

2-5810 NATIONAL SHAWMUT BANK OF BOSTON WELL

Buchanan County, Virginia
Location: 1.90 miles west of 81° 55',
2.94 miles south of 37° 25'
Ground elevation: 1263.12 Total depth: 5302
Drilling commenced: February 2, 1949
Drilling completed: August 12, 1949
Water: 22; 45, HFW
Gas: 222, show; 494, show; 917, show; 1209, show; 1350, show
Oil: None
Casing record: 13 3/8 at 19, 10 at 514, 8 1/4 at 2197, 6 5/8 at 2814
Depth corrections: None
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

0 - 60 No sample

60 - 85 Sandstone, white, medium- to coarse-grained, subangular to subrounded, quartzose, moderate amount of green and black mineral, slightly micaceous, some quartz-pebble fragments, at 70-79 mostly medium-grained

85 - 95 Siltstone, light-gray, quartzose, argillaceous

95 - 106 Sandstone, same as lower portion of 60-85

106 - 138 Sandstone, same as above, but mostly medium-grained, slightly chloritic

138 - 150 Shale, gray, silty, micaceous; some siltstone, gray, quartzose, argillaceous

150 - 171 Shale, gray, very silty, micaceous

171 - 185 Shale, gray, micaceous, hard; laminated with siltstone, light-gray, quartzose, at 171-175 slightly calcareous

185 - 225 Shale, gray to dark-gray, moderately hard

TOP LEE FORMATION 228

225 - 235 Sandstone, white, fine- to very fine grained, angular, quartzose, chloritic, slightly micaceous; some shale, same as above

235 - 242 Sandstone, same as above, but light-tan; and shale, gray

242 - 256 Shale, gray, silty, micaceous; and siltstone, gray, quartzose

256 - 291 Siltstone, gray, quartzose, argillaceous, micaceous

291 - 304 Shale, gray, silty, micaceous

304 - 315 Shale, same as above; and siltstone, same as 256-291

315 - 325 Siltstone, same as above, but calcareous; a little sandstone, white, fine-grained, subangular, quartzose, moderate amount of accessory minerals, calcareous

325 - 335 Siltstone, same as 304-315

335 - 390 Shale, gray, silty in part, moderately hard

390 - 440 Sandstone, white, medium-grained, occasional coarse grains in lower half, angular to subangular, quartzose, slightly micaceous and chloritic, small amount of dark mineral; at 417-440 apparently interbedded with gray shale and siltstone

440 - 456 Shale, gray, silty in part in lower portion, hard

456 - 486 Shale, dark-gray

486 - 500 Sandstone, white, fine- to very fine grained, angular to subangular, quartzose, slightly feldspathic, clean, at 491-496 some coarse to very coarse grains

500 - 505 No sample

505 - 535 Sandstone, white, fine-grained, angular to subangular, quartzose, slightly feldspathic, slightly micaceous, moderately chloritic, moderate amount of green mineral, at 527-535 all accessory minerals increase in amount

535 - 544 Sandstone, gray, fine-grained, angular to subangular, quartzose, feldspathic, micaceous, chloritic, green mineral, sideritic, dirty, very calcareous

544 - 550 Shale, tan to dark-gray, coaly plant fossils; some siltstone, gray

550 - 566 Siltstone, gray, quartzose, micaceous, argillaceous layers

566 - 575 Shale, dark-gray, very silty, carbonaceous, hard

575 - 598 Siltstone, tan, quartzose; laminated with shale, dark-gray, carbonaceous

598 - 645 Sandstone, tan to white, fine- to very fine grained, angular, quartzose, slightly feldspathic and micaceous, much coaly to argillaceous material, calcareous at the top grading downward to non-calcareous at the base

645 - 673 Sandstone, white, medium-grained, angular to subangular, quartzose, clean at the top, but in the lower portion slightly chloritic and sideritic

673 - 685 Shale, gray, micaceous, hard; some sandstone, same as above, but slightly calcareous

685 - 695 Shale, gray to dark-gray, silty, slightly micaceous, hard

695 - 705 Shale, dark-gray, very silty, slightly micaceous, hard

705 - 715 Shale, dark-gray, carbonaceous, slightly micaceous, hard

715 - 722 Shale, same as above, but silty; a little siltstone, gray, quartzose

722 - 750 Sandstone, tan to white, very fine grained to silt, subangular, quartzose, feldspathic, very slightly micaceous, slightly calcareous, nearly clean; at 730-738 apparently interbedded with a little shale, gray, micaceous

750 - 805 Sandstone, white but at 754-766 light tan, fine-grained with some very fine grains, subangular, quartzose, feldspathic, very slightly micaceous, nearly clean, at 762-766 a few gray argillaceous laminations

805 - 817 Shale, dark-gray, hard; and sandstone, same as above

817 - 828 Shale, dark-gray, hard

828 - 836 Shale, same as above; and sandstone, light-gray, coarse-grained, angular, quartzose, clean

836 - 850 Shale, dark-gray, hard; and siltstone, dark-gray, quartzose, both grading downward to gray

850 - 870 Siltstone, gray, quartzose; a little shale, gray, hard

870 - 881 Sandstone, light-tan, medium- to fine-grained, angular to

subangular, quartzose, slightly calcareous, nearly clean; some siltstone, same as above

881 - 890 Sandstone, same as above, but grayish-tan, occasional coarse grain, dirty with an argillaceous cement, very slightly calcareous

890 - 905 Sandstone, light-tan, fine- to very fine grained, occasional medium grain, angular to subangular, quartzose, nearly clean

905 - 985 Shale, dark-gray, carbonaceous, hard

985 - 991 Siltstone, gray, quartzose; some shale, same as above

991 -1005 Shale, gray, silty, hard, at 1000-1005 very silty

1005-1011 Shale, same as above, but darker; and interbedded siltstone, dark-gray, quartzose

1011-1030 Siltstone, light-gray to dark-gray, quartzose

1030-1046 Sandstone, off-white, very fine grained, quartzose, feldspathic, clean; a little interbedded shale, gray, silty

1046-1060 Sandstone, same as above, but very fine grained to silt; laminated with siltstone, gray, quartzose, argillaceous

1060-1076 Siltstone, gray, quartzose, argillaceous

1076-1090 Sandstone, white, medium- to coarse-grained, subangular to subrounded, quartzose, clean, many fragments of milky-white quartz pebbles at the top but decreasing in amount toward the bottom

1090-1095 Sandstone, same as above, but some fine grains and no pebble fragments

1095-1107 Sandstone, same as above, but coarse-grained with some medium and very coarse grains

1107-1113 Sandstone, same as above, but coarse-grained with some very coarse grains, and many fragments of milky-white quartz pebbles

1113-1118 Sandstone, same as above, but medium- to fine-grained, a few coarse grains, a few pebble fragments

1118-1136 Sandstone, same as above, but at 1118-1121 coarse-grained with some medium grains, at 1133-1136 some very coarse grains, many quartz pebble fragments throughout

1136-1145 Sandstone, same as above, but medium- to coarse- to very coarse grained, no pebble fragments

1145-1150 Conglomerate, white quartz pebble fragments, in a matrix of coarse- to very coarse grained sandstone, same as above

1150-1157 Sandstone, light-gray to tan, fine-grained, angular to subangular, quartzose, slightly micaceous and sideritic, moderate amount of coaly material

1157-1163 Sandstone, white, medium- to coarse-grained, subangular to subrounded, quartzose, clean, many milky-white quartz pebble fragments; at the top some sandstone, same as above

1163-1165 Sandstone, white, medium-grained with a few coarse grains, subangular to subrounded, quartzose, clean

1165-1170 Sandstone, same as above, but mostly coarse with some medium and very coarse grains, some quartz pebble fragments

1170-1174 Sandstone, same as above, but mostly medium-grained, a few coarse grains, a few quartz pebble fragments

1174-1176 Sandstone, same as above, but medium- to coarse-grained with some quartz pebble fragments

1176-1195 Conglomerate, white, quartz pebble fragments (the samples consist entirely of pebble fragments)

1195-1200 Conglomerate, white, quartz pebble fragments, in a matrix of clean coarse-grained quartz sandstone (samples consist of about 75% pebble fragments)

1200-1205 Sandstone, same as 1174-1176 above, but coarse- to very coarse grained, a few quartz pebble fragments

1205-1212 Conglomerate, same as 1176-1195 above

1212-1217 Shale, gray, silty, slightly micaceous, hard

1217-1236 Sandstone, light-tannish gray at the top otherwise light-gray, medium- to fine-grained, angular to subangular,

quartzose, very dirty with the accessory minerals mica, siderite, and dark mineral, small amount of carbonaceous material, at 1217-1220 very calcareous; at 1230-1236 a little siltstone, gray, argillaceous

1236-1240 Sandstone, white, coarse- to medium-grained, some fine grains, subangular to subrounded, quartzose, clean

1240-1250 Shale, gray, silty, hard; some siltstone, light-gray

1250-1258 Shale, same as above, and light-tan underclay and carbonaceous shale

1258-1285 Sandstone, light-gray, at the top very fine-grained to silt grading downward to fine-grained and at the bottom fine-grained with a few medium grains, angular to subangular, quartzose, slightly dirty, micaceous, chloritic, dark mineral

1285-1305 Sandstone, same as above, but medium- to fine-grained, subangular to subrounded, at 1285-1290 and 1295-1300 small amount of carbonaceous material

1305-1314 Sandstone, same as above, but mostly fine- to very fine grained

1314-1360 Sandstone, same as above, but white and clean, below 1331 no accessory minerals except for a little mica, below 1331 mostly fine-grained, at 1314-1331 very slightly calcareous; at 1324-1327 a little interbedded shale, dark-gray

1360-1371 Sandstone, same as above, but medium- to fine-grained with an occasional coarse grain, at 1360-1365 one milky-white quartz pebble fragment

1371-1394 Sandstone, same as above, but mostly fine-grained, no coarse, no pebble fragments, at 1371-1381 slightly calcareous, at 1390-1394 calcite cement

1394-1396 No sample

1396-1412 Sandstone, same as 1371-1394 above, but fine-grained, occasional coarse grain near the base, at 1407-1410 one pebble fragment, at 1396-1407 calcite cement, at 1407-1412 slightly calcareous

1412-1425 Sandstone, same as above, but medium- to fine-grained, at 1412-1418 calcite cement

1425-1431 Shale, gray, silty, micaceous, moderately hard

1431-1438 Sandstone, same as 1412-1425 above, but slightly calcareous, rather dirty with mica and dark mineral; some shale, same as above

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1438

1438-1456 Siltstone, light-gray to white to pale-green, quartzose, feldspathic, very slightly calcareous

1456-1461 Siltstone, same as above; and shale, pale-green and soft to in part light-red and calcareous

1461-1467 Shale, same as above, with a little maroon

1467-1474 Shale, light-gray to pale-maroon to dull-red, calcareous in part, soft

1474-1490 Shale, pale-maroon to dull-red to pale-green, soft; some siltstone, pale-green

1490-1497 Shale, mostly maroon with some brick-red, finely micaceous

1497-1529 Shale, olive-green, at 1506-1520 calcareous in part, at 1520-1529 very slightly calcareous

1529-1550 Shale, olive-green with some maroon, very slightly calcareous; some apparently interbedded limestone, brownish-gray, coarse- to medium-crystalline, fossiliferous in part, dirty and argillaceous

1550-1555 Shale, brick-red to maroon to light-gray, soft, very calcareous; some limestone, tannish-gray, medium-crystalline, finely fossiliferous, dirty

1555-1567 Siltstone, light-greenish gray, quartzose, much calcite cement at the top; and shale, same as above

1567-1579 Siltstone, light-gray, quartzose, ostracods, very calcareous; and shale, light-gray, soft

1579-1587 Shale, red to grayish-green, soft; some siltstone, white, quartzose, calcareous

1587-1635 Sandstone, white and in part with a pale-green cast, very fine grained to silt, angular, quartzose, clean, at 1587-1621 very slightly calcareous

1635-1658 Sandstone, same as above, but light-gray, with some gray and argillaceous beds which become carbonaceous toward the bottom, very slightly calcareous

1658-1665 Sandstone, same as above, but no argillaceous beds; and shale, gray, moderately hard

1665-1700 Shale, dark-gray, carbonaceous, calcareous, moderately hard

1700-1707 Shale, same as above; and sandstone, light-gray, very fine to fine-grained, angular, quartzose, calcite cement

1707-1714 Siltstone, gray to light-gray, quartzose

1714-1721 Siltstone, same as above; a little interbedded shale, gray

1721-1730 Siltstone, same as above; and interbedded shale, gray

1730-1738 Shale, gray; a little interbedded siltstone, same as above

1738-1747 Same as 1721-1730

1747-1760 Siltstone, same as above, but very slightly calcareous; a little interbedded shale, gray

TOP PRINCETON SANDSTONE 1760

UNITED FUEL GAS COMPANY

1-6416 NATIONAL SHAWMUT BANK OF BOSTON WELL

Buchanan County, Virginia
Location: 0.59 miles east of 82° 00',
0.16 miles south of 37° 34'
Ground elevation: 1157.43 Total depth: 5250
Drilling commenced: November 28, 1949
Drilling completed: June 8, 1950
Water: 45
Gas: 615, show
Oil: None
Casing record: 10 at 549, 8 1/4 at 2058, 6 5/8 at 2601
Depth corrections: None
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 22 | "Soil" |
| 22 - 63 | "Sand" |
| 63 - 78 | "Slate" |
| 78 - 95 | "Sand" |
| 95 - 98 | "Coal" |
| 98 - 290 | "Sand" |
| 290 - 441 | Sandstone, white, fine-grained, subangular to subrounded, quartzose, very slightly feldspathic and micaceous, very small amount of dark mineral, at 328-336 a few argillaceous laminations, at 353-358 and 429-432 an occasional medium grain, at 362-367 medium- to fine-grained, at 367-371 no sample |
| 441 - 446 | Sandstone, same as lower part above, but occasional medium to coarse grains, laminated with a small amount of coaly material |
| 446 - 456 | Sandstone, white with a light-green cast, medium- to fine-grained, occasional coarse grain, angular to subrounded, quartzose, slightly micaceous and chloritic, large amount of green mineral at the top but decreases downward, at the bottom calcareous |

456 - 465 Sandstone, white, medium- to fine-grained, occasional coarse grain, angular to subrounded, trace of quartz pebble fragments, quartzose, clean

465 - 482 Sandstone, white, medium-grained, angular to subrounded, quartzose, clean, at 470-475 trace of quartz pebble fragments

482 - 486 Sandstone, same as above, but medium- to fine-grained, occasional coarse grain, occasional fragments of quartz pebbles

486 - 491 Sandstone, same as above, but fine-grained, with occasional fragments of quartz pebbles

491 - 504 Sandstone, white, medium- to fine-grained, angular to subrounded, quartzose, clean

504 - 523 Sandstone, same as above, but mostly fine-grained

523 - 524 Sandstone, same as above, but with some coarse grains and many fragments of milky quartz pebbles

524 - 528 Sandstone, same as above, but medium- to coarse-grained, few fragments of quartz pebbles

528 - 535 Conglomerate, milky-white to pink quartz pebbles (fragments) in a matrix of coarse quartz grains, clean

535 - 544 Shale, dark-gray; some laminations of siltstone, gray, quartzose

544 - 555 No sample

555 - 564 Shale, dark-gray, hard

564 - 597 Sandstone, gray grading downward to light-gray, very fine grained to silt, quartzose, micaceous, at the top very dirty with argillaceous to coaly material, at the bottom laminated with argillaceous to coaly material, at 587-595 in part cemented with tan calcite

597 - 606 Shale, dark-gray; laminated with some siltstone, gray, quartzose

606 - 621 Shale, dark-gray; laminated with siltstone, gray, quartzose

621 - 631 Sandstone, light-gray, very fine to fine-grained, angular to

subangular, quartzose, argillaceous, micaceous, calcareous

631 - 639 Sandstone, same as above, but with a moderate amount of green mineral and dark mineral, in part calcareous, not argillaceous

639 - 661 Sandstone, light-brown, very fine to fine-grained, angular to subangular, quartzose, in part calcareous, at 655-661 very light green, moderate amount of green mineral

661 - 681 Sandstone, same as 639-655 above, but light-gray

681 - 691 Sandstone, same as above; and shale, gray, finely micaceous

691 - 706 Shale, dark-gray

TOP LEE FORMATION 711

706 - 716 Shale, gray, silty, finely micaceous; and sandstone, very light gray, fine-grained, angular to subangular, quartzose, moderately argillaceous, very small amount of green mineral, slightly calcareous

710 - 727 Shale, same as above; some sandstone, same as above (sample bag incorrectly marked)

724 - 734 Sandstone, white, fine-grained, angular to subangular, quartzose, small amount of green mineral, slightly calcareous

734 - 761 Sandstone, same as above, but medium- to fine-grained, not calcareous, at 749-761 light-gray and an occasional coarse grain

761 - 770 Sandstone, same as above, but white, fine-grained

770 - 781 Sandstone, light-gray, medium- to fine-grained, angular to subrounded, slightly dirty; some shale, dark-gray, in part finely micaceous

781 - 790 Shale, tannish-gray, silty to sandy; and sandstone, brownish-gray, very fine grained to silt, argillaceous

790 - 813 Sandstone, white, fine-grained with some medium grains, subangular to subrounded, quartzose, clean

813 - 818 Sandstone, same as above, but medium- to fine-grained, occasional coarse grain

818 - 834 Sandstone, same as above, but mostly fine-grained

834 - 840 Sandstone, same as above, but medium- to fine-grained

840 - 842 Sandstone, same as above, but mostly fine-grained

842 - 846 Sandstone, same as above, but coarse-grained

846 - 850 Sandstone, same as above, but medium- to coarse-grained

850 - 859 Sandstone, same as above, but coarse-grained, moderate amount of pebble fragments of milky-white quartz

859 - 864 No sample

864 - 871 Sandstone, same as 850-859

871 - 881 Sandstone, same as above, but medium- to fine-grained, some coarse grains, no pebble fragments

881 - 884 Sandstone, same as above, but no coarse grains

884 - 889 Sandstone, same as above, but occasional coarse grain, occasional pebble fragment

889 - 893 Sandstone, same as above, but moderate amount of coarse grains

893 - 895 No sample

895 - 908 Sandstone, same as 889-893, but medium- to fine-grained, at 900-903 an occasional pebble fragment

908 - 911 Sandstone, same as lower part above, but medium-grained

911 - 916 Sandstone, same as above, but with some coarse grains

916 - 934 Sandstone, same as above, but coarse-grained, at 928-934 a few medium grains

934 - 941 Conglomerate, milky-white quartz pebble fragments in a matrix of very coarse, subangular to subrounded quartz grains

941 - 948 Conglomerate, same as above, but matrix is medium- to very coarse grained; a little coal

948 - 955 Conglomerate, same as above, but matrix is coarse- to very coarse grained

955 - 964 Conglomerate, same as above; and sandstone, light-gray, very

fine grained to silt, quartzose, occasional argillaceous lamination

964 - 969 No sample

969 - 974 Sandstone, light-gray, very fine grained to silt, quartzose, occasional argillaceous lamination

974 - 983 Sandstone, same as above; some interbedded shale, gray, micaceous, silty

983 - 989 Sandstone, light-tan, fine- to very fine grained, angular to subangular, quartzose, slightly micaceous and chloritic, small amount of dark mineral, tan calcite cement

989 -1007 Sandstone, white, fine-grained, at the bottom in part medium-grained, angular to subangular, quartzose, nearly clean

1007-1015 Sandstone, same as above, but medium-grained

1015-1039 Sandstone, same as above, medium- to fine-grained, clean, at 1029-1039 mostly medium-grained

1039-1051 Sandstone, same as above, but medium-grained with some coarse grains, occasional pebble fragment of milky-white quartz

1051-1067 Sandstone, same as above, but medium-grained at the top grading downward to in part fine-grained, no pebble fragments

1067-1078 Sandstone, same as above, but medium- to fine-grained, in part cemented with tan calcite

1078-1095 Sandstone, same as above, but medium-grained with some fine grains and some coarse grains, no calcite cement

1095-1100 Sandstone, same as above, but medium-grained, an occasional coarse grain

1100-1105 No sample

1105-1110 Sandstone, same as 1095-1100

1110-1116 No sample

1116-1121 Sandstone, same as 1105-1110, but medium- to coarse-grained

1121-1126 Conglomerate, milky-white, quartz pebble fragments

1126-1140 No sample

1140-1160 Shale, dark-gray, slightly silty

1160-1170 Sandstone, white, a little is light-gray, angular to subangular, quartzose, clean

1170-1198 Sandstone, same as above, but white, toward the base an occasional medium grain, at 1184-1191 a few coal laminations

1198-1206 Sandstone, same as basal part above, but fine- to very fine grained, few argillaceous and micaceous laminations

1206-1216 Sandstone, same as above, but fine-grained; some shale, dark-gray, silty

1216-1225 Shale, dark-brownish gray, silty; some coal

1225-1231 Shale, gray, underclay; and sandstone, white, fine-grained, angular to subangular, quartzose, clean

1231-1243 Sandstone, same as above

1243-1251 Sandstone, same as above, but medium- to fine-grained, occasional coarse grain

1251-1270 Sandstone, same as above, but fine-grained, at 1265-1270 an occasional medium grain

1270-1277 Sandstone, same as above, but medium- to coarse-grained, some pebble fragments of milky-white quartz

1277-1283 Sandstone, same as above, but only a few pebble fragments

1283-1300 Sandstone, same as above, but medium-grained, an occasional coarse grain, no pebble fragments, at 1297-1300 in part coarse-grained

1300-1316 Sandstone, same as above, but medium- to coarse-grained, at 1305-1311 mostly medium-grained

1316-1336 Sandstone, same as above, but fine-grained, at 1321-1327 very small amount of dark mineral

1336-1342 Sandstone, same as bottom part above, but medium- to coarse-grained, an occasional pebble fragment of milky-white quartz

1342-1348 Sandstone, same as above, but medium- to fine-grained, an occasional coarse grain, no pebble fragments

1348-1354 Sandstone, same as above, but medium- to coarse-grained, moderate amount of pebble fragments of milky-white quartz

1354-1367 Sandstone, same as above, but medium- to coarse-grained, no pebble fragments except at 1361-1367 an occasional pebble fragment

1367-1373 Sandstone, same as above, but fine- to medium- to coarse-grained, numerous pebble fragments of milky-white quartz

1373-1389 Sandstone, same as above, but medium- to fine-grained grading downward to mostly fine-grained, no pebble fragments, at 1383-1389 an occasional coarse grain

1389-1393 Sandstone, same as above, but medium- to coarse-grained, occasional pebble fragment

1393-1403 Sandstone, same as above, but medium- to fine-grained, an occasional coarse grain, no pebble fragments except at 1396-1403 an occasional pebble fragment

1403-1414 Sandstone, same as upper part above, but medium- to fine-grained, light-gray because of a little tan to gray interstitial material

1414-1425 Sandstone, same as above, but mostly medium-grained, occasional coarse grain, at 1420-1425 becoming off-white

1425-1435 Shale, black, carbonaceous to coaly, 60%; sandstone, gray, fine-grained, quartzose, argillaceous, 20%; shale, light-gray, underclay, 20%

1435-1473 Sandstone, white, medium- to coarse-grained, angular to subrounded, quartzose, nearly clean, at 1444-1450 angular to subangular

1473-1482 Sandstone, white to light-gray, very fine grained to silt; and shale, gray, very silty

1482-1489 Shale, gray, very silty

1489-1493 Sandstone, white to light-gray, very fine grained to silt, few shale laminations

1493-1509 Sandstone, white, very fine to fine-grained, angular to

subangular, quartzose, clean

1509-1530 Sandstone, same as above, but fine-grained, at 1520-1525 occasional medium grain, at 1525-1530 in part medium-grained

1530-1534 Sandstone, same as above, but medium- to fine-grained

1534-1539 Sandstone, same as above, but in part very coarse grained, pebble fragments of milky-white quartz

1539-1544 Sandstone, same as above, but medium- to fine-grained, occasional coarse grain, occasional pebble fragment

1544-1554 Sandstone, same as above, but medium- to fine-grained, at 1550-1554 occasional pebble fragment

1554-1559 Sandstone, same as above, but coarse-grained, numerous pebble fragments of milky-white quartz

1559-1564 Sandstone, same as above, but medium- to fine-grained, numerous pebble fragments of milky-white quartz

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1564

1564-1574 Shale, gray, finely micaceous, moderately hard

1574-1584 Shale, pale-green, rust-red, light-gray, mudstone; a little limestone, yellowish-tan, argillaceous

1584-1594 Siltstone, light-green, quartzose, micaceous; and shale, maroon to light-gray; a little limestone, same as above

1594-1602 Siltstone, olive-green, quartzose, micaceous

1602-1613 Shale, gray, finely micaceous, moderately hard

1613-1621 Shale, same as above, but olive-green, in part calcareous, small amount of creamy-white chert (?)

1621-1630 Shale, drab-red to gray, finely micaceous; some limestone, tan, silty to argillaceous, ostracods

1630-1637 Shale, red to greenish-gray

1637-1645 Shale, gray

1645-1655 Shale, red to olive-gray, mudstone, possibly contains limy nodules

1655-1661 Shale, red, slightly calcareous, soft, few ostracods

1661-1671 Shale, red to greenish-gray, soft, few ostracods; a little siltstone, white to light-gray, quartzose

1671-1677 Shale, same as above; and interbedded siltstone, same as above

1677-1686 Shale, red, soft, few ostracods; and interbedded siltstone, same as above

1686-1691 No sample

1691-1699 Siltstone, same as 1677-1686 above, but calcareous; some interbedded shale, gray, silty, micaceous

1699-1704 Siltstone, same as above, but slightly calcareous, few argillaceous laminations

1704-1726 Siltstone, gray, quartzose, feldspathic, micaceous, very argillaceous

1726-1736 Shale, gray, finely micaceous; some siltstone, same as above

1736-1742 Shale, greenish-gray, a little is red, mudstone, slightly calcareous; and sandstone, white, fine-grained, angular to subangular, quartzose, clean

1742-1751 Sandstone, same as above

1751-1757 Shale, gray, micaceous; and shale, red, mudstone; and siltstone, green, quartzose

1757-1765 Siltstone, light-green, quartzose, slightly argillaceous; and shale, reddish-brown, micaceous, moderately hard

1765-1772 Shale, same as above; and shale, red to gray, soft

1772-1780 Shale, gray

1780-1805 Sandstone, white, fine-grained, occasional medium grain, angular to subangular, quartzose, clean

1805-1815 Shale, gray, finely micaceous

1815-1822 Shale, light-gray, silty, finely micaceous; some siltstone to very fine grained sandstone, white, quartzose

1822-1828 Siltstone to very fine grained sandstone, white to light-gray, quartzose

1828-1838 Siltstone to very fine grained sandstone, yellowish-tan, quartzose

1838-1856 Shale, gray, silty, coaly plant fossils; a little interbedded siltstone, light-gray, quartzose

1856-1863 Sandstone, white, very fine grained to silt, quartzose; laminated with some shale, gray, micaceous

1863-1867 Shale, gray, silty, micaceous

1867-1870 Shale, dark-gray, silty, micaceous

1870-1873 Shale, light-gray to gray, mostly mudstone, in part with poorly-developed siderite nodules; a little sandstone, white to light-gray, very fine grained to silt

1873-1877 Shale, same as above, but dark-gray

TOP PRINCETON SANDSTONE 1877

UNITED FUEL GAS COMPANY

8415 NATIONAL SHAWMUT BANK OF BOSTON WELL

Buchanan County, Virginia
Location: 1.90 miles west of 81° 55'
2.93 miles south of 37° 25'
Ground elevation: 1353.65 Total depth: 5567
Drilling commenced: July 2, 1957
Drilling completed: November 11, 1957
Water: 61-63, HFW
Gas: 2183-2192, 60 MCF
Oil: None
Casing record: 13 3/8 at 39, 10 3/4 at 807, 8 5/8 at 2780
Depth corrections: None
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

0 - 63 No sample

63 - 100 Sandstone, light-gray, medium-grained with a few coarse grains, at 96-100 mostly coarse-grained, subangular to subrounded, quartzose, very slightly feldspathic, moderately micaceous and chloritic, moderate amount of green grains and dark grains, at 63-79 moderate amount of coaly material

100 - 112 Shale, gray with a little tan, silty, micaceous, hard, slightly calcareous

112 - 118 Siltstone, light-gray, quartzose, moderately micaceous

118 - 123 Shale, gray, silty, hard, micaceous

123 - 130 Shale, same as above; and siltstone, light-gray, quartzose, slightly feldspathic

130 - 137 No sample

137 - 143 Sandstone, light-gray, fine-grained, subangular, quartzose, feldspathic, calcareous, moderately micaceous, a few chips are darkly laminated with coaly material

143 - 149 Siltstone, gray, quartzose, argillaceous, slightly calcareous micaceous, dirty; some sandstone, gray, slightly calcareous, otherwise same as above

149 - 150 Siltstone, same as above; a little coal; a little shale, carbonaceous

150 - 157 Shale, gray, silty, silty laminations, micaceous

157 - 204 Shale, gray, soft, small amount of scattered pyrite, most is very calcareous and nearly an argillaceous limestone

204 - 225 Sandstone, dark-gray, fine-grained, subangular, quartzose, quite argillaceous, moderately micaceous, slightly calcareous, at 204-210 one orange-colored lamination of siderite (?)

225 - 237 Sandstone, tan to light-gray, fine- to very fine grained, subangular, quartzose, feldspathic, moderately micaceous, calcareous cement

237 - 254 Siltstone, gray, quartzose, argillaceous, slightly micaceous, slightly calcareous

254 - 301 Sandstone, white, medium-grained with a few fine grains, at the base a few coarse grains, subangular to subrounded, quartzose, slightly calcareous, micaceous, chloritic, some green grains, at 254-263 a few coal grains, at 280-288 a little included coal

301 - 313 Shale, gray, soft

313 - 331 Shale, gray, micaceous; and siltstone, gray, quartzose, feldspathic

331 - 336 Shale, gray, micaceous; and shale, gray, unctuous, underclay with a coaly film; some sandstone, gray, fine-grained to silt, quartzose, dirty

336 - 342 Sandstone, brown, fine-grained, subangular, quartzose, feldspathic, micaceous

342 - 395 Sandstone, white, mostly medium-grained with some fine grains, subangular, quartzose, micaceous, chloritic, at 367-389 dirty with coaly material

395 - 402 Shale, gray, soft; a little sandstone, dark-gray, fine-grained, quartzose, much coaly material

402 - 412 Shale, gray, soft, micaceous in part

412 - 445 Shale, gray, micaceous, silty; and interbedded sandstone,

light-gray, fine-grained to silt, subangular, quartzose, micaceous, slightly calcareous, small amount of fine coaly material

445 - 467 Shale, gray, silty; and siltstone, gray, quartzose

467 - 472 Shale, gray, unctuous, underclay, a little is dark-gray and carbonaceous, a little is gray and silty, 60%; sandstone, white, medium-grained, subangular to subrounded, quartzose, slightly micaceous, a few green grains, slightly calcareous, 40%

472 - 551 Sandstone, same as above, with some fine grains at 480-485 and a few coarse grains at 485-510 and 537-551, slightly chloritic below 485, no sample at 519-525

551 - 581 Siltstone, gray, quartzose, argillaceous, very slightly calcareous

581 - 600 Siltstone, very light tan, quartzose, feldspathic, a little coaly or bituminous material on bedding surfaces

600 - 609 Sandstone, very light tan, very fine grained, subangular, quartzose, feldspathic, in part a little dirty with coaly material

609 - 685 Sandstone, white, fine-grained, subangular, quartzose, clean, at 609-620 very slightly feldspathic and micaceous, at 615-639 and 647-685 a few laminations of argillaceous to coaly material, at 667-677 most grains are well-rounded

685 - 699 Sandstone, white, fine-grained, a few coarse grains, subangular, quartzose, micaceous, chloritic, slightly calcareous

699 - 708 Sandstone, white, coarse- to medium-grained, subangular to subrounded, quartzose, clean except for a little biotite, milky-white pebble fragments of vein quartz

708 - 731 Sandstone, same as above, but medium-grained and no pebble fragments

731 - 784 Sandstone, same as above, but medium to fine-grained, at 736-743 and 771-778 a few coarse grains, at 778-784 a few pebble fragments as at 699-705

784 - 796 Sandstone, light-gray, fine-grained, subangular, quartzose, micaceous, chloritic, moderate amount of coaly material, dirty; some sandstone, same as above

796 - 798 "Sand"

798 - 888 "Slate and shells"

TOP LEE FORMATION 888

888 - 913 "Sand"

913 -1022 "Slate and shells"

1022-1117 "Sand"

1117-1184 Sandstone, white, medium-grained with a few fine grains and coarse grains, subangular to subrounded, quartzose, clean, several pebbles of milky-white quartz, at 1162-1184 the grains exhibit crystal faces, at 1134-1142 no sample

1184-1188 No sample

1188-1197 Sandstone, light-gray, fine-grained to silt, subangular, quartzose, rather feldspathic, carbonaceous material on bedding surfaces

1197-1205 Siltstone, gray, quartzose, argillaceous

1205-1214 Shale, gray, silty, micaceous; some siltstone, same as above; a little shale, gray, unctuous, underclay

1214-1226 Sandstone, light-gray, fine-grained, subangular, quartzose, slightly feldspathic, micaceous, chloritic, calcareous cement, a few coaly laminations

1226-1254 Sandstone, light-gray, medium- to fine-grained, subangular to subrounded, quartzose, slightly feldspathic, micaceous, moderately chloritic, a few coaly laminations; at 1237-1244 a little coal

1254-1276 Sandstone, light-gray, medium- to fine-grained, a few coarse grains, a few fragments of quartz pebbles, subangular to subrounded, quartzose, slightly feldspathic, slightly calcareous, clean

1276-1287 Sandstone, same as above, but no coarse grains

1287-1295 Sandstone, same as above, but mostly fine-grained, some medium grains, a very few coarse grains

1295-1305 Sandstone, white to light-gray, fine-grained, subangular, quartzose, slightly micaceous, coaly laminations, in part calcareous

1305-1315 Shale, gray, silty, micaceous

1315-1319 No sample

1319-1331 Sandstone, white, fine-grained with a few medium grains, subangular, quartzose, moderately micaceous and chloritic, calcareous; some shale, gray, soft, finely micaceous

1331-1339 Shale, brown to dark-brown, in part carbonaceous, contains floating quartz grains which are fine and angular, coaly laminations

1339-1349 Sandstone, light-tan, very fine to medium-grained, with a few coarse grains, angular to subrounded, quartzose, in part very argillaceous; and shale, same as above

1349-1355 Sandstone, same as above; some shale, very light gray, soft, finely micaceous

1355-1387 Sandstone, light-tan, very fine to medium-grained, mostly subangular, quartzose, argillaceous in part, micaceous, chloritic, coaly laminations

1387-1397 Sandstone, same as above, but fine-grained and very slightly pyritic

1397-1400 No sample

1400-1420 Shale, gray, silty, hard

1420-1432 Sandstone, light-gray, fine- to very fine grained, subangular, quartzose, coaly laminations, in part calcareous, 40%; shale, same as above, 30%; coal and shale, dark-brown, carbonaceous, 30%

1432-1439 Siltstone, light-gray, quartzose, argillaceous, siderite nodules, 60%; shale, light-gray, soft, siderite nodules, underclay, 30%; coal and shale, dark-brown, carbonaceous, 10%

1439-1463 Sandstone, white to light-gray, fine-grained, subangular, quartzose, clean

1463-1471 Sandstone, same as above, but fine- to coarse-grained

1471-1480 Sandstone, same as above, but medium- to coarse-grained, some quartz-pebble fragments

1480-1516 Sandstone, same as above, but medium-grained

1516-1523 Sandstone, same as above, but medium- to coarse-grained, no pebble fragments

1523-1550 Sandstone, same as above, but fine-grained, in the middle a few coarse grains, slightly feldspathic

1550-1572 Sandstone, same as above, but medium- to fine-grained with a few coarse grains, at 1565-1572 a few very coarse grains

1572-1576 No sample

1576-1597 Sandstone, light-gray, fine-grained with some medium grains and a few coarse grains, subangular, quartzose, moderately micaceous

1597-1645 Sandstone, white, medium- to very coarse grained, fragments of milky-white quartz pebbles, subangular to subrounded, quartzose, clean

1645-1664 Sandstone, light-tan, medium- to fine-grained, angular to subrounded, quartzose, moderately micaceous and chloritic, some green grains, in the upper part calcareous cement, in the lower part some argillaceous laminations

1664-1675 Sandstone, same as above, but gray; and shale, gray, silty

1675-1684 Sandstone, light-gray, fine-grained, subangular, quartzose, slightly feldspathic, very slightly micaceous and chloritic, nearly clean; and siltstone, gray, quartzose, argillaceous

1684-1699 Sandstone, white, medium- to fine-grained, subangular to subrounded, quartzose, clean

1699-1707 Sandstone, same as above, with several whole quartz pebbles 6 m.m. in largest dimension

1707-1722 Sandstone, same as above, but mostly medium-grained with some fine grains and some coarse grains, no whole pebbles but some fragments, very slightly calcareous

1722-1729 Sandstone, light-gray, fine-grained, subangular, quartzose, very slightly calcareous, clean except for a few coaly laminations

1729-1736 Sandstone, as at 1707-1722, but with some very coarse grains

1736-1744 Conglomerate, white, many fragments of quartz pebbles and some whole pebbles approximately 6 m.m. in largest dimension, apparently in a matrix of subangular to subrounded, fine to coarse quartz grains

1744-1755 Sandstone, white, medium- to coarse-grained, some pebble fragments, subangular to subrounded, quartzose, clean

1755-1764 Sandstone, same as above, but some fine grains and some very coarse grains, only a few pebble fragments, very slightly calcareous

1764-1769 Sandstone, same as above, but medium- to fine-grained, no pebble fragments

1769-1776 Sandstone, same as above; some shale, dark-gray and silty to light-gray and soft

1776-1784 Sandstone, same as above, but with a few coarse grains and many fragments of quartz pebbles, not calcareous

1784-1790 Sandstone, same as above, but no pebble fragments

1790-1795 Sandstone, same as above, but with many pebble fragments

1795-1802 Sandstone, same as above, some crystal faces on grains, one pebble fragment appears to be quartzite, in part very slightly calcareous

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1802

1802-1813 Shale, light-gray to light-green, soft, claystone

1813-1820 Shale, gray, micaceous

1820-1838 Shale, gray to rusty to light-gray, in part silty, in part unctuous, rusty shale is calcareous; and limestone, brown to gray, silty and argillaceous; some siltstone, light-gray, quartzose, calcareous (all apparently interbedded)

1838-1848 Shale, gray to light-gray, in part silty, in part unctuous; and siltstone, brown, quartzose, argillaceous to

carbonaceous cement

1848-1859 Shale, dark-brown, carbonaceous, slightly pyritic, a few tiny fossils

1859-1867 Siltstone, light-grayish green, quartzose, calcareous; some shale, gray to light-gray, slightly calcareous

1867-1897 Siltstone to sandstone, very fine grained, light-gray, quartzose, calcareous; at 1875-1897 some interbedded shale, light-gray, soft

1897-1902 Siltstone to sandstone, same as above, but in part light-green; a little limestone, brown, fossiliferous

1902-1935 Siltstone, white to light-gray, quartzose, slightly feldspathic, in part calcareous, in the lower third slightly micaceous

1935-1944 Siltstone, same as above; some interbedded sandstone, white, fine-grained, subangular, quartzose, clean

1944-1952 Siltstone, same as above, but micaceous

1952-1961 Sandstone, white, very fine grained, subangular, quartzose, clean; and siltstone, light-gray, quartzose, slightly feldspathic, micaceous, carbonaceous laminations

1961-1975 Sandstone, same as above

1975-2035 Shale, dark-brownish gray, hard, somewhat carbonaceous

2035-2062 Sandstone, white to light-gray, fine-grained, subangular, quartzose, pyritic, clean; and interbedded shale, same as above

2062-2080 Sandstone, same as above, but slightly calcareous, argillaceous material and coaly material on bedding surfaces; some interbedded shale, gray, slightly silty, micaceous

2080-2089 Shale, light-gray, appears unctuous but hard

2089-2104 Siltstone, gray to white, quartzose, micaceous, slightly pyritic, in the lower part disseminated coaly material

TOP PRINCETON SANDSTONE 2104

## UNITED FUEL GAS COMPANY

## 74-8295 KENTLAND COAL AND COKE COMPANY WELL

Buchanan County, Virginia
Location: 0.54 miles west of 82° 05',
0.01 miles north of 37° 25'
Ground elevation: 1242.10 Total depth: 5392
Drilling commenced: August 4, 1957
Drilling completed: September 30, 1957
Water: None
Gas: None
Oil: None
Casing record: 13 3/8 at 9, 10 3/4 at 72, 7 at 2745
Depth correction: None
Samples examined by George R. Thomas, Geologist, United Fuel Gas Company, during the drilling operation. Description has been edited by David G. Bowen to conform to the style of the present report. Formation boundaries placed by Bowen and based in part on the radioactivity log of the well. The well was drilled with rotary tools and natural gas was used as the drilling fluid.

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

0 - 350 "Sand and shale"

350 - 370 Shale, gray, silty

370 - 390 Shale, same as above; and sandstone, fine-grained, angular; at 380-390 a little brown shale

390 - 400 Shale, dark-gray, silty

400 - 410 Shale and siltstone

410 - 420 Sandstone, fine- to medium-grained, subangular to subrounded, moderately micaceous

420 - 440 Siltstone; and sandstone, angular to subangular, dirty

440 - 490 Sandstone, fine- to medium-grained, angular to subangular, micaceous, at 460-470 in part medium-grained and subrounded to rounded, at 470-480 not micaceous; at 480-490 some shale, silty, dirty

490 - 500 Sandstone and siltstone, angular, dirty

500 - 510 Sandstone, medium- to coarse-grained, angular to sub-angular, in part subrounded, tightly cemented

510 - 560 "Sand"

560 - 620 "Shale"

620 - 630 Shale, gray to dark-gray; some sandstone, coarse-grained, angular

630 - 640 Shale, light-gray to dark-gray

640 - 660 Sandstone, fine- to medium-grained, angular to subangular, dirty, tight

660 - 670 Sandstone, fine- to medium-grained, angular to subangular, many quartz grains have crystal faces

670 - 680 Shale, dark-gray; trace of sandstone

680 - 690 Shale, gray to dark-gray; some sandstone, angular

690 - 700 Shale, gray to dark-gray, silty

700 - 740 Sandstone, fine- to medium-grained, angular to subangular, dirty, tight; at 720-740 some shale, dark-gray

740 - 750 Shale, gray to dark-gray; some sandstone, dirty

750 - 760 Shale, gray, silty

760 - 780 Shale, dark-gray, in part silty

TOP LEE FORMATION 780

780 - 790 Sandstone, fine- to medium-grained, angular, dirty, tight; some shale, dark-gray to black

790 - 800 Sandstone, same as above; some shale, gray

800 - 810 Sandstone, fine- to coarse-grained, angular to subangular, tight; some shale, gray to dark-gray

810 - 850 Shale, dark-gray; some (apparently interbedded) sandstone, same as above

850 - 860 Shale, dark-gray, silty; some sandstone, angular

860 - 870 Shale, dark-gray, silty; some sandstone, angular; a little coal

870 - 900 Sandstone, fine- to coarse-grained, angular, dirty, tight

900 - 920 Sandstone, fine-grained to conglomeratic, angular to subangular, tight

920 - 940 Sandstone, coarse-grained to conglomeratic, unsorted, tight

940 - 960 Sandstone, fine- to coarse-grained, angular to subangular, tight, at 950-960 many quartz crystal faces

960 - 970 Sandstone, medium- to coarse-grained, conglomeratic, angular to subrounded, tight

970 - 980 Sandstone, fine- to coarse-grained, angular, tight

980 - 990 Sandstone, coarse-grained, conglomeratic, subangular to subrounded, tight; some shale, dark-gray to black; a little coal

990 -1000 Sandstone, coarse-grained, conglomeratic, angular to subrounded, quartz crystal faces, very tight; some shale, dark-gray to black

1000-1010 Sandstone, same as above; and shale, dark-gray

1010-1030 Sandstone, fine-grained, conglomeratic, angular to subangular, tight; at 1020-1030 some shale, dark-gray

1030-1040 Sandstone, fine- to coarse-grained, angular, tight; and shale, gray to dark-gray; and coal

1040-1050 Sandstone, conglomeratic; some shale, gray to dark-gray

1050-1060 Sandstone, coarse-grained, conglomeratic, angular to subangular, very dirty, tight

1060-1100 Sandstone, fine- to coarse-grained, conglomeratic, subangular, dirty, tight; some shale, dark-gray; at 1080-1100 some coal

1100-1120 Sandstone, medium- to coarse-grained, conglomeratic, subangular to subrounded, micaceous, unsorted, tight, at 1110-1120 many quartz crystal faces

1120-1130 Sandstone, medium- to coarse-grained, angular to subangular, tightly cemented; some shale, gray

1130-1150 Sandstone, medium- to coarse-grained, conglomeratic, angular

to subangular, tight

1150-1180 Sandstone, medium-grained to conglomeratic, subangular to subrounded, unsorted, tightly cemented

1180-1210 Sandstone, fine- to coarse-grained, conglomeratic, angular to subangular, unsorted, tight

1210-1220 Sandstone, medium- to coarse-grained, angular to subrounded, tightly cemented

1220-1240 Sandstone, same as above, but conglomeratic, micaceous, dirty

1240-1250 Sandstone, fine- to coarse-grained, conglomeratic, angular to subrounded, micaceous, dirty, tight

1250-1260 Sandstone, medium- to coarse-grained, angular to subangular, tight

1260-1270 Sandstone, same as above, but subangular to subrounded

1270-1280 Sandstone, coarse-grained, conglomeratic, angular to subrounded, tight

1280-1290 Sandstone, same as above; and shale, dark-gray; some coal

1290-1300 Shale, dark-gray; some sandstone, coarse-grained, conglomeratic

1300-1310 Shale, dark-gray; and coal

1310-1320 Shale, gray to dark-gray; and coal

1320-1330 Shale, dark-gray, silty

1330-1340 Siltstone, gray to dark-gray

1340-1350 Siltstone, gray to dark-gray; and sandstone, medium-grained, angular to subrounded

1350-1360 Shale, gray to dark-gray; and sandstone, fine- to coarse-grained, angular to subrounded, tight

1360-1370 Sandstone, medium- to coarse-grained, angular to subrounded, tightly cemented

1370-1380 Sandstone, fine- to coarse-grained, angular to subangular, tight

1380-1390 Sandstone, medium- to coarse-grained, conglomeratic, subangular to subrounded, quartz crystal faces

1390-1410 Sandstone, fine- to coarse-grained, angular to subrounded, tight; at 1400-1410 some shale, dark-gray

1410-1450 Sandstone, same as above, but conglomeratic, angular to subangular; a little shale, dark-gray

1450-1480 Sandstone, same as above, but angular to subrounded, unsorted; at 1460-1470 a little coal; at 1470-1480 some shale, gray

1480-1490 Sandstone, same as above; some shale, gray, very dirty

1490-1540 Sandstone, medium- to coarse-grained, conglomeratic, angular to subrounded, in part rounded, tightly cemented, at 1500-1540 quartz crystal faces, at 1520-1540 dirty and tight; at 1530-1540 a little shale, dark-gray

1540-1560 Sandstone, coarse-grained, conglomeratic, subangular to subrounded; some shale, gray to dark-gray

1560-1570 Sandstone, medium- to coarse-grained, subangular to rounded, tightly cemented with quartz

1570-1580 Sandstone, fine- to coarse-grained, angular to subangular, unsorted, tight

1580-1590 Sandstone, medium- to coarse-grained, conglomeratic, angular to subrounded, unsorted, tight; a little shale, gray

1590-1610 Sandstone, same as above; some shale, dark-gray to brown; a little shale, gray

1610-1630 Sandstone, same as above, but subangular to subrounded, at 1620-1630 very friable

1630-1640 Sandstone, medium- to coarse-grained, angular to subangular, unsorted, tight

1640-1650 Sandstone, same as above, but very dirty; some shale; a little coal

1650-1690 Sandstone, coarse-grained, conglomeratic, angular to subangular, quartz crystal faces, tight

1690-1720 Sandstone, medium- to coarse-grained, conglomeratic, angular to subrounded, quartz cement, tight

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1723

1720-1730 Sandstone, same as above; some shale, light-gray to gray

1730-1750 Shale, light-gray to gray, claystone; at 1740-1750 some coal

1750-1780 Shale, red to gray to buff to black, pyritic; some shale, light-gray, dolomitic; at 1770-1780 some limestone, gray

1780-1790 Limestone, white to tan, dense; and shale, light-gray; few grains of subrounded to rounded, fine- to medium-grained sand

1790-1810 Limestone, tan to gray, dense to coarse-crystalline; and shale, light-gray to in part red; some sand, same as above

1810-1820 Limestone, gray to tan to light-brown; and shale, light-gray; and sandstone, fine- to medium-grained, subangular to subrounded, tight

1820-1830 Shale, light-gray, dolomitic; a little sandstone, same as above

1830-1850 Shale, light-gray, dolomitic; some shale, red to gray; a little sandstone, same as above

1850-1860 Sandstone, tight; and limestone; and shale

1860-1870 Shale, red to light-gray to black; and sandstone, fine- to medium-grained, angular to subrounded, tight

1870-1880 Shale, light-gray to gray, silty; some limestone; a little sandstone

1880-1890 Shale, limestone and sandstone

1890-1900 Shale, gray; some sandstone; some coal

1900-1910 Shale, gray to in part red; some sandstone

1910-1920 Shale, gray to dark-gray, in part silty

1920-1940 Shale, same as above; and sandstone, fine-grained, angular, dirty

1940-1950 Shale, gray to dark-gray, in part brown, silty; some shale, red

1950-1980 Shale, gray to dark-gray, in part silty

1980-2000 Shale, dark-gray, silty; trace of shale, red

2000-2010 Shale, gray to dark-gray, silty

2010-2020 Shale, light-gray, in part red

TOP PRINCETON SANDSTONE 2015

UNITED FUEL GAS COMPANY

1-6431 HUGH McRAE WELL

Buchanan County, Virginia
Location: 1.82 miles east of 82° 00',
0.78 miles south of 37° 10'
Ground elevation: 1799.14 Total depth: 4800
Drilling commenced: October 16, 1948
Drilling completed: June 7, 1949
Water: 967-974, small amount
Gas: 810, show; 935-938, 133 MCF; 1348-1352, show
Oil: None
Casing record: 10 3/4 at 666, 8 5/8 at 2520, 7 at 3621
Depth corrections: None
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 10 | "Surface" |
| 10 - 20 | "Lime" |
| 20 - 45 | "Sand" |
| 45 - 143 | "Lime" |
| 143 - 171 | "Slate" |
| 171 - 186 | "Lime" |
| 186 - 240 | "Slate" |

TOP LEE FORMATION 240

| | |
|---|---|
| 240 - 275 | "Sand" |
| 275 - 288 | Shale, dark-gray to gray, in the lower part some is reddish, silty, carbonaceous material, micaceous, pyritic, plant fossils; and sandstone, white, medium-grained, angular, quartzose, slightly glauconitic |
| 288 - 295 | Shale, same as above; and sandstone, white to rusty, medium- to fine-grained, angular, quartzose, slightly glauconitic |
| 295 - 303 | Shale, same as above |

303 - 325 Shale, gray

325 - 355 Shale, gray; some interbedded sandstone, gray, fine-grained, angular, quartzose, very argillaceous

355 - 374 Shale, gray, silty, micaceous; and interbedded sandstone, same as above

374 - 389 Shale, gray, micaceous; and interbedded sandstone, gray, medium- to fine-grained, angular, quartzose, very argillaceous, small amount of coaly material

389 - 407 Shale, gray, micaceous, at 400-407 silty

407 - 414 Shale, same as basal portion above, 60%; coal, 20%; sandstone, light-gray, fine-grained, angular, quartzose, 20%

414 - 420 No sample

420 - 429 Sandstone, white, medium- to fine-grained, angular, quartzose, micaceous, moderate amount of dark grains; a little interbedded shale, gray, silty, micaceous

429 - 435 Sandstone, same as above; and shale, same as above

435 - 473 Shale, gray, slightly micaceous

473 - 488 Sandstone, light-gray, fine-grained, angular, quartzose, micaceous, glauconitic, at 482-488 much dark mineral, at 473-482 argillaceous

488 - 508 Sandstone, white, medium-grained, angular, quartzose, dark mineral

508 - 520 Sandstone, white to gray, fine-grained, angular, quartzose, micaceous

520 - 531 Sandstone, same as above, but very fine grained

531 - 537 Shale, gray, micaceous, 80%; coal, 20%

537 - 545 Shale, same as above

545 - 554 Shale, same as above; and sandstone, white to gray, medium- to fine-grained, angular, quartzose, micaceous

554 - 603 Sandstone, white, medium-grained, angular, quartzose,

glauconitic, at 568-603 dark mineral

603 - 610 Coal

610 - 623 Sandstone, gray to white, medium- to fine-grained, angular, quartzose, micaceous, slightly glauconitic; some shale, gray, plant fossils

623 - 630 Sandstone, white, medium-grained, angular, quartzose

630 - 653 Sandstone, white, medium- to coarse-grained, quartzose, micaceous, glauconitic; a little shale, gray, carbonaceous, pyritic; at 641-648 a little coal

653 - 666 Sandstone, same as above; and shale, light-gray, silty, micaceous

666 - 676 Shale, same as above, but very silty toward the base

676 - 692 Shale, dark-gray to light-gray, silty, micaceous; some sandstone, gray, fine-grained, angular, quartzose, dirty

692 - 699 Shale, same as above; and sandstone, same as above

699 - 707 Sandstone, same as above; some shale, same as above, but very silty

707 - 769 Shale, dark-gray; possibly an occasional thin bed of sandstone, same as above

769 - 798 Sandstone, white, medium-grained, angular, quartzose; some shale, gray; at 780-792 a little coal

798 - 812 Sandstone, white to gray, fine-grained, angular, quartzose, dirty; and shale, gray, silty, micaceous

812 - 868 Sandstone, white, medium-grained, angular, quartzose, micaceous, glauconitic

868 - 878 Sandstone, same as above, 60%; coal and shale, dark-gray, pyritic, 40%

878 - 933 Sandstone, white, fine-grained, angular, quartzose

933 - 941 Sandstone, same as above, 60%; shale, gray, and coal, 40%

941 - 950 Sandstone, same as above, 50%; shale, gray, and coal, 50%

950 - 956 Shale, gray to dark-gray, micaceous

956 - 967 Sandstone, white, medium-grained, angular, quartzose

967 -1006 Sandstone, same as above, but some dark mineral, micaceous, at 998-1006 glauconitic

1006-1016 Sandstone, white, medium- to fine-grained, angular to subangular, quartzose, micaceous

1016-1034 Sandstone, same as above, but with a few coarse grains

1034-1060 Shale, gray, very silty

1060-1080 Sandstone, dark-gray to gray, fine-grained, angular, quartzose, much carbonaceous material

1080-1100 Sandstone, white, fine-grained, angular, quartzose

1100-1113 Sandstone, white, medium-grained, angular, quartzose, small amount of carbonaceous material, at 1103-1113 micaceous and glauconitic

1113-1130 Sandstone, white with much rusty stain, fine-grained, angular, quartzose (the sample has a weathered appearance and possibly is surface rock from the well site)

1130-1140 Sandstone, white, medium-grained, angular to subangular, quartzose; and shale, gray, silty, carbonaceous

1140-1184 Sandstone, same as above

1184-1199 Shale, gray, at 1191-1199 in part brown

1199-1210 Shale, gray with a little brown; and shale, dark-gray, very sandy containing medium angular quartz grains

1210-1239 Sandstone, white, medium-grained, angular to subangular, quartzose, moderately micaceous and glauconitic, other unidentified accessory minerals

1239-1249 Sandstone, same as above, 60%; shale, light-tan, 35%; coal, 5%

1249-1263 Sandstone, light-gray, fine-grained; and shale, light-gray, very micaceous, very silty (both contain reddish-orange grains which resemble rutile)

1263-1340 Sandstone, white, medium-grained, angular to subangular, quartzose, very micaceous, moderately glauconitic, at 1298-1323 in part argillaceous

1340-1354 Sandstone, white, medium-grained, angular to subangular, quartzose, 90%; shale, gray, and coal, 10%

1354-1367 Shale, gray, in part very silty, some chips contain red grains as at 1249-1263 above

1367-1384 Shale, gray, very silty

1384-1390 Sandstone, gray, fine-grained, angular, quartzose, moderately micaceous

1390-1408 Shale, gray

1408-1418 Coal; and shale, gray

1418-1457 Sandstone, white, fine- to medium-grained, angular, quartzose, moderately glauconitic

1457-1479 Shale, dark-gray to brown

1479-1487 Sandstone, white to gray, fine-grained, angular, quartzose, moderately micaceous

1487-1500 Sandstone, same as above, but moderately glauconitic; some sandstone, brown

1500-1535 Sandstone, brown to white, medium- to fine-grained, angular, quartzose, moderately micaceous and glauconitic

1535-1545 Shale, gray, very silty; some sandstone, white, fine-grained, angular, quartzose

1545-1552 Shale, gray; and sandstone, dark-gray to gray, fine- to medium-grained, quartzose, some argillaceous material

1552-1562 Shale, gray

1562-1590 Shale, gray; and interbedded sandstone, dark-gray, fine-grained, quartzose, argillaceous (the shale predominates toward the top and the sandstone predominates toward the base)

1590-1614 Sandstone, white, medium- to fine-grained, angular, quartzose, slightly micaceous, reddish-orange grains; some interbedded shale, light-gray, plant fossils

1614-1648 Sandstone, white, medium-grained, angular, quartzose, a few frosted and rounded grains; some interbedded shale, light-gray

1648-1752 Sandstone, white to gray, medium- to fine-grained, angular to subangular, quartzose, some accessory minerals, at 1648-1656 somewhat argillaceous; at 1723-1752 a little interbedded shale, gray, trace of red to maroon to brown

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1752

1752-1772 Shale, light-gray with a little red

1772-1778 Shale, red, green, and gray

1778-1803 Shale, red to maroon with some light-gray, slightly calcareous; and interbedded sandstone, green, fine-grained, angular to subangular, quartzose, slightly micaceous and chloritic

1803-1823 Sandstone, same as above, but considerable chlorite and mica; some shale, light-gray to a little red

1823-1827 Shale, variegated red and gray, soft, slightly calcareous

1827-1835 Shale, same as above, and maroon; and sandstone, light-green, fine- to very fine grained, angular, quartzose, slightly feldspathic, slightly calcareous, banded

1835-1872 Sandstone, same as above, but olive-gray, in part slightly calcareous

1872-1877 Sandstone, light-green to gray, fine-grained, quartzose, slightly feldspathic and micaceous, slightly calcareous, banded

1877-1887 Sandstone, same as above, but mostly dark-gray with carbonaceous material

1887-1889 Shale, variegated brick-red and gray, soft

1889-1893 Shale, same as above; and sandstone, white, fine-grained, angular, quartzose, very calcareous; a few large pieces of pyrite

1893-1900 Sandstone, same as above, but in part gray, in part calcareous, interbedded with carbonaceous material

1900-1929 Sandstone, gray to dark-gray, fine-grained, angular, quartzose, interbedded with carbonaceous material, slightly

pyritic, slightly to very slightly calcareous

1929-1964 Sandstone, light-gray with a little dark-gray, fine-grained, subangular, quartzose, feldspathic, slightly micaceous, interbedded with carbonaceous to coaly material, at 1946-1964 calcareous

1964-1974 Sandstone, same as above, but gray to light-gray, calcareous, no carbonaceous to coaly material

1974-2002 Sandstone, gray, fine-grained, subangular, quartzose, slightly feldspathic and micaceous, very slightly calcareous

2002-2012 Shale, gray, silty, hard

2012-2043 Shale, same as above; and sandstone, gray, fine-grained, subangular, quartzose, dirty; at 2020-2043 both slightly pyritic and very slightly calcareous

2043-2052 No sample

2052-2060 Sandstone, white with some gray, fine-grained, subangular, quartzose, very slightly feldspathic, slightly micaceous and chloritic, calcareous; some shale, gray, silty, hard

2060-2086 Siltstone, gray, quartzose, micaceous, calcareous, argillaceous; some interbedded sandstone, same as above; some interbedded shale, same as above

2086-2095 Shale, same as above; a little siltstone, same as above

2095-2132 Shale, same as above, but at 2123-2132 some has a faint brownish cast; and interbedded siltstone, same as above

2132-2143 Shale, same as 2123-2132 above; some siltstone, same as above

2143-2153 Shale, same as above; and shale, green, calcareous; some limestone, mottled-brown, fine-crystalline, fossiliferous

2153-2161 Shale, same as above, but fossiliferous, very calcareous

2161-2170 Shale, brown, slightly silty, slightly pyritic

2170-2189 Shale, gray to light-gray to brick-red, in part slightly silty and pyritic

TOP PRINCETON SANDSTONE 2189

## UNITED FUEL GAS COMPANY

## 6705 NEW RIVER AND POCAHONTAS COAL COMPANY WELL

Buchanan County, Virginia
Location: 0.59 miles west of 81° 45',
2.14 miles south of 37° 15'
Ground elevation: 2893.51 Total depth: 6082
Drilling commenced: April 24, 1951
Drilling completed: March 21, 1952
Water: 113; 1063-1069, 1/3 BPH; 1260-1268, 1 BPH
Gas: None
Oil: None
Casing record: 13 3/8 at 38, 10 at 612, 8 5/8 at 2610, 6 5/8 at 4472
Depth corrections: 2563 = 2611
Samples examined by David G. Bowen, 1958

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

0 - 426 No sample

426 - 432 Sandstone, gray, fine- to very fine grained with an occasional coarse grain, angular to subangular, quartzose, very dirty with gray argillaceous material, very slightly calcareous; a little shale, gray, micaceous

432 - 445 Siltstone, gray, quartzose, very argillaceous, micaceous

445 - 481 Shale, gray, slightly silty, at 467-476 very silty, at 462-481 very slightly calcareous

481 - 501 Shale, same as basal portion above; laminated with siltstone, gray, quartzose

501 - 507 Shale, same as above, but in part silty and micaceous

507 - 532 Shale, same as above, but not micaceous; and interbedded siltstone, gray, quartzose, at 512-532 micaceous, argillaceous, and very slightly calcareous

532 - 537 Siltstone, same as above

537 - 542 Sandstone, light-gray, fine- to very fine grained, subangular to angular, quartzose, micaceous, slightly chloritic and feldspathic, rather argillaceous, very slightly calcareous

542 - 547 Sandstone, same as above; and shale, gray, micaceous

547 - 555 Sandstone, same as above, but gray, in part medium-grained to silt; a little shale, same as above; a little shale, tan, underclay; a little coal

555 - 565 Sandstone, white, medium- to fine-grained, subangular to subrounded, quartzose, slightly micaceous, a small amount of dark to green mineral, nearly clean

565 - 571 Sandstone, same as above, but medium-grained

571 - 574 Sandstone, same as above, but medium- to coarse-grained

574 - 584 No sample

584 - 590 Sandstone, same as 571-574, but medium-grained with some coarse and fine grains

590 - 597 Sandstone, same as above, but medium- to coarse-grained

597 - 608 Shale, brownish-gray and carbonaceous to gray and micaceous; a little siltstone, grayish-brown, quartzose

608 - 612 No sample

612 - 628 Sandstone, same as 590-597 above, but medium- to fine-grained with an occasional coarse grain

628 - 634 Sandstone, same as above, but mostly fine-grained, no coarse grains

634 - 653 Sandstone, same as above, but medium- to fine-grained, at 639-653 slightly to very slightly calcareous

653 - 661 Sandstone, same as above, but light-gray, not calcareous; some shale, gray, silty, micaceous; some siltstone, gray, quartzose, argillaceous, micaceous

661 - 668 Sandstone, same as 634-653 above, but not calcareous

668 - 677 Shale, gray, in part silty; a little siltstone, gray, quartzose

677 - 682 Shale, same as above, but micaceous

682 - 689 Sandstone, white to gray, medium- to fine-grained, subangular to subrounded, quartzose, argillaceous; a little shale, light-gray

689 - 694 Sandstone, gray, fine-grained with an occasional medium

grain, subangular to subrounded, quartzose, contains interstitial argillaceous material which is gray and micaceous

694 - 702 Sandstone, same as above; and shale, gray, finely micaceous

702 - 724 Shale, same as above

724 - 733 Siltstone, gray, quartzose, argillaceous, very slightly calcareous

733 - 741 Siltstone, same as above; and shale, same as 702-724 above; both slightly calcareous and interlaminated

741 - 758 Shale, gray, silty, calcareous

758 - 785 Shale, gray, at 776-785 darker and very slightly calcareous

TOP LEE FORMATION 800

785 - 806 Shale, same as above, but not calcareous; and sandstone, light-gray, medium- to fine-grained, angular to subangular, quartzose, slightly argillaceous, slightly micaceous and chloritic (This interval is represented by one sample. The driller records the top of the sandstone at 806. Consequently, this interval is probably mostly shale.)

806 - 820 Sandstone, white, coarse- to fine-grained, subangular to subrounded, quartzose, slightly micaceous and chloritic

820 - 846 Sandstone, same as above, but medium- to coarse-grained with some fine grains, at 838-846 an increase in chlorite, moderate amount of green mineral

846 - 866 Sandstone, same as basal portion above, but mostly fine-grained with a lesser amount of medium and coarse grains

866 - 873 Sandstone, same as above, but medium- to coarse-grained with some fine grains

873 - 955 Siltstone, gray, quartzose, in part very slightly calcareous; and shale, gray, silty, micaceous

955 - 972 Shale, dark-gray

972 - 987 Sandstone, gray to light-gray, fine-grained, angular to subangular, quartzose, slightly micaceous, in part

argillaceous, slightly calcareous

987 - 996 Shale, gray, silty, finely micaceous

996 -1007 Shale, same as above, but dark-gray; a little interbedded siltstone to very fine grained sandstone, gray, quartzose

1007-1012 Siltstone, gray, quartzose; some shale, same as above

1012-1063 Siltstone, same as above, but laminated with argillaceous material which is gray and micaceous, at 1023-1063 in part calcareous

1063-1068 Sandstone, white, medium-grained with some coarse and fine grains, angular to subrounded, quartzose, nearly clean; a little shale, black, very carbonaceous

1068-1091 Sandstone, same as above, but only an occasional coarse grain, clean

1091-1100 Sandstone, same as above, but medium-grained with an occasional coarse grain

1100-1110 Sandstone, same as above, but coarse-grained

1110-1120 Sandstone, same as above, but medium- to coarse-grained

1120-1142 Sandstone, same as above, but medium-grained, at 1126-1142 angular to subangular

1142-1149 Siltstone, light-gray, quartzose, argillaceous, slightly micaceous

1149-1164 Siltstone to very fine grained sandstone, light-tannish gray, quartzose, slightly micaceous

1164-1178 Siltstone, light-gray, quartzose, slightly micaceous, slightly laminated

1178-1185 Sandstone, white, fine-grained with an occasional medium grain, angular to subangular, quartzose, nearly clean, slightly calcareous

1185-1212 Sandstone, light-gray, medium- to fine-grained, angular to subangular, quartzose, slightly micaceous and chloritic, small amount of brown material, slightly calcareous; a little shale, gray, micaceous

1212-1259 Sandstone, white, medium- to fine-grained, angular to subangular, quartzose, very slightly micaceous and chloritic, at 1234-1259 angular to subrounded; at 1234-1242 a little shale, gray and micaceous to black and carbonaceous

1259-1273 Shale, gray to dark-gray, in part micaceous

1273-1286 Sandstone, light-gray, very fine grained to silt, quartzose, slightly micaceous and chloritic; at 1280-1286 interbedded with shale, gray, micaceous

1286-1308 Siltstone, gray, quartzose, feldspathic, slightly argillaceous, slightly micaceous and chloritic, in part slightly calcareous

1308-1318 Shale, gray and finely micaceous to black and carbonaceous; some siltstone, same as above, but not calcareous

1318-1338 Shale, same as above; a very little coal

1338-1350 Shale, gray, in part slightly calcareous

1350-1397 Shale, dark-gray, somewhat carbonaceous; some interbedded sandstone, gray, fine- to very fine grained, quartzose, argillaceous, very slightly calcareous

1397-1437 Sandstone, white, medium- to fine-grained, angular to subrounded, quartzose, slightly micaceous, essentially clean

1437-1449 Sandstone, same as above; some sandstone, light-gray, very fine grained, quartzose, slightly argillaceous; some shale, black, carbonaceous

1449-1479 Sandstone, light-tannish gray, very fine grained with some fine grains and an occasional medium grain, angular to subangular, quartzose, slightly argillaceous; a little shale, black, carbonaceous, coaly laminations, at 1471-1474 dark-tan and seems to be an underclay, at 1474-1479 gray and micaceous

1479-1488 Sandstone, white, medium-grained with some fine grains, angular to subrounded, quartzose, slightly micaceous, essentially clean; and siltstone, gray, quartzose, argillaceous, micaceous

1488-1497 Sandstone, same as above, but in part cemented with a tan material (siderite ?)

1497-1515 Sandstone, light-gray, medium-grained with some fine grains, angular to subangular, quartzose, micaceous, chloritic, at 1511-1515 very calcareous

1515-1532 Sandstone, white, medium- to fine-grained, angular to subangular, quartzose, moderate amount of green mineral, essentially clean, at 1525-1532 very slightly calcareous

1532-1544 Sandstone, same as above, but not calcareous; and shale, gray, silty and micaceous to black and carbonaceous; and coal (unusually large pieces of coal in sample)

1544-1560 Shale, black and carbonaceous to gray and silty to tan and silty; a little coal

1560-1579 Sandstone, tan to light-tan, fine-grained to silt, subangular to subrounded, quartzose, in the middle slightly calcareous, clean

1579-1611 Shale, gray, in part micaceous and silty; some interbedded siltstone, light-gray to gray, quartzose, very slightly calcareous

1611-1618 Siltstone, gray, quartzose, very argillaceous, micaceous, considerable interstitial coaly material, many coaly laminations

1618-1621 Sandstone, white, fine- to very fine grained, angular to subangular, quartzose, very slightly calcareous

1621-1639 Sandstone, same as above, but medium-grained, at 1629-1639 moderate amount of green mineral

1639-1653 Sandstone, same as above, but some fine grains, small amount of green mineral

1653-1660 Shale, light-tan, pasty, some floating quartz grains, occasional siderite nodule; some sandstone, same as above

1660-1689 Sandstone, same as above, but not calcareous

1689-1699 Sandstone, same as above; and shale, gray, moderately hard

1699-1707 Shale, gray, very slightly silty, micaceous; a little shale, dark-gray and carbonaceous

1707-1729 Sandstone, same as 1689-1699 above, but angular to subrounded, at 1715-1729 calcareous

1729-1734 Sandstone, same as above, but fine-grained with some medium grains, angular to subangular, very slightly calcareous

1734-1749 Sandstone, same as above, but mostly medium-grained, at the bottom not calcareous

1749-1758 Siltstone, gray, quartzose, very argillaceous, finely laminated; some sandstone, same as above

1758-1772 Siltstone to very fine grained sandstone, brown, quartzose, micaceous, dirty; a little shale, gray, in part silty and micaceous

1772-1778 Siltstone to sandstone, same as above; and shale, same as above

1778-1794 Sandstone, white, fine-grained, angular to subangular, quartzose, slightly micaceous and chloritic, at 1785-1794 angular to subrounded, at 1789-1794 slightly calcareous

1794-1817 Sandstone, same as above, but medium- to fine-grained, very slightly calcareous

1817-1848 Sandstone, same as above, but laminated with some light-gray, very fine grained to silt laminations, all non-calcareous except at 1838-1848 very slightly calcareous

1848-1878 Shale, dark-gray, in part finely micaceous; at 1865-1878 a little tan underclay

1878-1890 Siltstone, tannish-gray, quartzose, micaceous, very slightly calcareous, occasional coaly lamination; a little shale, gray, silty, micaceous

1890-1898 Shale, gray to dark-tan, in part silty and micaceous, a little is black and carbonaceous

1898-1932 Sandstone, very light gray to tan, fine-grained with an occasional medium grain, angular to subangular, quartzose, moderate amount of green mineral, slightly micaceous and chloritic, in part cemented with tan calcite, calcareous to slightly calcareous

1932-1944 Shale, gray and finely micaceous to dark-gray and carbonaceous

1944-1953 Shale, same as above; and siltstone, brown, quartzose, dirty with a little coaly material

1953-1962 Sandstone, very fine grained to siltstone, same as above

1962-1974 Sandstone to siltstone, same as above, but gray and very slightly calcareous, laminated with gray argillaceous to coaly material

1974-1986 Shale, gray, in part silty and finely micaceous, coaly laminations

1986-2004 Shale, gray to dark-gray and carbonaceous; a little siltstone, gray, quartzose, micaceous, dirty

2004-2014 Sandstone, light-tan, fine-grained, subangular to subrounded, quartzose, a small amount is cemented with a tan argillaceous material; some shale, black, carbonaceous

2014-2017 Sandstone, same as above, but no argillaceous cement

2017-2032 Sandstone, same as above; a little coal; a little shale, black, carbonaceous

2032-2048 Sandstone, same as above, but tan, fine- to very fine grained, at 2042-2048 an occasional medium grain; a little coal; a little shale, same as above

2048-2056 Sandstone, same as above

2056-2067 Sandstone, same as above, but in part light-gray, all calcareous; some shale, gray, silty, micaceous

2067-2074 Sandstone, white, fine-grained with an occasional medium grain, angular to subangular, quartzose, slightly micaceous, small amount of green mineral

2074-2099 Sandstone, same as above, but medium- to fine-grained, only a trace of mica and green mineral

2099-2109 Sandstone, same as above, but mostly medium-grained with a few fine grains

2109-2121 Sandstone, same as above, but medium-grained with a few coarse grains, trace of chlorite

2121-2133 Shale, dark-gray, carbonaceous; and shale, light-gray, greasy, underclay; and coal; some sandstone, same as above

2133-2142 Coal; and shale, same as above; and siltstone, light-gray, quartzose

2142-2187 Siltstone, gray, quartzose, in the basal part micaceous; and interbedded shale, gray and in part finely micaceous to dark-gray and carbonaceous

2187-2195 Siltstone, light-gray, quartzose, micaceous; and sandstone, light-gray, fine- to very fine grained, quartzose, micaceous

2195-2207 Siltstone and sandstone, both same as above; a little shale, dark-gray, very finely micaceous

2207-2214 Sandstone, white, medium-grained, angular to subangular, quartzose, clean, slightly calcareous; a little shale, black, carbonaceous, nearly an earthy coal

2214-2225 Shale, gray and finely micaceous to dark gray and carbonaceous; some siltstone, gray, quartzose

2225-2232 Siltstone, same as above grading to sandstone, very fine grained, slightly feldspathic, very slightly calcareous

2232-2284 Shale, gray, silty, micaceous; some interbedded siltstone to sandstone, same as above

2284-2314 Sandstone, light-gray, very fine to fine-grained, angular to subangular, quartzose, slightly micaceous and chloritic, a small amount of dark mineral, at 2289-2298 a very little interstitial coaly material

2314-2322 Shale, dark-gray, carbonaceous; some coal

2322-2333 Shale, same as above

2333-2375 Sandstone, white, medium- to fine-grained, subangular to subrounded, quartzose, clean, at 2353-2375 few to moderate amount of coarse grains

2375-2380 Sandstone, same as above, but medium- to coarse-grained, some fine grains, an occasional very coarse grain

2380-2387 Sandstone, same as above, but medium- to fine-grained; a little siltstone, light-greenish gray, quartzose

2387-2411 Sandstone, light-gray, in part with a faint greenish cast, fine- to very fine grained, angular to subangular, quartzose, moderately chloritic, moderate amount of green mineral, slightly calcareous

2411-2419 Shale, gray, silty, finely micaceous

2419-2444 Sandstone, white, medium- to fine-grained, subangular to subrounded, quartzose

2444-2458 Sandstone, light-gray, fine- to very fine grained, an occasional medium grain, angular to subangular, quartzose, slightly micaceous, moderately chloritic, moderate amount of green mineral; at 2450-2458 a little interbedded shale, gray, finely micaceous

2458-2482 Sandstone, same as 2419-2444 above, but at 2474-2482 very slightly calcareous

2482-2488 Sandstone, white, medium-grained, angular to subangular, quartzose, clean; and shale, light-tannish gray, pasty, soft, siderite nodules

2488-2511 Sandstone, same as above, but with some fine grains and an occasional coarse grain

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 2511

2511-2519 Shale, light-gray to light-yellowish gray, claystone, soft, contains floating very fine to silt-size grains of clear quartz

2519-2525 Shale, same as above; and shale, dull-red, in part slightly calcareous

2525-2544 Shale, both same as above; a little interbedded siltstone, light-green, quartzose, slightly feldspathic

2544-2550 Shale, same as above, but the dull-red is micaceous, both very slightly calcareous

2550-2563 Shale, dull-red to red, finely micaceous, in part calcareous; at 2554-2558 a little shale, pale-green

2563-2611 Depth correction

2611-2619 Siltstone, pale-green, quartzose, calcareous; some shale, red

2619-2649 Shale, pale-green to green and maroon to red with minor amounts of gray, all calcareous at the top grading downward to non-calcareous at the bottom

2649-2664 Shale, olive-gray, calcareous to slightly calcareous; a little interbedded siltstone, olive-gray, dirty, calcareous

2664-2672 Sandstone, white, coarse-grained with a few medium grains at the top, grading downward to medium- to fine-grained, subangular to subrounded, quartzose, clean, very calcareous

2672-2678 Shale, gray, in part with a maroon cast, finely micaceous; some sandstone, same as above, but in part cemented with tan calcite

2678-2690 Shale, variegated gray and red, with a few nodules of limestone

2690-2694 Siltstone, light-greenish gray, quartzose, slightly calcareous; a little shale, red

2694-2702 Siltstone, same as above; and shale, gray to dark-gray, calcareous, fossil fragments and ostracods

2702-2719 Shale, gray to dark-gray, in part carbonaceous, slightly pyritic, ostracods, calcareous; some interbedded sandstone, light-gray, fine- to very fine grained, angular to subangular, quartzose, slightly calcareous

2719-2729 Shale, olive-green and red, soft

2729-2743 Shale, pale-green and red, soft, floating fine to very fine quartz grains; a little limestone, nearly white, very argillaceous, sparsely fossiliferous

2743-2750 Shale, light-gray and red, soft; a very little sandstone, white to light-green, very fine grained to silt, quartzose

2750-2767 Shale, mostly red, a little gray, soft

2767-2793 Shale, light-gray, soft, at 2785-2793 an occasional siderite nodule; and interbedded siltstone to very fine grained sandstone, very pale green, quartzose, at 2778-2793 an occasional siderite nodule

2793-3015 Shale, dark-gray, at 3004-3015 carbonaceous and very slightly calcareous

TOP PRINCETON SANDSTONE 3015

## CLINCHFIELD COAL CORPORATION

## 154 WASHINGTON DEEL WELL

Buchanan County, Virginia
Location: 1.91 miles west of 82° 10',
0.45 miles south of 37° 15'
Ground elevation: 1515.4 Total depth: 5806
Drilling commenced: August 4, 1953
Drilling completed: May 13, 1954
Water: 30
Gas: None
Oil: None
Casing record: 13 3/8 at 15, 10 3/4 at 596, 8 5/8 at 2304, 7 at 3410
Depth corrections: None

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 12 | "Surface" |
| 12 - 48 | "Sand" |
| 48 - 117 | "Slate" |
| 117 - 132 | "Slate, black" |
| 132 - 137 | "Sand" |
| 137 - 155 | "Lime, black" |
| 155 - 156 | "Coal" |
| 156 - 177 | "Lime, gritty" |
| 177 - 217 | "Slate, black" |
| 217 - 254 | "Lime, black" |
| 254 - 257 | "Slate" |
| 257 - 392 | "Lime" |
| 392 - 435 | "Sand" |
| 435 - 438 | "Slate" |
| 438 - 449 | "Lime, black" |

449 - 475 "Slate"

475 - 491 "Lime"

491 - 569 "Slate and shells"

569 - 623 "Sand"

623 - 682 "Slate and shells"

682 - 685 "Coal"

685 - 693 "Slate"

TOP LEE FORMATION 693

693 - 717 "Sand"

717 - 730 "Slate"

730 - 769 "Sand"

769 - 786 "Slate"

786 - 802 "Sand"

802 - 930 "Slate and shells"

930 - 946 "Lime"

946 -1026 "Sand"

1026-1031 "Coal"

1031-1183 "Sand"

1183-1196 "Slate"

1196-1231 "Sand"

1231-1290 "Slate and shells"

1290-1315 "Sand"

1315-1339 "Slate and shells"

1339-1404 "Sand"

1404-1487 "Slate"

1487-1530 "Sand, broken"

1530-1552 "Lime, gritty"

1552-1678 "Sand"

1678-1738 "Sand, broken"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1738

1738-1743 "Coal"

1743-1760 "Slate"

1760-1770 "Lime, gritty"

1770-1795 "Slate and shells"

1795-1840 "Lime, gritty"

1840-1895 "Slate"

1895-1908 "Lime, gritty"

1908-2010 "Red rock"

2010-2027 "Lime, gritty"

2027-2052 "Red rock"

2052-2150 "Lime, gritty"

2150-2295 "Slate"

TOP PRINCETON SANDSTONE 2295

## CLINCHFIELD COAL CORPORATION

## 172 BIG SANDY FUEL COMPANY WELL

Buchanan County, Virginia
Location: 0.41 miles east of 82° 15',
1.08 miles north of 37° 15'
Ground elevation: 1554.3 Total depth: 3651
Drilling commenced: March 25, 1955
Drilling completed: August 30, 1955
Water: 65
Gas: None
Oil: None
Casing record: 13 3/8 at 24, 10 3/4 at 903, 8 5/8 at 2439, 7 at 3215
Depth corrections: None

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 11 | "Surface" |
| 11 - 84 | "Slate" |
| 84 - 96 | "Lime" |
| 96 - 126 | "Slate" |
| 126 - 176 | "Sand" |
| 176 - 195 | "Lime, gritty" |
| 195 - 214 | "Slate" |
| 214 - 245 | "Sand" |
| 245 - 259 | "Slate" |
| 259 - 301 | "Lime, gritty" |
| 301 - 315 | "Sand" |
| 315 - 359 | "Slate" |
| 359 - 390 | "Sand" |
| 390 - 536 | "Lime" |
| 536 - 726 | "Sand" |

726 - 842 "Lime"

842 - 868 "Sand"

868 - 921 "Lime"

921 - 998 "Slate"

TOP LEE FORMATION 998

998 -1026 "Sand"

1026-1068 "Slate"

1068-1142 "Sand"

1142-1144 "Coal"

1144-1155 "Slate"

1155-1193 "Sand"

1193-1274 "Slate"

1274-1340 "Sand"

1340-1350 "Slate"

1350-1447 "Sand"

1447-1456 "Slate and shells"

1456-1457 "Coal"

1457-1493 "Sand"

1493-1636 "Slate"

1636-1809 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1809

1809-1875 "Slate"

1875-1886 "Lime, black"

1886-1942 "Slate"

1942-2039 "Red rock"

2039-2070 "Lime"

2070-2130 "Red rock"

2130-2150 "Lime"

2150-2412 "Slate"

TOP PRINCETON SANDSTONE 2412

## CLINCHFIELD COAL CORPORATION

## 181 BIG SANDY FUEL COMPANY WELL

Buchanan County, Virginia
Location: 1.00 miles east of 82° 15',
1.56 miles north of 37° 15'
Ground elevation: 1614.3 Total depth: 3670
Drilling commenced: November 23, 1955
Drilling completed: June 23, 1956
Water: 45
Gas: 1846, show
Oil: None
Casing record: 13 3/4 at 13, 10 3/4 at 943, 8 5/8 at 2407, 7 at 3203
Depth corrections: None

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 58 | "Sand" |
| 58 - 194 | "Slate and shells" |
| 194 - 233 | "Sand" |
| 233 - 292 | "Slate" |
| 292 - 313 | "Sand" |
| 313 - 384 | "Slate" |
| 384 - 422 | "Sand" |
| 422 - 585 | "Slate" |
| 585 - 788 | "Sand" |
| 788 - 814 | "Slate" |
| 814 - 840 | "Lime" |
| 840 - 854 | "Slate" |
| 854 - 872 | "Sand" |
| 872 - 894 | "Slate" |
| 894 - 918 | "Sand" |

| | |
|---|---|
| 918 -1020 | "Slate" |
| | TOP LEE FORMATION 1020 |
| 1020-1060 | "Sand" |
| 1060-1095 | "Slate" |
| 1095-1200 | "Sand" |
| 1200-1208 | "Slate" |
| 1208-1230 | "Sand" |
| 1230-1300 | "Lime, gritty" |
| 1300-1530 | "Sand" |
| 1530-1550 | "Slate" |
| 1550-1552 | "Coal" |
| 1552-1618 | "Slate" |
| 1618-1695 | "Sand" |
| 1695-1700 | "Slate" |
| 1700-1846 | "Sand" |
| | TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1846 |
| 1846-1897 | "Slate" |
| 1897-1916 | "Lime" |
| 1916-1970 | "Slate" |
| 1970-1983 | "Red rock" |
| 1983-2000 | "Lime, gritty" |
| 2000-2060 | "Slate and shells" |
| 2060-2200 | "Red rock and slate and shells" |
| 2200-2248 | "Slate" |
| 2248-2336 | "Lime, black" |

2336-2380 "Slate"

2380-2404 "Lime"

TOP PRINCETON SANDSTONE 2404

## CLINCHFIELD COAL CORPORATION

## 186 BIG SANDY FUEL COMPANY WELL

Buchanan County, Virginia
Location: 0.47 miles east of 82° 15'
1.84 miles north of 37° 15'
Ground elevation: 1669.9 Total depth: 3631
Drilling commenced: March 7, 1956
Drilling completed: October 30, 1956
Water: 75; 1848, salt water
Gas: 1060, show; 1276, show
Oil: None
Casing record: 13 3/8 at 11, 10 3/4 at 392, 8 5/8 at 2417, 7 at 3291
Depth corrections: None

### POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 11 | "Surface" |
| 11 - 75 | "Sand" |
| 75 - 150 | "Slate and shells" |
| 150 - 160 | "Lime" |
| 160 - 230 | "Slate" |
| 230 - 243 | "Sand, broken" |
| 243 - 279 | "Slate" |
| 279 - 315 | "Sand" |
| 315 - 405 | "Slate" |
| 405 - 445 | "Sand" |
| 445 - 577 | "Slate and shells" |
| 577 - 658 | "Sand" |
| 658 - 661 | "Slate" |
| 661 - 775 | "Sand" |
| 775 - 850 | "Slate" |

850 - 907 "Sand"

907 -1015 "Slate"

1015-1060 "Lime"

TOP LEE FORMATION 1060

1060-1276 "Sand"

1276-1334 "Lime, gritty"

1334-1536 "Sand"

1536-1673 "Slate"

1673-1675 "Coal"

1675-1884 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1884

1884-1958 "Slate, white"

1958-1970 "Lime"

1970-2028 "Red rock"

2028-2039 "Lime"

2039-2050 "Slate"

2050-2185 "Red rock"

2185-2330 "Slate"

2330-2354 "Lime, black"

2354-2415 "Slate"

TOP PRINCETON SANDSTONE 2415

PIPE LINE CONSTRUCTION AND DRILLING COMPANY

1 J. G. BUSTON ET AL WELL

Buchanan County, Virginia
Location: 0.22 miles west of 82° 00',
1.66 miles north of 37° 15'
Ground elevation: 1909.5 Total depth: 4088
Drilling commenced: August 20, 1950
Drilling completed: April 3, 1953
Water: 1523, 4 BPH
Gas: 724, show
Oil: None
Casing record: 13 5/8 at 26, 10 3/4 at 824, 8 5/8 at 2410, 7 at 3493
Depth corrections: None

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 26 | "Clay" |
| 26 - 30 | "Shells" |
| 30 - 75 | "Sand" |
| 75 - 160 | "Slate and shells" |
| 160 - 162 | "Coal" |
| 162 - 292 | "Lime" |
| 292 - 294 | "Coal" |
| 294 - 300 | "Lime" |
| 300 - 380 | "Sand" |
| 380 - 405 | "Slate and shells" |
| 405 - 407 | "Coal" |
| 407 - 615 | "Sand" |
| 615 - 665 | "Slate and shells" |
| 665 - 667 | "Coal" |
| 667 - 671 | "Lime" |

671 - 674 "Coal"

674 - 715 "Slate and shells"

715 - 735 "Lime"

735 - 775 "Sand"

775 - 785 "Slate and shells"

785 - 790 "Lime, black"

790 - 800 "Sand"

800 - 830 "Lime, black"

TOP LEE FORMATION 830

830 - 863 "Sand"

863 - 910 "Lime, black"

910 - 965 "Slate and shells"

965 - 985 "Lime"

985 -1047 "Slate"

1047-1051 "Coal"

1051-1070 "Slate"

1070-1150 "Lime"

1150-1195 "Sand"

1195-1205 "Slate and shells"

1205-1226 "Sand"

1226-1230 "Coal"

1230-1340 "Slate"

1340-1344 "Coal"

1344-1415 "Sand"

1415-1436 "Slate and shells"

1436-1439 "Coal"

1439-1498 "Sand"

1498-1523 "Slate and shells"

1523-1529 "Coal"

1529-1545 "Lime"

1545-1670 "Sand"

1670-1672 "Coal"

1672-1695 "Lime"

1695-1798 "Sand"

1798-1803 "Coal"

1803-1862 "Slate and shells"

1862-2020 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 2020

2020-2042 "Lime"

2042-2046 "Red rock"

2046-2082 "Lime"

2082-2090 "Red rock"

2090-2185 "Lime"

2185-2223 "Slate and shells"

2223-2290 "Sand"

2290-2312 "Slate and shells"

2312-2322 "Shale, brown"

2322-2355 "Lime"

2355-2376 "Slate and shells"

2376-2390 "Lime, hard"

2390-2400 "Sand"

2400-2424 "Lime"

2424-2488 "Slate and shells"

2488-2548 "Lime"

TOP PRINCETON SANDSTONE 2548

## PIPE LINE CONSTRUCTION AND DRILLING COMPANY

### 1-B F. H. CURTIS WELL

Buchanan County, Virginia
Location: 1.02 miles west of 82° 05',
0.02 miles north of 37° 15'
Derrick floor elevation: 1208.5 Total depth: 5751
No drillers log or well record available
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 80 | No sample |
| 80 - 86 | Shale, dark-gray, moderately hard |
| 86 - 118 | Shale, gray, micaceous, soft |
| 118 - 125 | Sandstone, white, medium- to coarse-grained, subangular to subrounded, quartzose, small amount of green mineral and dark mineral |
| 125 - 133 | Sandstone, same as above, but mostly medium-grained, some fine grains and coarse grains, small amount of siderite |
| 133 - 138 | Sandstone, same as above, but mostly fine-grained, trace of siderite |
| 138 - 157 | Sandstone, same as above, but medium- to fine-grained, at 143-157 slightly chloritic and micaceous |
| 157 - 164 | Shale, gray, moderately hard, in part micaceous |
| 164 - 176 | Shale, same as above, but gray to dark-gray |
| 176 - 186 | Shale, dark-gray, finely micaceous, moderately hard |
| 186 - 196 | Shale, same as above, but somewhat carbonaceous |

TOP LEE FORMATION 196

| | |
|---|---|
| 196 - 206 | Sandstone, gray, very fine grained to silt, quartzose, micaceous, dirty |
| 206 - 227 | Sandstone, white, fine-grained, angular to subangular, quartzose, slightly micaceous, small amount of argillaceous |

material

227 - 235 Shale, brownish-gray, very micaceous, slightly silty

235 - 245 Shale, tannish-gray, soft; and sandstone, gray, very fine grained, quartzose, micaceous, argillaceous; a little coal

245 - 253 Sandstone, white, fine- to very fine grained, subangular, quartzose, moderately micaceous, moderate amount of dark mineral

253 - 265 Sandstone, white, medium- to coarse-grained, few fine grains, angular to subrounded, quartzose, small amount of green mineral and dark mineral, tan calcite cement

265 - 275 Sandstone, same as above, but with a few very coarse grains, a little argillaceous material, no calcite cement

275 - 286 No sample

286 - 301 Sandstone, white, medium-grained, some coarse and fine grains, angular to subrounded, quartzose, slightly micaceous, small amount of green mineral and dark mineral, slightly sideritic, small amount of argillaceous material

301 - 309 Siltstone, tannish-gray, quartzose, feldspathic, micaceous; a little interbedded shale, gray, finely micaceous

309 - 317 Sandstone, light-gray to tannish-gray, very fine to fine-grained, subangular, quartzose, feldspathic, micaceous, dirty

317 - 326 Sandstone, same as above; and shale, gray, very silty, micaceous

326 - 374 Siltstone, gray, quartzose, feldspathic, dirty; and interbedded shale, gray, very silty, micaceous

374 - 384 Shale, gray, in part micaceous, moderately hard; a little limestone, gray, very argillaceous, dense

384 - 395 Shale, same as above; some sandstone, white to light-gray, very fine grained, quartzose, clean; a little siltstone, gray, quartzose, dirty, slightly calcareous

395 - 402 Sandstone, same as above; and siltstone, same as above, but not calcareous

402 - 409 No sample

409 - 417 Shale, gray, slightly silty, finely micaceous; and interbedded siltstone, gray, quartzose, dirty

417 - 424 Shale, gray, finely micaceous; a little interbedded siltstone, same as above

424 - 432 Siltstone, gray to light-gray, quartzose, dirty, slightly calcareous; a little interbedded shale, dark-gray, carbonaceous

432 - 442 Siltstone, same as above, but mostly gray, in part slightly calcareous; some interbedded shale, gray, finely micaceous

442 - 465 No sample

465 - 479 Sandstone, white, fine- to very fine grained, angular to subangular, quartzose, clean except for a trace of brown mineral, at 472-479 some is light-tan with a small amount of dark mineral and green mineral

479 - 486 Sandstone, same as upper portion above, but clean

486 - 491 Sandstone, same as above, but medium-grained, some fine grains, few coarse grains

491 - 506 Sandstone, same as above, but medium- to fine-grained, at 501-506 occasional green mineral and dark mineral

506 - 516 Sandstone, same as upper portion above, but mostly fine-grained

516 - 529 Sandstone, same as above, but with some coarse to very coarse grains, occasional pebble fragment of milky-white quartz

529 - 535 Sandstone, same as above, but medium- to fine-grained, some coarse grains, no pebble fragments

535 - 541 Sandstone, same as above, but few coarse grains, occasional pebble fragment of milky-white quartz

541 - 548 Sandstone, same as above, but medium-grained, occasional coarse grain, no pebble fragments

548 - 576 No sample

576 - 582 Sandstone, same as 541-548

582 - 586 Sandstone, same as above; and coal; a little shale, dark-gray, carbonaceous

586 - 596 No sample

596 - 604 Sandstone, same as 582-586

604 - 657 No sample

657 - 710 Sandstone, gray, fine- to very fine grained, quartzose, much coaly material, at 667-710 tannish-gray, at 657-687 and 706-710 slightly calcareous, at 687-697 in part very calcareous; at 687-710 a small amount of coaly material; at 697-710 laminated with some shale, gray

710 - 732 No sample

732 - 745 Sandstone, tannish-gray, fine- to very fine grained, quartzose, argillaceous, dirty

745 - 755 Sandstone, same as above, but very fine grained

755 - 772 Sandstone, white to tannish-gray, fine-grained, some medium grains and coarse grains, quartzose, slightly argillaceous

772 - 795 No sample

795 - 810 Sandstone, white, fine-grained, subangular, quartzose, slightly micaceous, small amount of dark mineral, nearly clean

810 - 816 Shale, dark-gray, somewhat carbonaceous, hard

816 - 847 No sample

847 - 857 Siltstone, tan, quartzose; a little sandstone, tan, fine-grained, quartzose, calcareous

857 - 867 Siltstone, tan to black, in part carbonaceous, quartzose

867 - 875 Siltstone, tan, in part dark-gray, quartzose, argillaceous

875 - 900 No sample

900 - 914 Siltstone, tan, in part dark-gray, quartzose, argillaceous,

in part calcareous; and shale, gray to dark-gray, in part carbonaceous

914 - 924 Siltstone, gray, quartzose; some shale, gray

924 - 946 No sample

946 - 986 Shale, black, slightly silty, carbonaceous

986 -1090 No sample

1090-1153 Sandstone, white, fine-grained, angular to subangular, quartzose, clean except for a small amount of carbonaceous to argillaceous material at 1090-1122

1153-1161 Sandstone, same as lower part above, but medium- to coarse-grained, some fine grains, some pebble fragments of milky-white quartz

1161-1186 No sample

1186-1201 Sandstone, same as 1153-1161, but medium- to fine-grained, some coarse grains, many pebble fragments of milky-white quartz

1201-1230 Sandstone, same as above, but medium- to coarse-grained, many pebble fragments

1230-1247 Sandstone, same as above, but medium- to fine-grained, few coarse grains, no pebble fragments

1247-1252 No sample

1252-1265 Sandstone, same as 1230-1247, but with pebble fragments of milky-white quartz

1265-1276 Sandstone, same as above, but mostly medium- to coarse-grained, pebble fragments

1276-1281 Sandstone, gray to white, medium- to fine-grained, occasional coarse grain, angular to subangular, quartzose, slightly micaceous, small amount of green mineral, dirty with coaly material, slightly calcareous; a little coal

1281-1295 Sandstone, same as above, but light-gray, less coaly material, in part slightly calcareous

1295-1303 No sample

1303-1308 Sandstone, same as above, but not calcareous; and siltstone, gray, quartzose, micaceous, argillaceous

1308-1313 Siltstone, same as above; laminated with shale, gray, micaceous

1313-1318 Shale, gray to light-gray, finely micaceous; a little siltstone, same as above (about 30% of sample is coal which appears to be cavings)

1318-1330 Siltstone, same as above, but more argillaceous

1330-1343 Shale, dark-gray, carbonaceous, plant fossils; a very little coal

1343-1353 Siltstone, gray, quartzose, slightly feldspathic, argillaceous and micaceous laminations

1353-1365 Shale, light-gray, siderite nodules; and shale, gray to dark-gray, carbonaceous

1365-1376 Siltstone, gray, quartzose, coaly and argillaceous laminations

1376-1420 Siltstone, same as above, but grading in part to sandstone, white, very fine grained, at 1391-1402 sandstone is calcareous; and interbedded shale, gray, silty

1420-1458 Sandstone, white, fine- to very fine grained, subangular, quartzose, clean, at 1420-1435 occasional pebble fragment of milky-white quartz

1458-1462 No sample

1462-1467 Sandstone, same as lower part of 1420-1458

1467-1481 No sample

1481-1490 Sandstone, same as 1462-1467, but mostly fine-grained, subangular to subrounded; and shale, gray, silty, micaceous

1490-1496 Sandstone, same as above; some shale, same as above

1496-1504 Sandstone, very light gray, fine- to very fine grained, angular to subangular, quartzose, micaceous, chloritic, slightly sideritic

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 1504

1504-1511 Siltstone, pale-green, quartzose; and shale, pale-green, micaceous, siderite nodules, soft

1511-1516 Shale, dull-red, soft

1516-1520 Shale, maroon to dull-red, in part calcareous, soft

1520-1525 No sample

1525-1546 Shale, red, soft; and siltstone, pale-green, quartzose, argillaceous, slightly calcareous

1546-1558 Shale, pale-green, silty, micaceous, moderately hard

1558-1571 Shale, red, in part calcareous, moderately hard; a little siltstone, white, quartzose, slightly calcareous

1571-1584 Shale, same as above; some siltstone, same as above, but calcareous

1584-1600 Shale, red to very light gray, moderately hard; some siltstone, green

1600-1631 No sample

1631-1640 Sandstone, very pale green, very fine grained, subangular, quartzose, green mineral, slightly calcareous

1640-1647 Shale, gray, moderately hard

1647-1650 No sample

1650-1660 Siltstone, white to light-gray, in part very argillaceous, very calcareous; and interbedded shale, light-gray, very calcareous

1660-1690 Shale, same as above; a little interbedded siltstone, same as above

1690-1700 Shale, same as above; and siltstone, same as above, but with fossil fragments and ostracods

1700-1710 Shale, black, carbonaceous, pyritic, calcareous, moderately hard

1710-1720 Shale, light-gray, carbonaceous specks, siderite nodules, soft

1720-1735 No sample

1735-1745 Shale, same as 1710-1720

1745-1750 No sample

1750-1756 Shale, same as 1735-1745; and shale, black, carbonaceous, pyritic

1756-1759 Shale, same as light-gray above; some shale, same as black above

1759-1773 No sample

1773-1784 Shale, light-gray, few siderite nodules

1784-1792 Shale, same as above; and sandstone, white, fine-grained, occasional coarse grain, angular to subangular, quartzose, clean, calcareous

1792-1800 Sandstone, white to light-gray, fine-grained to silt, angular to subangular, quartzose, some argillaceous laminations

1800-1805 Sandstone, same as above, but white, very fine grained; and shale, light-gray, soft

1805-1817 Sandstone, same as above; and shale, same as above

1817-1823 Shale, gray, moderately hard

1823-1845 No sample

1845-1856 Shale, gray to dark-gray, moderately hard

1856-1888 Shale, dark-gray, moderately hard

1888-1898 Shale, same as above, but slightly pyritic and calcareous, in part slightly silty

1898-1914 No sample

1914-1934 Shale, black, silty, pyritic, slightly calcareous

1934-1946 Shale, gray, finely micaceous, in part slightly silty; some siltstone, gray

TOP PRINCETON SANDSTONE 1946

PIPE LINE CONSTRUCTION AND DRILLING COMPANY

2-A F. H. CURTIS WELL

Buchanan County, Virginia
Location: 0.40 miles north of 37° 20',
1.57 miles west of 82° 00'
Ground elevation: 2009.8 Total depth: 6453
Drilling commenced: September 1, 1949
Drilling completed: September 7, 1950
Water: 174-180, 3 BPH
Gas: 1035-1040, show; 1904-1908, show; 2125-2130, show
Oil: 1090-1095, show
Casing record: 13 3/8 at 71, 10 3/4 at 1344, 8 5/8 at 2495
Depth corrections: 2510 = 2495
Samples examined by David G. Bowen, 1958

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

0 - 187 No sample

187 - 193 Sandstone, white, medium- to coarse-grained, subrounded, quartzose, moderately micaceous and chloritic, moderately coaly

193 - 199 Sandstone, gray, fine-grained, subangular, quartzose, feldspathic, very dirty with argillaceous material, mica, and interstitial pyrite

199 - 206 Sandstone, same as 187-193, but with a moderate amount of green grains

206 - 227 Siltstone, gray, quartzose, argillaceous, dirty

227 - 240 Sandstone, light-gray, fine- to very fine grained, subangular, quartzose, feldspathic, micaceous, coaly material, calcareous to slightly calcareous, rather dirty

240 - 280 Siltstone, gray, quartzose, argillaceous, dirty, slightly calcareous

280 - 287 Sandstone, gray, very fine grained, subangular, quartzose, dirty, micaceous, coaly material on bedding surfaces, very slightly calcareous

287 - 296 Shale, gray, silty, micaceous, moderately hard

296 - 326 Sandstone, white, mostly fine-grained but some medium grains and very fine grains, subangular to subrounded, quartzose, feldspathic, moderately micaceous and chloritic, moderate amount of darker minerals, at 312-321 moderate amount of coaly material and trace of light-gray underclay

326 - 332 Shale, gray to dark-gray and carbonaceous, slightly micaceous; a little coal

332 - 337 Sandstone, gray, fine-grained, subangular, quartzose, dirty, argillaceous, micaceous

337 - 400 Sandstone, white, medium-grained with a few coarse grains grading to equal amount of both at 388-400, subangular to subrounded, quartzose, slightly feldspathic, slightly micaceous and chloritic, at 356-365 calcareous to slightly calcareous

400 - 419 Siltstone, dark-gray, quartzose, micaceous, faintly laminated with argillaceous material

419 - 424 Shale, gray to light-gray, finely micaceous, soft, coaly plant fossils; a little underclay; trace of coal

424 - 430 Shale, same as above; and shale, gray, silty, micaceous

430 - 442 Shale, gray, silty, micaceous, moderately hard; some siltstone, gray, quartzose, micaceous at the base

442 - 451 Siltstone, same as above; and underclay, gray, soft, coaly plant fossils; a little coal

451 - 455 Sandstone, very light tan, fine-grained, subangular, quartzose, slightly micaceous, some coaly and argillaceous laminations

455 - 476 Siltstone, gray, quartzose, argillaceous; and shale, gray, soft, coaly plant fossils

476 - 492 Sandstone, white, medium- to fine-grained, subangular to subrounded, quartzose, micaceous, chloritic

492 - 499 Sandstone, same as above, but dirtier and a little darker; some shale, gray

499 - 515 Sandstone, light-gray to light-tannish gray, fine-grained, subangular to subrounded, quartzose, in part slightly feldspathic, micaceous, some argillaceous and coaly

laminations at top, calcareous at bottom

515 - 541 Shale, gray, moderately hard, finely micaceous; laminated with a little siltstone, gray, which grades to fine-grained sandstone at the bottom

541 - 564 Sandstone, light-gray, fine-grained, subangular, quartzose, slightly micaceous and chloritic, slightly glauconitic, at 549-564 coaly material on bedding surfaces; at 549-564 a little interbedded shale, gray, finely micaceous

564 - 574 Sandstone, white, fine-grained, subangular, quartzose, finely micaceous but otherwise clean; and shale, white to faintly pink, soft, slightly silty, siderite nodules

574 - 582 Sandstone, gray, very fine grained to silt, quartzose, moderately micaceous, in part slightly calcareous

582 - 622 Shale, gray, finely micaceous, moderately hard; at the top a little siltstone, gray; at 588-594 no sample

622 - 655 Shale, same as above, but slightly darker, pyrite and pyritized plant fossils at the top; laminated with sandstone, gray to light-gray, fine-grained, subangular, quartzose, slightly feldspathic, rather dirty, grading toward the base to light-tan to white, cleaner, very calcareous

655 - 665 Siltstone, gray, quartzose, argillaceous; and sandstone, light-tan to white, fine-grained, subangular, quartzose, slightly micaceous and chloritic

665 - 694 Shale, gray, finely micaceous; some interbedded sandstone, light-gray, fine-grained, subangular, quartzose, feldspathic, slightly micaceous and chloritic, dirty (sandstone content decreases toward the bottom)

694 - 713 Shale, same as above, but silty

713 - 739 Shale, same as above; and interbedded sandstone, gray, fine-grained, at the base fine- to medium-grained, subangular, quartzose, feldspathic, slightly micaceous and chloritic, dirty

739 - 769 Sandstone, white, coarse- to medium-grained, subrounded to subangular, quartzose, moderately micaceous and chloritic, moderate amount of green grains and dark minerals, at the base in part calcareous

769 - 783 Sandstone, same as above, but in part medium- to fine-grained, at the base dirtier; and shale, gray, micaceous, at the top silty to sandy, slightly pyritic

783 - 789 Sandstone, same as above

789 - 797 Sandstone, white, coarse-grained, subrounded, quartzose, few green grains

797 - 804 Sandstone, same as above; some sandstone, light-tan, medium- to fine-grained, subangular to subrounded, quartzose, calcareous, moderately micaceous and chloritic, moderate amount of green grains

804 - 812 Sandstone, light-tan to light-gray, fine-grained, subangular, quartzose, feldspathic, slightly micaceous, dirty; and shale, gray, micaceous

812 - 821 Shale, gray, micaceous, silty

821 - 835 Sandstone, light-tan to light-gray, very fine grained, quartzose, feldspathic, moderately micaceous, in part calcareous

835 - 843 Shale, gray, finely micaceous, coaly plant fossils; some sandstone, same as above

843 - 863 Shale, same as above

863 - 873 Sandstone, light-gray, fine-grained, subangular, quartzose, slightly feldspathic; and interbedded shale, same as above

873 - 934 Sandstone, gray, very fine grained to silt, subangular to subrounded, quartzose, moderately micaceous, at the top argillaceous cement, in part calcareous; laminated with shale, dark-gray and carbonaceous at the top to gray and micaceous from 889 downward, at the base silty and sandy

934 - 946 Shale, gray, micaceous, moderately hard, at the base very silty

946 - 950 Shale, same as above; and siltstone

950 - 957 Sandstone, light-gray to white, fine-grained, subangular, quartzose, feldspathic, micaceous, calcareous

957 - 991 Shale, gray, finely micaceous, hard; laminated with some

sandstone, light-gray to white, fine-grained to silt, subangular, quartzose, feldspathic, micaceous

991 -1016 Shale, same as above

TOP LEE FORMATION 1016

1016-1028 Sandstone, very light gray, fine- to very fine grained, subrounded, quartzose, micaceous, moderate amount of coaly material

1028-1038 Sandstone, same as above, but some medium grains; some shale, light-gray, very micaceous, moderately hard

1038-1045 Sandstone, same as above, but medium- to coarse-grained; some siltstone, light-gray, quartzose, argillaceous; some shale, dark-gray to light-gray and greasy

1045-1086 Sandstone, white, coarse- to medium-grained in upper two-thirds, balance is medium-grained with some very coarse grains at the bottom, subrounded to subangular, quartzose, slightly micaceous and chloritic, a few green grains, nearly clean

1086-1093 Shale, dark-gray, silty, micaceous

1093-1127 Sandstone, light-reddish gray, fine-grained with a few medium grains, subangular, quartzose, micaceous, interstitial hematite

1127-1147 Sandstone, light-gray, fine- to very fine grained, subangular to subrounded, quartzose, clean, very slightly calcareous near the base

1147-1163 Sandstone, same as above, but laminated with coaly to argillaceous and micaceous material

1163-1177 Shale, dark-gray, sandy to very sandy, micaceous

1177-1185 No sample

1185-1200 Shale, dark-gray, slightly silty, micaceous; at 1192-1200 some underclay, light-gray, pyritic; at 1192-1200 some coal

1200-1206 Sandstone, light-gray to white, medium- to fine-grained, subangular to subrounded, quartzose, slightly micaceous but nearly clean, moderate amount of poorly-developed siderite nodules

1206-1213 Sandstone, same as above; and siltstone, gray, very argillaceous and dirty

1213-1227 Sandstone, white, medium- to coarse-grained with some very coarse to granule-size grains at the bottom, subrounded to subangular, quartzose, slightly micaceous and chloritic, few green grains, calcareous

1227-1235 Shale, gray, in part silty and very micaceous

1235-1238 Sandstone, light-gray, fine- to very fine grained, subangular, quartzose, slightly feldspathic, micaceous, small amount of coaly material, very slightly calcareous

1238-1311 Shale, dark-gray, moderately hard, very finely micaceous

1311-1321 Shale, same as above; some siltstone, very light tan, quartzose, clean

1321-1335 Siltstone, very light tan, quartzose, in part micaceous, moderate amount of poorly-developed siderite nodules, grading downward to off-white and clean

1335-1344 No sample

1344-1375 Sandstone, very light gray to white, very fine grained, subangular, quartzose, nearly clean, at 1355-1367 few laminations of coaly and micaceous shale, very slightly calcareous at the bottom

1375-1382 Sandstone, light-gray, fine- to very fine grained, subangular, quartzose, coal grains, micaceous, chloritic, slightly calcareous

1382-1400 Shale, gray, soft, micaceous, very slightly pyritic, sideritic, at the top in part sandy and silty; and siltstone, gray, quartzose

1400-1441 Shale, dark-gray, moderately hard, carbonaceous, slightly silty; probably a thin coal at 1436-1441

1441-1484 Sandstone, light-gray to white, fine- to very fine grained, subrounded, quartzose, slightly feldspathic, at 1441-1451 an occasional argillaceous lamination; at 1451-1455 some interbedded shale, gray

1484-1492 Sandstone, gray, fine-grained to silt, quartzose, clean; and shale, gray, silty, micaceous

1492-1509 Shale, same as above; and siltstone, gray, quartzose; both pyritic in lower half; at 1500-1509 some coal

1509-1545 Sandstone, white, in upper half medium- to fine-grained, in lower half medium-grained with an occasional coarse to very coarse grain, subangular to subrounded, quartzose, slightly micaceous, few green grains, some dark grains, at the bottom slightly calcareous

1545-1554 Shale, gray and micaceous to dark-gray and carbonaceous, some coaly plant fossils

1554-1578 Sandstone, light-gray, very fine grained to silt, quartzose, slightly feldspathic, slightly micaceous, at the top in part gray and argillaceous, in the lower two-thirds very calcareous

1578-1593 Shale, gray, silty, hard

1593-1597 No sample

1597-1630 Shale, dark-gray, moderately hard, rather carbonaceous, silty; at 1617-1624 interbedded with siltstone, dark-gray, quartzose

1630-1635 Shale, gray, very micaceous, somewhat silty; some sandstone, very light gray, fine- to very fine grained, subangular to subrounded, quartzose, moderately feldspathic, moderately micaceous and chloritic

1635-1687 Sandstone, light-gray to white, fine-grained, subangular to subrounded, quartzose, moderately feldspathic, moderately micaceous and chloritic, small amount of scattered argillaceous material and interstitial bituminous material, at 1679-1687 in part fine- to medium-grained, sideritic, increased amount of mica

1687-1698 Sandstone, white, fine- to medium-grained, subangular to subrounded, quartzose, slightly feldspathic, very slightly micaceous and chloritic, very slightly sideritic, nearly clean

1698-1720 Sandstone, same as above, but mostly medium-grained, some fine grains, a few coarse grains

1720-1732 Sandstone, same as above, but mostly fine-grained, increase in accessory minerals especially chlorite

1732-1737 Sandstone, same as 1698-1720

1737-1752 Sandstone, same as above with an increase of accessory minerals toward the bottom

1752-1768 Sandstone, same as above, but light-gray, medium- to fine-grained, at 1652-1656 in part very fine grained to silt, at the base a small amount of coaly material

1768-1775 Sandstone, same as lower part above, one milky-white quartz pebble fragment; some shale, dark-gray, hard, micaceous, in part carbonaceous

1775-1782 Shale, same as above, but slightly micaceous; a little coal

1782-1808 Siltstone, at the top light-gray grading downward to gray, quartzose, argillaceous, moderately micaceous

1808-1842 Shale, gray, micaceous, rather soft, at the top and bottom silty, in the middle finely pyritic

1842-1852 Shale, gray, silty, micaceous, rather soft; and sandstone, light-tannish gray, very fine grained, subangular to subrounded, quartzose, very slightly feldspathic and micaceous, nearly clean

1852-1860 Shale, same as above, but moderately hard

1860-1867 Shale, tannish-gray, underclay; some shale, same as above

1867-1891 Shale, gray, silty, micaceous; and interbedded sandstone, light-tannish gray, very fine grained to silt, subangular to subrounded, quartzose, very slightly feldspathic and micaceous, nearly clean (shale content decreases to 25% toward the bottom)

1891-1898 Sandstone, white, coarse-grained, moderate amount of pebble fragments of milky-white quartz, subangular, quartzose, clean

1898-1903 Same as 1867-1891 (sample may be out of place)

1903-1914 Sandstone, white, medium-grained, some coarse grains and fine grains, subangular to subrounded, quartzose, clean

1914-1942 Sandstone, same as above, but fine-grained except for a few coarse grains at 1925-1931

1942-1957 Sandstone, same as above, but medium- to fine-grained with

some coarse grains, some fragments of milky-white quartz pebbles

1957-1977 Sandstone, same as above, but medium- to coarse-grained, no pebble fragments except at 1957-1961 and 1967-1972

1977-1981 No sample

1981-1985 Sandstone, same as 1957-1977, but medium- to fine-grained, no pebble fragments

1985-1992 No sample

1992-2033 Sandstone, white, coarse- to medium- to fine-grained in varying amounts throughout, subangular to subrounded, quartzose, clean, at 2000-2003 and 2016-2031 some pebble fragments, at 2013-2016 large amount of pebble fragments including one whole pebble 6 m.m. x 4 m.m. x 4 m.m.

2033-2047 Sandstone, white to light-gray, medium- to fine-grained, subangular to subrounded, quartzose, occasional pebble fragment, slightly micaceous and chloritic, at the bottom a small amount of coaly material

2047-2055 Shale, light-tannish gray, underclay, moderately hard, coaly plant fossils; some siltstone, light-tannish gray, quartzose, clean; a little coal

2055-2060 Coal

2060-2089 Sandstone, light-gray but at the top white to light-tan, fine-grained, in the middle and at the bottom some medium grains, subangular, quartzose, slightly micaceous and chloritic, rather dirty in the lower half, at 2079-2082 a few argillaceous laminations

2089-2103 Shale, gray to dark-gray, hard, in part finely micaceous, many coaly plant fossils

2103-2108 Shale, rather light-gray, in part with an olive cast, soft to moderately hard; and siltstone, light-gray, quartzose, micaceous

2108-2136 Shale, gray, slightly silty in the lower two-thirds, micaceous, siderite nodules, hard to moderately hard; interbedded in the lower two-thirds with a little siltstone, gray, quartzose

2136-2148 Sandstone, white, fine- to very fine grained, subangular to subrounded, quartzose, very slightly feldspathic; a little coal (probably overlies the sandstone)

2148-2263 Sandstone, same as above, but mostly fine-grained, at 2221-2226 a few medium to coarse grains, at 2216-2221 and 2258-2263 occasional quartz pebble fragments, at 2242-2252 very calcareous

2263-2274 Sandstone, white, fine- to coarse-grained, subangular to subrounded, quartzose, very slightly feldspathic, clean

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 2274

2274-2280 Shale, light-olive gray, claystone, moderately hard to soft

2280-2284 Shale, pale-green; a little siltstone, light-gray, quartzose

2284-2300 Shale, pale-green to light-olive gray to maroon to red, in part very calcareous

2300-2307 Shale, same as above, but no maroon; a little siltstone, light-green, quartzose, calcareous

2307-2323 Shale, pale-green to brick-red, silty; a little sandstone, white, fine-grained, angular to subangular, quartzose, clean, calcareous; at 2317-2323 some siltstone, dusty-red, quartzose

2323-2337 Siltstone, olive-gray to dusty-red, quartzose, rather argillaceous; in the lower half some shale, brick-red

2337-2352 Shale, gray, silty, hard

2352-2358 Limestone, gray, argillaceous, fossiliferous; some shale, same as above

2358-2387 Siltstone, white to very pale green, quartzose

2387-2408 Siltstone, pale-green to light-gray, quartzose, very slightly calcareous

2408-2423 Siltstone, light-gray, quartzose, argillaceous laminations, very slightly calcareous

2423-2435 Siltstone, light-tan, quartzose, coaly to argillaceous laminations, very slightly calcareous

2435-2453 Siltstone, same as above, but not laminated

2453-2460 Siltstone, light-tan to gray, quartzose, very slightly calcareous; and shale, dark-gray, carbonaceous, moderately hard

2460-2507 Shale, same as above, scattered very fine pyrite in the lower three-fourths

2507-2545 Shale, same as above; some interbedded sandstone, white, fine-grained, angular, quartzose, clean except for a little pyrite, calcareous; at 2515-2545 shale is not carbonaceous and sandstone is only slightly calcareous

2545-2562 Shale, gray; and interbedded siltstone, gray, quartzose

2562-2569 Shale, gray; interbedded with a little siltstone, same as above

2569-2577 Shale, gray; interbedded with some siltstone, same as above, but slightly pyritic

TOP PRINCETON SANDSTONE 2577

## PIPE LINE CONSTRUCTION AND DRILLING COMPANY

### 1 L. MAUDE FUGATE WELL

Buchanan County, Virginia
Location: 0.10 miles east of 81° 55',
1.80 miles south of 37° 15'
Ground elevation: 2288.25 Total depth: 6658
Drilling commenced: June 30, 1950
Drilling completed: March 7, 1951
Water: None
Gas: None
Oil: None
Casing record: 13 3/8 at 13, 10 3/4 at 703, 8 5/8 at 2567, 7 at 4018
Depth corrections: None

POST-LEE FORMATION BEDS (PENNSYLVANIAN) UNDIVIDED

| | |
|---|---|
| 0 - 25 | "Clay" |
| 25 - 38 | "Soap stone" |
| 38 - 135 | "Slate" |
| 135 - 150 | "Lime" |
| 150 - 153 | "Coal" |
| 153 - 262 | "Sand" |
| 262 - 265 | "Lime, black" |
| 265 - 267 | "Coal" |
| 267 - 383 | "Sand" |
| 383 - 426 | "Slate" |
| 426 - 500 | "Lime" |
| 500 - 520 | "Sand" |
| 520 - 524 | "Coal" |
| 524 - 595 | "Sand" |
| 595 - 619 | "Slate and shells" |

619 - 629 "Lime, black"

629 - 635 "Slate"

635 - 667 "Sand"

667 - 728 "Lime, black"

TOP LEE FORMATION 728

728 - 820 "Sand"

820 - 870 "Lime"

870 - 885 "Slate and shells"

885 - 906 "Lime"

906 - 945 "Lime, gritty"

945 - 970 "Slate and shells"

970 - 985 "Lime, black"

985 -1005 "Lime, gray"

1005-1013 "Coal"

1013-1047 "Slate and shells"

1047-1108 "Lime, black"

1108-1175 "Sand"

1175-1275 "Slate and shells"

1275-1300 "Sand"

1300-1325 "Lime"

1325-1427 "Sand"

1427-1431 "Slate"

1431-1455 "Sand"

1455-1501 "Slate and shells"

1501-1521 "Lime, gritty"

1521-1560 "Sand"

1560-1600 "Slate and shells"

1600-1610 "Sand"

1610-1615 "Slate break"

1615-1630 "Lime, black"

1630-1735 "Slate and shells"

1735-1740 "Coal"

1740-1755 "Sand"

1755-1790 "Lime, black"

1790-1805 "Sand"

1805-1808 "Slate"

1808-1830 "Lime, gray"

1830-1862 "Sand"

1862-1872 "Slate"

1872-1875 "Coal"

1875-1890 "Lime, black, gritty"

1890-1910 "Sand"

1910-1915 "Slate"

1915-1920 "Lime, gray"

1920-1970 "Sand"

1970-2000 "Lime, black"

2000-2018 "Sand"

2018-2030 "Slate and shells"

2030-2045 "Sand"

2045-2066 "Lime, gray"

2066-2170 "Sand"

2170-2172 "Slate break"

2172-2217 "Sand"

TOP BLUESTONE FORMATION (MISSISSIPPIAN) 2217

2217-2220 "Lime, gray"

2220-2225 "Red rock"

2225-2263 "Lime, gray"

2263-2360 "Sand"

2360-2467 "Lime, black"

2467-2500 "Slate and shells"

2500-2525 "Lime, hard"

2525-2543 "Sand"

2543-2563 "Slate and shells"

2563-2608 "Lime"

2608-2630 "Lime, red"

2630-2655 "Lime, black, hard"

2655-2678 "Lime, gray"

TOP PRINCETON SANDSTONE 2678

# SUBSURFACE STUDY OF THE LEE FORMATION IN BUCHANAN COUNTY, VIRGINIA


## ABSTRACT

Buchanan County, located in southwest Virginia at the eastern margin of the Appalachian Plateau, is underlain by gently dipping Pennsylvanian formations. The lowest Pennsylvanian Lee Formation is exposed in an area of only 0.3 of a square mile, but information on its character and thickness has been obtained from wells drilled primarily for natural gas. Two members of the Lee are recognized informally. The lower member containing the Pocahontas coals and distinguished by a predominance of conglomerate and orthoquartzitic sandstone may be the approximate equivalent of the Pocahontas Group of West Virginia. The upper member is characterized by "dirty" sandstone, siltstone, shale, and coal and a lack of conglomerate and orthoquartzitic sandstone.

Subsurface data indicate that rocks of Devonian and Early and Middle Mississippian age were deposited in a stable shelf environment, an environment dissimilar to that of the Lee Formation consisting predominantly of continental beds. Published regional surface data supported by lithologic analysis and isopach mapping of the present report indicate that post-Mississippian pre-Pennsylvanian time in Buchanan County was a time of emergence and erosion. During this time, basin-like topographic depressions were developed in southeastern and northwestern Buchanan County separated by a low northeast-southwest trending

ridge in central Buchanan County coincident with the present axis of the Grapevine Branch Anticline.

Initial subsidence of the post-Mississippian surface probably accompanied a rising Blue Ridge igneous and metamorphic terrain, the probable source of the Lee clastics, southeast of Buchanan County. Initial subsidence invited a southeastward transgression of the Lee sea which is believed to have advanced as far southeast as central Buchanan County where it probably was halted initially by the low topographic ridge coincident with the present-day Grapevine Branch Anticline. Subsequent southeast advances were impeded by the rapid filling of southeastern Buchanan County with continental sediments, and the southeastern margin of the marine environment remained essentially static throughout lower member time. Inference of a marine environment and its extent is based on the marine aspect of the orthoquartzite as contrasted with the continental aspect of the "dirty" sandstones and associated shales of the formation.

Isopach maps suggest that deposition in Buchanan County during Lee time was controlled predominantly by the character of local subsidence. It is inferred from the maps that during lower member time Buchanan County subsided essentially as two blocks. Southeastern Buchanan County subsided differentially toward the southeast and the block was hinged along a line coincident with the present-day Grapevine Branch Anticline in the central part of the county. Simultaneously, northwestern Buchanan County foundered almost vertically with only a slight component of southeastward tilt. As a result, continental

deposition was localized in southeastern Buchanan County while marine conditions prevailed in northwestern Buchanan County.

Failure of the central Buchanan County hinge at the end of lower member time was followed by general differential subsidence during which the county acted as a single unit and subsided toward the southeast in a manner analogous to the subsidence of southeastern Buchanan County during lower member time. A new hinge-line which functioned throughout upper member time is believed to have been located along the northwestern border of the county as indicated by the present distribution of orthoquartzite in the upper member.

# BUCHANAN COUNTY, VIRGINIA

## STRUCTURE

TOP OF THE

## GRAY SHALE MEMBER

OF THE

## BLUESTONE FORMATION

CONTOUR INTERVAL : 100 FEET

● GEOLOGIST'S DESCRIPTION ○ DRILLER'S LOG

1 0 1 2 3 4 Miles

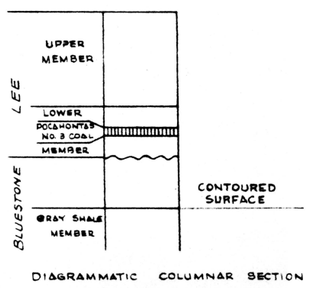
BASE MAP TAKEN FROM PLATE I (TOPOGRAPHIC MAP OF BUCHANAN CO. VIRGINIA) OF VIRGINIA GEOLOGICAL SURVEY BULLETIN 18

GEOLOGY BY DAVID G. BOWEN 1960

NORTH

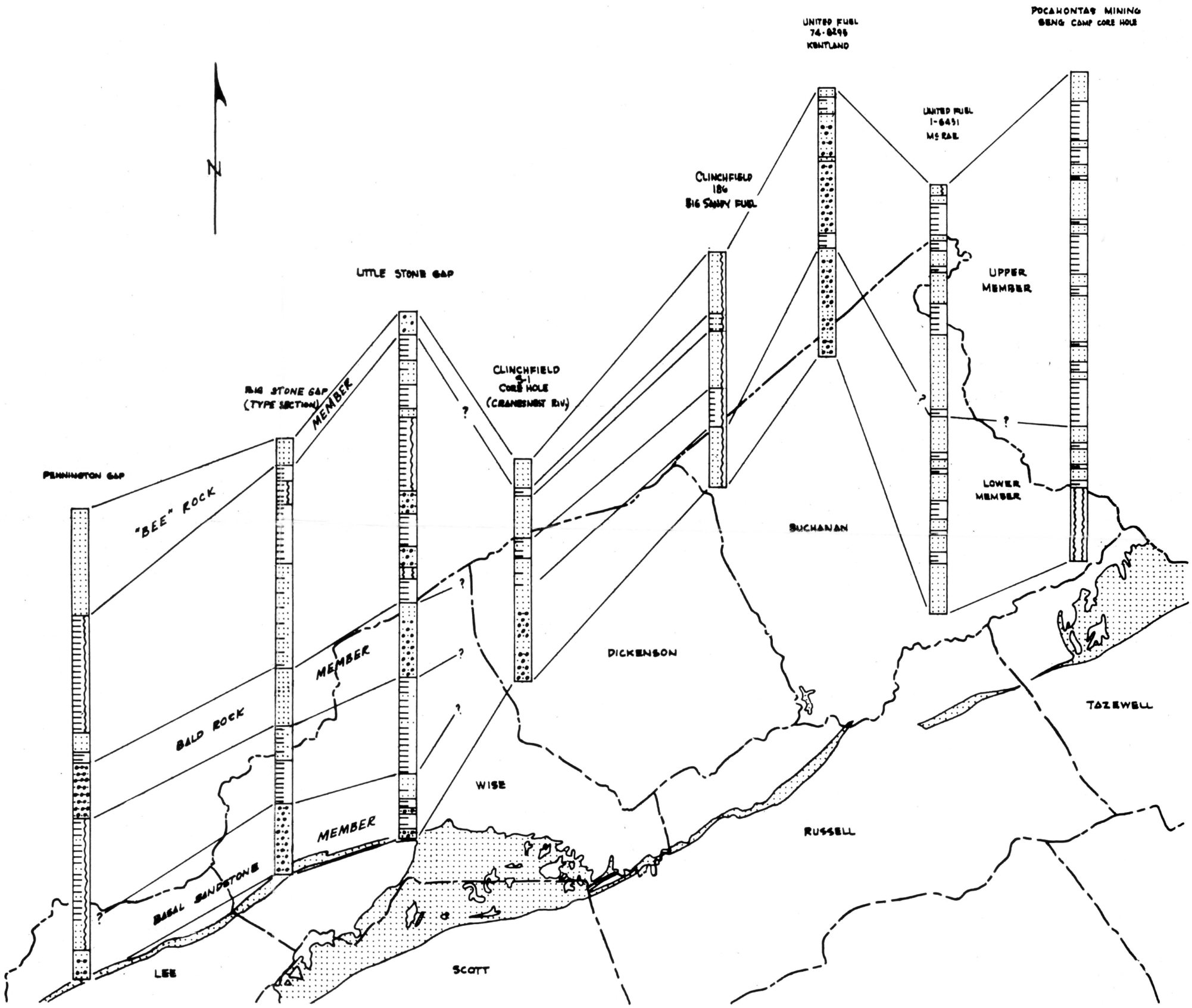
MAGNETIC TRUE

APPROXIMATE MEAN DECLINATION 2° 1950




DIAGRAMMATIC COLUMNAR SECTION

PLATE I




SOURCE OF PUBLISHED DATA

PENNINGTON GAP: EBY (1923, P. 28)
LITTLE STONE GAP: EBY (1923, P. 99)
CLINCHFIELD S-1 CORE HOLE: EBY (1923, P. 111-114)
POCAHONTAS MINING SEBG CAMP CORE HOLE: MILLER (1918, P. 18-16)
OUTCROP DISTRIBUTION OF THE LEE: BUTTS (1933)
BASE MAP: BUTTS (1933)
BIG STONE GAP: EBY (1923, P. 96)

LOCATION OF SECTION OR WELL IS AT THE CENTER OF THE COLUMN BASE.

OUTCROP DISTRIBUTION OF THE LEE FORMATION IS INDICATED BY STIPPLING

# FENCE DIAGRAM

# CORRELATION AND OUTCROP DISTRIBUTION OF THE LEE FORMATION IN SOUTHWEST VIRGINIA

BY
DAVID G. BOWEN
1960

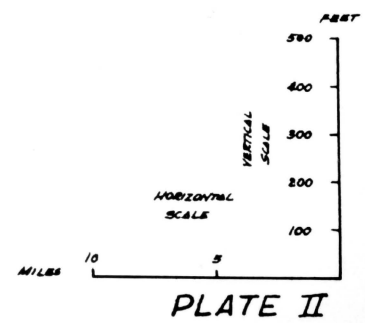



PLATE II

NORTHWEST

# A

# A'

SOUTHEAST

UNITED FUEL GAS CO
74-8295 KENTLAND COAL & COKE CO.

PIPE LINE CONSTR. & DRLG CO.
2-A CURTIS

UNITED PRODUCING CO
1-1601 MATNEY

UNITED PRODUCING CO.
1-1454 YUKON-POCAHONTAS COAL CO.

UNITED PRODUCING CO.
5-1647
YUKON-POCAHONTAS COAL CO.

UNITED PRODUCING CO
8-1673
YUK-POCA. COAL CO.

UNITED FUEL GAS CO.
1-6431 MS RAE

POST-LEE BEDS UNDIVIDED

LEE FORMATION

BLUESTONE FORMATION

GAMMA RAY

NEUTRON

MIDDLE SEABOARD (?) COAL

LOWER SEABOARD (?) COAL

TOP LOWER MEMBER OF LEE FORMATION

POCAHONTAS NO. 3 COAL

BETA COLORED ZONE

ALPHA COLORED ZONE

DEPTH CORRECTION

TOP GRAY SHALE MEMBER OF BLUESTONE FORMATION

Qal

## EXPLANATION

- CONGLOMERATE
- CONGLOMERATIC SANDSTONE
- SANDSTONE
- SILTSTONE
- SHALE, LIGHT
- SHALE, MEDIUM
- SHALE, DARK
- COAL
- LIMESTONE
- CARBONACEOUS
- COALY
- SILTY
- NO SAMPLE
- NO SAMPLE, INTERPRETED FROM DRILLER'S LOG
- BROWN
- RED
- ORANGE
- GREEN

BEDS OF UNDEMOTED COLOR ARE SHADES OF GRAY

NUMBER ON RIGHT SIDE OF WELL INDICATES DEPTH TO TOP OF ASSOCIATED BED

NUMBER ON LEFT SIDE OF WELL SHOWS DEPTH OF WELL IN UNIFORM INCREMENTS

WENTWORTH GRAIN SIZE: VERY FINE, FINE, MEDIUM, COARSE

ORTHOQUARTZITE

# CROSS-SECTION A-A'

# STRATIGRAPHIC SECTION OF THE LEE FORMATION IN BUCHANAN COUNTY, VIRGINIA

BY

DAVID G. BOWEN

1960

PLATE III

VERTICAL EXAGGERATION IS APPROXIMATELY 52.8X

HORIZONTAL SCALE

MILES 5 4 3 2 1

VERTICAL SCALE

FEET 500 400 300 200 100

# BUCHANAN COUNTY, VIRGINIA

## ISOPACH
## BASE OF LEE FORMATION
TO
## TOP OF GRAY SHALE MEMBER
OF THE
## BLUESTONE FORMATION

CONTOUR INTERVAL: 100 FEET

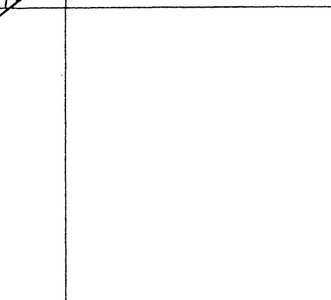
● GEOLOGIST'S DESCRIPTION  ○ DRILLER'S LOG

BASE MAP TAKEN FROM PLATE I (TOPOGRAPHIC MAP OF BUCHANAN CO. VIRGINIA) OF VIRGINIA GEOLOGICAL SURVEY BULLETIN 18

GEOLOGY BY DAVID G. BOWEN 1960

NORTH
MAGNETIC
TRUE

APPROXIMATE MEAN DECLINATION 1950 2°




DIAGRAMMATIC COLUMNAR SECTION

PLATE IV

# BUCHANAN COUNTY, VIRGINIA

## ISOPACH
## TOP POCAHONTAS NO.3 COAL
TO
## TOP GRAY SHALE MEMBER
OF THE
## BLUESTONE FORMATION

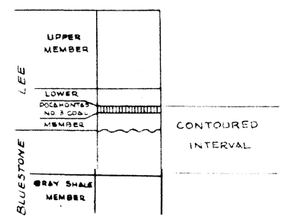
CONTOUR INTERVAL: 100 FEET

● GEOLOGIST'S DESCRIPTION ○ DRILLER'S LOG

BASE MAP TAKEN FROM PLATE 1 (TOPOGRAPHIC MAP OF BUCHANAN CO. VIRGINIA) OF VIRGINIA GEOLOGICAL SURVEY BULLETIN 18

GEOLOGY BY DAVID G. BOWEN 1980

NORTH
MAGNETIC
TRUE




MINGO COUNTY, WEST VIRGINIA
PIKE COUNTY, KENTUCKY
DICKENSON COUNTY
MCDOWELL COUNTY, WEST VIRGINIA
TAZEWELL COUNTY
RUSSELL COUNTY

U.F.G. 1-6416 ● NAT'L SHAWMUT 341 F
U.F.G. 8415 ○ NAT'L SHAWMUT
CABOT 1-851 ○ NAT'L SHAWMUT
U.F.G. 74-8299 ● KENTLAND 339
U.F.G. 2-5810 ○ NAT'L SHAWMUT
PIPE LINE 2-A ● CURTIS 402
U.P. 4-2632 ○ CLINCHFIELD 500?
U.P. 2-1725 ○ MATNEY 567
U.P. 11-2482 ○ ROGERS 514
U.P. 10-2381 ○ ROGERS
CLINCHFIELD 186 ○ BIG SANDY
CLINCHFIELD 181 ○ BIG SANDY
CLINCHFIELD 172 ○ BIG SANDY
U.P. 1-1601 ● MATNEY 482
PIPE LINE 1 ○ EUSTON 492
U.P. 15-1930 ○ YUK-POCA 490
U.P. 14-1907 ○ YUK-POCA
PIPE LINE 1-B ● CURTIS 424
U.P. 2-1558 ○ SLOCUM 452
PIPE LINE 1 ● CARLSON 406
U.P. 1-1784 ○ POCA MINING
CLINCHFIELD 154 ○ DEEL
U.P. 1-1454 ● YUK-POCA 492
U.P. 6-1671 ● YUK-POCA 534
U.P. 7-1672 ● YUK-POCA 537
U.P. 1-1724 ○ MCNEIL 510
PIPE LINE 1 ○ FUGATE 488
U.P. 5-1647 ● YUK-POCA 481
U.P. 12-1912 ○ YUK-POCA 500
U.F.G. 6705 ● NEW RIVER-POCA 672
U.P. 1-2177 ○ COMBS AND POBST 521
U.P. 9-1674 ○ YUK-POCA
U.P. 8-1673 ● YUK-POCA 480
U.P. 17-1952 ○ YUK-POCA 539
POCA. MINING SENG CAMP ○ CORE HOLE
CLINCHFIELD 102 ● CLINCHFIELD 582
2-1466 U.P. YUK-POCA 508
U.F.G. 1-8481 ● MCRAE 479
PENN-OHIO 1-272 ● CLINCHFIELD 580

A — A'

37°30' 37°25' 37°20' 37°15' 37°10' 37°05' 37°00'
82° 15' 82° 10' 82° 05' 82° 00' 81°-55°

# BUCHANAN COUNTY, VIRGINIA

## ISOPACH

## TOTAL LEE FORMATION

CONTOUR INTERVAL : 100 FEET

● GEOLOGIST'S DESCRIPTION ○ DRILLER'S LOG

0 1 2 3 4 Miles

BASE MAP TAKEN FROM PLATE I (TOPOGRAPHIC MAP OF BUCHANAN CO. VIRGINIA) OF VIRGINIA GEOLOGICAL SURVEY BULLETIN 18

GEOLOGY BY DAVID G. BOWEN 1960

NORTH

MAGNETIC

TRUE

APPROXIMATE MEAN DECLINATION 2° 1950

LEE

UPPER MEMBER

LOWER POCAHONTAS NO. 3 COAL MEMBER

CONTOURED INTERVAL

BLUESTONE

GRAY SHALE MEMBER

DIAGRAMMATIC COLUMNAR SECTION

PLATE VI

# BUCHANAN COUNTY, VIRGINIA

## SAND/ SHALE RATIO
## LEE FORMATION

CONTOUR INTERVAL : 1

20(S) : RATIO (NUMBER OF SANDSTONE BEDS)

THE TERM "SHALE" AS USED HERE
ALSO INCLUDES SILTSTONE AND COAL

● GEOLOGIST'S DESCRIPTION ○ DRILLER'S LOG

0 1 2 3 4 MILES

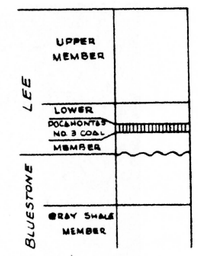
BASE MAP TAKEN FROM PLATE I (TOPOGRAPHIC MAP OF BUCHANAN CO. VIRGINIA) OF VIRGINIA GEOLOGICAL SURVEY BULLETIN 18

GEOLOGY BY DAVID G. BOWEN 1960

NORTH

MAGNETIC TRUE

APPROXIMATE MEAN DECLINATION 2° 1950




DIAGRAMMATIC COLUMNAR SECTION

PLATE VII

# BUCHANAN COUNTY, VIRGINIA

## ISOPACH
## ORTHOQUARTZITE
## LEE FORMATION

CONTOUR INTERVAL : 100 FEET

100 (50) : TOTAL THICKNESS (THICKNESS IN UPPER MEMBER)

● GEOLOGIST'S DESCRIPTION ○ DRILLER'S LOG

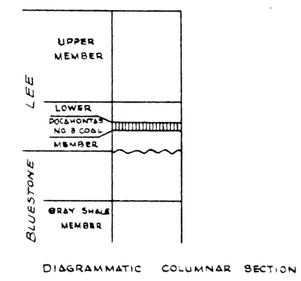
BASE MAP TAKEN FROM PLATE I (TOPOGRAPHIC MAP OF BUCHANAN CO. VIRGINIA) OF VIRGINIA GEOLOGICAL SURVEY BULLETIN 18

GEOLOGY BY DAVID B. BOWEN 1960

NORTH

MAGNETIC TRUE

APPROXIMATE MEAN DECLINATION 2° 1950




DIAGRAMMATIC COLUMNAR SECTION

PLATE VIII

# BUCHANAN COUNTY, VIRGINIA

## ISOPACH
## CONGLOMERATE AND CONGLOMERATIC SANDSTONE
## LEE FORMATION

CONTOUR INTERVAL: 100 FT.

● GEOLOGIST'S DESCRIPTION  ○ DRILLER'S LOG

BASE MAP TAKEN FROM PLATE I (TOPOGRAPHIC MAP OF BUCHANAN CO. VIRGINIA) OF VIRGINIA GEOLOGICAL SURVEY BULLETIN 18

GEOLOGY BY DAVID G. BOWEN 1960

NORTH

MAGNETIC TRUE

APPROXIMATE MEAN DECLINATION 2° 1950

DIAGRAMMATIC COLUMNAR SECTION

LEE
- UPPER MEMBER
- LOWER
- POCAHONTAS NO 3 COAL
- MEMBER

BLUESTONE
- GRAY SHALE MEMBER

PLATE IX

# BUCHANAN COUNTY, VIRGINIA

## ISOPACH
## TOP POCAHONTAS NO. 3 COAL
TO
## BASE LEE FORMATION

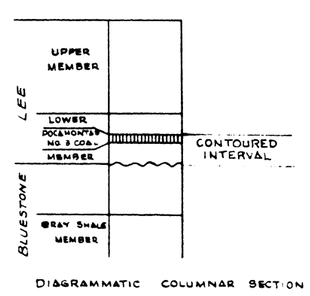
CONTOUR INTERVAL: 100 FEET

● GEOLOGIST'S DESCRIPTION ○ DRILLER'S LOG

BASE MAP TAKEN FROM PLATE I (TOPOGRAPHIC MAP OF BUCHANAN CO. VIRGINIA) OF VIRGINIA GEOLOGICAL SURVEY BULLETIN 18

GEOLOGY BY DAVID G. BOWEN 1960

NORTH
MAGNETIC
TRUE
APPROXIMATE MEAN DECLINATION 2° 1950



DIAGRAMMATIC COLUMNAR SECTION

PLATE X

# BUCHANAN COUNTY, VIRGINIA

## ISOPACH
## TOP LEE FORMATION
TO
## TOP POCAHONTAS NUMBER 3 COAL

CONTOUR INTERVAL: 100 FEET

● GEOLOGIST'S DESCRIPTION  ○ DRILLER'S LOG

0 1 2 3 4 MILES

BASE MAP TAKEN FROM PLATE I (TOPOGRAPHIC MAP OF BUCHANAN CO. VIRGINIA) OF VIRGINIA GEOLOGICAL SURVEY BULLETIN 18

GEOLOGY BY DAVID G. BOWEN 1960

81°-55°

NORTH
MAGNETIC
TRUE

LEE
UPPER MEMBER
LOWER POCAHONTAS NO 3 COAL MEMBER
BLUESTONE
GRAY SHALE
CONTOURED INTERVAL

MINGO COUNTY, WEST VIRGINIA
PIKE COUNTY, KENTUCKY
DICKENSON COUNTY
MCDOWELL COUNTY WEST VIRGINIA
TAZEWELL COUNTY
RUSSELL COUNTY

800
900
1000
1100
1200
1300

AXIS OF THICKENING
AXIS OF THINNING

A
A'

U.F.G. 1-6416 ● NAT'L SHAWMUT 714?
U.F.G. 8415 ● NAT'L SHAWMUT 748
CABOT 1-851 ○ NAT'L SHAWMUT
U.F.G. 74-8295 ● KENTLAND 748
U.F.G. 2-5810 ○ NAT'L SHAWMUT
PIPE LINE 2-B ● CURTIS 1039
U.P. 4-2632 ● CLINCHFIELD 1129
U.P. 2-4725 ○ MATNEY 925
U.P. 11-2482 ○ ROGERS 1049
U.P. 10-2381 ○ ROGERS 1130
U.P. 1-1601 ● MATNEY 1109
PIPE LINE 1 ○ EUSTON 974
U.P. 14-1907 ○ YUK-POCA
U.P. 19-1930 ○ YUK-POCA 974
PIPE LINE 1-B ● CURTIS 1080
U.P. 2-1980 ○ SLOCUM 1097
PIPE LINE 1 ● CARLOS 1092
U.P. 1-1784 ○ POCA. MINING
CLINCHFIELD 186 ○ BIG SANDY
CLINCHFIELD 181 ○ BIG SANDY
CLINCHFIELD 172 ○ BIG SANDY
CLINCHFIELD 154 ○ DEEL
U.P. 1-1454 ● YUK-POCA 1007
U.P. 6-1671 ● YUK-POCA 1096
U.P. 7-1672 ● YUK-POCA 1111
U.P. 5-1647 ● YUK-POCA 1094
U.P. 12-1812 ○ YUK-POCA 1079
U.P. 1-1724 ○ MCNEIL 1220?
PIPE LINE 1 ○ FUGATE 1144
U.F.G. 6705 ○ NEW RIVER - POCA 1321
POCA. MINING SEMG CAMP ○ CORE HOLE 1394
U.P. 1-2177 ○ COMBS AND POBST 984
U.P. 9-1674 ○ YUK-POCA 1105
U.P. 8-1673 ● YUK-POCA 1140
U.P. 17-1952 ○ YUK-POCA
U.P. 2-1486 ● YUK-POCA 1139
U.F.G. 1-8431 ● MCRAE 1170
CLINCHFIELD 102 ● CLINCHFIELD 958
PENN-OHIO 1-272 ○ CLINCHFIELD

37°30'
37°25'
37°20'
37°15'
37°10'
37°05'
37°00'
82° 15'
82° 10'
82° 05'
82° 00'